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Multinational Transfer Pricing, Tax Arbitrage and the Arm's Length Principle*

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Abstract

This paper studies the multinational firm's choice of transfer prices when the firm uses separate transfer prices for tax and managerial incentive purposes, and when there is penalty for non-compliance with the arm's length principle. The optimal incentive transfer price is shown to be the weighted average of marginal cost and the optimal tax transfer price plus an adjustment by a fraction of the marginal penalty for non-arm's length pricing. Insofar as the tax rates are different in different jurisdictions, the firm optimally trades off the benefits of tax arbitrage against the penalty for non-arm's length pricing. Such a tradeoff leads the optimal tax transfer price to deviate from the arm's length price. In the special, but unlikely, case where the tax rates are the same and the arm's length price is equal to marginal cost, the optimal incentive price is equal to marginal cost.

Key words: Multinational transfer pricing, arm's length principle.

JEL Classification: H26, H73, H87.

1. Introduction

Transfer prices govern transactions among divisions of a firm. For firms operating in a single tax jurisdiction, transfer prices mainly serve the purpose of tracking internal transactions and allocating costs to different activities, partly based on which to provide incentives to divisional managers. Standard economic theory tells us that such transactions should be conducted at marginal cost (Hirshleifer, 1956; Milgrom and Roberts, 1992). Such a marginal cost rule will eliminate any inefficiencies arising from double marginalization. Should the same logic apply to multinational firms operating in several different tax jurisdictions and there are opportunities for tax arbitrage? If not, how should the marginal cost rule be modified? The main purpose of this paper is to answer these questions.

For multinational firms with affiliates operating in different tax jurisdictions, transfer prices serve more than tracking internal transactions for managerial accounting purpose. They also determine tax liability of affiliates in different countries, hence the overall tax liability of the multinational enterprise. For a single transfer price to do this 'double duty' can distort internal transactions. Consider, for example, a multinational with an affiliate in country B purchasing goods from an affiliate in country A. If the tax rate in country A is lower than the tax rate in country B, the multinational will have incentives to set a high transfer price to shift profits from country B to country A. However this can distort the purchase decision of the affiliate in country B. Should the same transfer price be used for incentive purposes, the affiliate in country B would purchase less than is optimal for the multinational as a whole. In short, there are difficulties using the single transfer price to coordinate both tax accounting and cost accounting policies.

Aware of this problem, a growing number of multinational firms use two different transfer prices, one for internal managerial purposes and another for tax purposes. For example, Springsteel (1999) reports an AnswerThink survey that, among a select group of large companies surveyed, 77% of the firms use separate reporting systems for tracking internal pricing information and for tax reporting purposes.[(1)] Should multinational firms adopt such a process of 'delinking' tax-based transfer pricing, would the marginal cost rule hold for transfer prices for internal transactions? The answer is more complex than it might look. For one

[(1)] There is nothing illegal about using two transfer prices in the US and many other countries. However, a typically expressed concern is that tax authorities may be antagonistic towards such practice and firms may have to produce internal accounting numbers, should tax disputes arise.

thing, transfer prices reported for tax purposes do affect the relevant affiliate's after-tax profits, hence its incentives. Moreover many tax authorities are becoming more and more stringent in enforcing transfer pricing regulations as the transactions within multinationals grow at an alarming rate, along with tax disputes that involve transfer prices.(2) Anomalies in transfer pricing reports can be scrutinized and may result in hefty penalties. Some of the highly publicized cases include DHL vs. Commissioner of Internal Revenue, and the on-going dispute between GlaxoSmithKline and IRS.

What do all these mean for multinationals in their choice of transfer prices? In choosing a transfer price for tax purposes, they need to consider not only its tax implications inclusive of any penalty that might be charged, but also its effect on the incentives of relevant affiliates through changes in their after-tax profits. Likewise, a transfer price for internal managerial purposes not only affects the incentives of relevant affiliates but also, through changing the incentives, indirectly affects the tax liability and possible penalty for the multinational as a whole. In short, 'delinking' of the two transfer prices is only in names: they are closely related and should not be literally 'delinked'. That said, it seems reasonable to expect that the transfer price for internal managerial purposes would not equal marginal cost in general. After describing the basic model in the following section, we formalize this claim by deriving the expressions for the optimal transfer prices in section 3.

Before closing the introductory section, we briefly review the relevant literature. Most studies in accounting and economics focus either on incentive implications of transfer prices (e.g., Amershi and Cheng, 1990; Holmström and Tirole, 1991; Anctil and Dutta, 1999), or on tax implications (e.g., Gordon and Wilson, 1986; Kant, 1990; Goolsbee and Maydew, 2000). Some of the studies that account for both aspects include Halperin and Srinidhi (1991), Sansing (1999), and Smith (2002). However all the above studies assume that the firm uses a single transfer price. Two recent studies explicitly model the multinational's problem when the two transfer prices are delinked. Hyde and Choe (2003) analyze the relationship between the two transfer prices and provide their comparative statics properties with respect to changes in tax and cost environments. But they do not explicitly derive the optimal transfer prices. Baldenius, Melumad and Reichelstein (2004) show how the cost-based optimal

(2) According to UNCTAD, 60% of global trade is within multinationals by the late 1990s. A US Senate report in 2001 claimed that multinationals evaded up to $45 billion in American taxes in 2000, including a firm selling toothbrushes between subsidiaries for $5,655 each (*The Economist*, Jan. 1 - Feb. 6, 2004, pp 65-66).

incentive transfer price can be expressed in terms of the marginal cost of production and other tax parameters. But their analysis is based on the assumption that the firm complies with transfer price regulation, hence non-compliance penalty is ruled out by assumption. As a result, the choice of tax transfer price becomes trivial. In a sense, we extend Baldenius et al. to the case where compliance is also the firm's choice variable, and show that their optimal incentive transfer price is a special case of ours. Moreover we also show how the optimal tax transfer price needs to be adjusted in the presence of non-compliance penalty, which again necessitates an adjustment in the optimal incentive transfer price. In this sense, the two transfer prices are closely related. For more discussions and institutional details relevant for transfer pricing, readers are referred to either Baldenius et al. or Hyde and Choe, and the references therein.

2. The Model

We closely follow the model used in Hyde and Choe (2003). Consider a multinational enterprise (MNE) comprising two affiliates. Affiliate A produces and sells quantity q_A in country A. Affiliate B buys quantity q_B from affiliate A for sale in country B. For simplicity, we assume that affiliate A does not purchase from affiliate B. Affiliate A produces at constant marginal cost c, hence its cost function is given by $c(q_A + q_B)$. Affiliate B's only cost is that from purchasing q_B from affiliate A. Thus if the purchase price is s per unit, called the *incentive transfer price*, then its total cost is sq_B. Any additional cost affiliate B incurs in selling q_B can be incorporated in a straightforward way. Affiliate i's $(i = A, B)$ total revenue in country i is denoted by $R_i(q_i)$, which satisfies $R_i'(q_i) \geq 0$ and $R_i''(q_i) < 0$. With decreasing marginal revenue and linear cost, relevant profit functions are concave in quantity.

The tax rate in country i is given by $\tau_i,\ i = A, B$. To fix the idea, we assume $\tau_A < \tau_B$. We further assume that taxable income in each country is calculated based on the separate entity approach. This approach treats each affiliate as if it were an independent entity for tax purposes, and is effectively the global standard for international transfer pricing (OECD, 2001). The transfer price relevant for tax purposes, called the *tax transfer price*, is denoted by t. Since $\tau_A < \tau_B$, the MNE will have incentives to set the tax transfer price as high as possible to shift profits from country B to country A, if there is no penalty for such tax arbitrage.[3]

[3] As will become clear, distortions in production due to such tax transfer pricing can be corrected by adjusting the incentive transfer price suitably.

Partly for this reason and partly to avoid the problem of double taxation, many tax authorities adopt the so-called arm's length principle. The arm's length principle is found in Article 9 of the OECD Model Tax Convention and is the framework for bilateral treaties between OECD countries as well as many non-OECD countries. The principle says what it means: it is the price that would be paid for similar goods in similar circumstances by unrelated parties dealing at arm's-length with each other. Failure to comply with the principle may result in penalty.(4) Denote the arm's length price by a.(5) Since $\tau_A < \tau_B$, tax evasion can become an issue in country B. That is, $t \geq a$. For any pair (a,t), the amount of underpaid tax in country B is $\tau_B(t-a)q_B$. Should tax arbitrage be detected, the MNE may be penalized. We denote the expected penalty by Ψ, which is assumed to depend on the amount of underpaid tax. Moreover, we assume, for analytical tractability, that Ψ is twice-differentiable and satisfies $\Psi(0) = lim_{x\to 0}\Psi'(x) = 0$, $\Psi'(x) > 0$ and $\Psi'' > 0$ for all $x > 0$. We believe such a penalty function reasonably describes reality.(6)

The MNE chooses both the incentive and tax transfer prices to maximize consolidated after-tax profit less any penalty for non-arm's length pricing. Given this, each affiliate chooses its own quantity. It is often the case that each affiliate is motivated to maximize its own after-tax profit.(7) Yet there is an issue regarding how the affiliates should be held responsible for part of the penalty for non-arm's length pricing. If the penalty were dependent only on $t-a$, then neither affiliate should be held responsible for the penalty since they do not exert control over $t-a$. However, the penalty depends on both t which is chosen by the MNE headquarters, and q_B which is chosen by affiliate B. As for affiliate A, there is no ambiguity that it should not be penalized for something it is not responsible for. However, if affiliate B were allowed to ignore this penalty altogether, it would purchase q_B more than is optimal for the MNE as a whole. Such 'negative externalities' need to be corrected by adjusting the

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(4) In the US, Section 482 of the Internal Revenue Code authorizes the IRS to allocate gross income, deductions, and credits between related parties based on the arm's length principle. When the reported tax transfer price is below or above the penalty threshold, the IRS can impose a penalty in pursuant of Sections 6662(e) and 6662(h). The penalty could be either 20% or 40% of the underpaid amount of tax, with higher penalty applicable when deviation from the penalty threshold is larger.

(5) While there is often a range of acceptable arm's length prices, we assume there is only one such price. This is for clarity of exposition. It is easy to see that all our arguments will go through if we replace a with the upper threshold of the acceptable range in case $\tau_A < \tau_B$.

(6) See footnote (4) above. Even when there are discrete levels of penalty, the expected penalty may be approximated by a smooth, convex function since the firm may perceive that it is more likely to be penalized if the amount of underpaid tax is larger.

(7) This assumption is also adopted in Baldenius et al. (2004), and Hyde and Choe (2003). See these papers for a discussion on why this assumption is reasonable and realistic.

incentive transfer price. On the other hand, if affiliate B were held responsible for the entire amount of the penalty, then it would purchase less than optimal quantity, again necessitating adjustments in the incentive transfer price. In short, the optimal incentive transfer price will depend on how much of the penalty for non-arm's length pricing affiliate B is held responsible for. Denote this fraction by α, $0 \leq \alpha \leq 1$. Then each affiliate's objective becomes

$$\pi_A = R_A(q_A) - c(q_A + q_B) + sq_B - \tau_A[R_A(q_A) - c(q_A + q_B) + tq_B], \tag{1}$$

$$\pi_B = (1 - \tau_B)R_B(q_B) - sq_B + \tau_B t q_B - \alpha\Psi[\tau_B(t - a)q_B]. \tag{2}$$

The objective for the MNE as a whole is

$$\pi_T = (1 - \tau_A)[R_A(q_A) - c(q_A + q_B)] + (1 - \tau_B)R_B(q_B) + (\tau_B - \tau_A)tq_B - \Psi[\tau_B(t - a)q_B]. \tag{3}$$

3. Derivation of Optimal Incentive and Tax Transfer Prices

In deriving optimal transfer prices, we will ignore affiliate A's choice of q_A as it is independent of (q_B, s, t). Regardless of (q_B, s, t), optimal q_A is where its marginal revenue is equal to marginal cost: $R'_A(q_A) = c$. Let us then start with affiliate B's problem. Affiliate B chooses q_B to maximize π_B, leading to the first-order condition,

$$\frac{\partial \pi_B}{\partial q_B} = (1 - \tau_B)R'_B(q_B) - (s - \tau_B t) - \alpha\tau_B(t - a)\Psi'[\tau_B(t - a)q_B] = 0, \text{ or}$$

$$R'_B(q_B) = \frac{s - \tau_B t + \alpha\tau_B(t - a)\Psi'[\tau_B(t - a)q_B]}{1 - \tau_B}. \tag{4}$$

Equation (4) states that affiliate B will choose q_B where its after-tax marginal revenue ($(1 - \tau_B)R'_B$) is equal to its marginal cost. The latter consists of three terms: s is payment per unit to affiliate A; $\tau_B t$ is tax credit per unit it receives from country B; $\alpha\tau_B(t - a)\Psi'$ is the expected marginal tax penalty affiliate B is held liable for.

If the MNE were choosing q_B to maximize π_T, then the first-order condition would be

$$\frac{\partial \pi_T}{\partial q_B} = -(1 - \tau_A)c + (1 - \tau_B)R'_B(q_B) + (\tau_B - \tau_A)t - \tau_B(t - a)\Psi'[\tau_B(t - a)q_B] = 0, \text{ or}$$

$$R'_B(q_B) = \frac{(1 - \tau_A)c - (\tau_B - \tau_A)t + \tau_B(t - a)\Psi'[\tau_B(t - a)q_B]}{1 - \tau_B}. \tag{5}$$

Equation (5) states that optimal q_B for the MNE as a whole should equate its after-tax marginal revenue to after-tax marginal cost, the latter being the sum of the after-tax marginal cost of production ($(1-\tau_A)c$) and the total expected marginal penalty ($\tau_B(t-a)\Psi'$) less the marginal benefit of tax arbitrage ($(\tau_B - \tau_A)t$).

Given that the tax transfer price is chosen optimally, the optimal incentive transfer price is the one that equates (4) and (5). This leads to

$$s \;=\; (1-\tau_A)c + \;\tau_A t \;+\; (1-\alpha)\tau_B(t-a)\Psi'[\tau_B(t-a)q_B]. \tag{6}$$

PROPOSITION 1: The optimal incentive transfer price is the weighted average of marginal cost and the optimal tax transfer price plus an adjustment by a fraction of the marginal penalty for non-arm's length pricing affiliate B is held responsible for.

The result obtained in Baldenius et al. (2004) is a special case of Proposition 1. They assume that the MNE always complies with the arm's length principle so that $t = a$. Thus the last term on the right hand side of equation (6) disappears. As a result, the optimal cost-based incentive transfer price is a simple weighted average of the marginal cost of production and the arm's length price. That is, $s = (1-\tau_A)c + \tau_A a$. Therefore, if the arm's length price is equal to the marginal cost of production, we are back to the marginal cost pricing rule: $s = c$. To the extent that the MNE complies with the arm's length principle, tax arbitrage is not an issue in Baldenius et al. Therefore $a = c$ is sufficient for marginal cost pricing, regardless of any differences in the tax rates.[8] As we will show below, when compliance is the MNE's choice, $a = c$ alone is not sufficient for marginal cost pricing.

Proposition 1 also clarifies how the incentive transfer price needs to be adjusted in the presence of penalty. If $\alpha = 0$ so that affiliate B is not held liable for the penalty, it will choose q_B larger than optimal for the MNE as a whole. To correct this negative externality, the incentive transfer price needs to be increased based on the expected marginal penalty. Such adjustments are necessary as long as $\alpha < 1$.

(8) In Hyde and Choe (2003), the penalty depends only on $t - a$ and is independent of q_B. As a result, the last term on the right hand side of equation (6) disappears, and the optimal incentive transfer price would again be a weighted average of c and t. However, the tax transfer price would not be equal to the arm's length price in their model since the MNE optimally trades off tax arbitrage benefits against the expected penalty.

We now turn to the optimal tax transfer price. Let us denote affiliate B's optimal choice by $q_B^* = q_B(s,t)$, and the MNE's objective by $\pi_T^* = \pi_T(q_A, q_B^*, s, t)$. If the incentive transfer price is determined as in (6), then q_B^* satisfies both equations (4) and (5). Note also that optimal q_A is independent of (s,t). Using envelope theorem, the derivative of π_T^* with respect to t becomes

$$\frac{\partial \pi_T^*}{\partial t} = (\tau_B - \tau_A) q_B^* - \tau_B q_B^* \Psi'[\tau_B(t-a)q_B^*]. \tag{7}$$

The first term on the right hand side of (7) is the marginal benefit from tax arbitrage and the second term is the marginal cost due to the penalty for non-arm's length pricing, given that affiliate B will optimally adjust its purchase quantity to any changes in the tax transfer price. It is immediate to see that $t = a$ is never optimal since $\frac{\partial \pi_T^*}{\partial t} = (\tau_B - \tau_A) q_B^* > 0$ if $t = a$.(9) Since $\Psi'' > 0$, there exists $t > a$ such that $(\tau_B - \tau_A) q_B^* = \tau_B q_B^* \Psi'[\tau_B(t-a)q_B^*]$. Again since $\Psi'' > 0$, Ψ' has an inverse, which allows us to express the optimal tax transfer price as(10)

$$t = a + \frac{(\Psi')^{-1}}{\tau_B q_B^*}\left(1 - \frac{\tau_A}{\tau_B}\right). \tag{8}$$

Thus the optimal tax transfer price is larger than the arm's length price since the MNE optimally trades off the marginal benefit from tax arbitrage against the marginal cost of penalty for non-arm's length pricing. As long as $\tau_A \neq \tau_B$, opportunities for tax arbitrage exist. Therefore $t = a$ if $\tau_A = \tau_B$.

Putting equations (6) and (8) together, we have $s \geq (1-\tau_A)c + \tau_A a$ and $t \geq a$. Both hold with equality if $\tau_A = \tau_B$. We have noted earlier that, in Baldenius et al., $a = c$ is sufficient for the optimal incentive tax transfer price to be equal to the marginal cost of production. As is clear, we need an additional condition for the marginal cost pricing rule when compliance with the arm's length pricing is the MNE's choice. Namely, $\tau_A = \tau_B$ along with $a = c$ will restore the marginal cost pricing rule. Summarizing, we have

(9) As long as Ψ is increasing and strictly convex, hence smooth, $t = a$ is never chosen in equilibrium. However if Ψ has discrete jumps, then $t = a$ could be optimal.

(10) Even if we allow a range of acceptable arm's length prices to be $[\underline{a}, \bar{a}]$, equation (8) will still remain valid with a replaced by $\bar{a}$ as long as Ψ satisfies all the stated assumptions for $t \geq \bar{a}$.

PROPOSITION 2: (a) If the tax rate for the purchasing affiliate is higher than that for the supplying affiliate, then the optimal tax transfer price is larger than the arm's length price, and the optimal incentive price is larger than the weighted average of the marginal cost of production and the arm's length price. (b) If the tax rates are the same, then the optimal tax transfer price is equal to the arm's length price. If, in addition to the same tax rates, the arm's length price is equal to the marginal cost of production, then the optimal incentive transfer price is also equal to the marginal cost of production.

We close the section with a numerical example. The optimal values of (q_B, s, t) are found by solving equations (5), (6) and (8) simultaneously. We suppose R_B and Ψ are both quadratic: $R_B(q_B) = d_1 q_B - d_2 q_B^2$ and $\Psi(x) = kx^2$, hence $(\Psi')^{-1}(y) = \frac{y}{2k}$. As a base case, we set $d_1 = 100$, $d_2 = 2$, $k = 0.2$, $c = 10$, $a = 15$, $\alpha = 0.2$, $\tau_A = 0.3$, and $\tau_B = 0.35$. Then the optimal transfer prices are $s = 11.54$ and $t = 15.113$. Next we vary only the arm's length price from $a = 15$ down to $a = 10$, equal to marginal cost. Other things equal, a decrease in the arm's length price implies a higher likelihood of penalty, so the firm adjusts its tax transfer price downwards as well. As the tax transfer price is decreased, affiliate B's tax credit from country B decreases, which reduces its incentives to purchase an optimal quantity. This can be corrected by decreasing the incentive transfer price as well. This is shown in Figure 1.

— Figure 1 goes about here. —

The next graph in Figure 1 is based on changes in the tax rate in country B as it increases from $\tau_B = 0.3$ while other parameter values are held fixed as in the base case. When $\tau_B = 0.3$, there is no benefit from tax arbitrage since τ_A is also fixed at 0.3. Thus the optimal tax transfer price is equal to the arm's length price: $t = a = 15$. As $\tau_B - \tau_A$ increases, the firm increases its optimal tax transfer price to exploit the increased benefits of tax arbitrage. Although the increase in the tax transfer price increases the expected penalty for non-arm's length pricing, this effect is small relative to the increased benefits of tax arbitrage, given the expected penalty function we chose. As the increase in the tax transfer price will motivate affiliate B to increase its purchase, the incentive transfer price needs to be increased as well.

4. Conclusion

This paper has studied the multinational firm's choice of tax and incentive transfer prices when there is penalty for non-compliance with the arm's length principle. The optimal incentive transfer price is shown to be the weighted average of the marginal cost of production and the optimal tax transfer price plus an adjustment by a fraction of the marginal penalty for non-arm's length pricing for which the relevant affiliate is held responsible. As long as as the tax rates are different in different jurisdictions, the firm optimally trades off the benefits of tax arbitrage against the penalty for non-arm's length pricing. Such a tradeoff leads the optimal tax transfer price to deviate from the arm's length price. If the tax rate for the purchasing affiliate is higher than that for the supplying affiliate, then the optimal tax transfer price is larger than the arm's length price, implying that the optimal incentive transfer price is larger than the weighted average of the marginal cost of production and the arm's length price. In the special, but unlikely, case where the tax rates are the same and the arm's length price is equal to marginal cost, the optimal incentive transfer price is equal to marginal cost. Thus the paper has shown how the marginal cost rule for internal transactions in multi-divisional firms in a single tax jurisdiction needs to be modified for multinational firms.

It is worth stressing that our results are based only on the assumptions of decreasing marginal revenue and increasing, strictly convex expected penalty. Therefore they are applicable whether the multinational's affiliate operates in a monopolistic or an oligopolistic market environment.

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Figure 1: Comparative Statics of the Optimal Transfer Prices