Strategic Transfer Pricing and Divisionalization

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Abstract

Most research of strategic transfer prices has focused on symmetric market power where two oligopolistic firms have the same number of divisions. This paper contributes to this literature by developing a model where the multinational enterprise (MNE) establishes multiple divisions in a foreign market, then chooses its transfer pricing policy. In the first stage, the MNE sets the transfer price it charges its foreign divisions. In the second stage, MNE divisions take the price of the intermediate goods (the transfer price) as given and compete with local rival firms on quantities. We show that the transfer price set by the MNE is vastly different when they have multiple divisions compared to when they only have one division. By manipulating their transfer prices, MNE's gain higher profits than they otherwise would, which is critically dependent upon their market share in the foreign market. Our results show that the MNE can use transfer prices not only for tax avoidance, but also as a strategic device to increase profits.

Keywords: Transfer prices, market share, divisionalization, tax motivated strategies

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1. Introduction

Transfer prices are prices established within a business enterprise (e.g., a divisionalized firm, a corporation, a holding company, etc.) for goods, services, intellectual property, and/or credit transferred between units. The units may be vertically related if one unit transfers intermediate goods or services to another for further processing, or the horizontally related if one unit transfers finished product to another (similar) unit in order to supplement the inventories of the recipient. Transfer pricing has been a topic of growing academic study in economics since the pioneering work of Hirschleifer (1956, 1957), Gould (1964), Horst (1971, 1973), Naert and Janssen (1971).

In the transfer pricing literature, it is well known that the transfer price can be used as a profit-shifting device when tax and tariff rates between the home and host countries are not harmonized (e.g., Horst, 1971, 1973; Eden 1983, 1998; Gao and Zhao, 2015). However, our understanding of strategic uses of transfer prices in by multinational enterprises (MNEs) remains limited. If the manager of the downstream division is responsible for pricing of the final product then the transfer price also affects the final product price because it determines the marginal cost of the downstream division. Unless firms are perfectly competitive, the final product price usually increases with the transfer price.

The relationship between the transfer price and the final product price becomes important in downstream markets where there exist only a small number of firms who react to each other price or quantity changes. Most research on the strategic uses of transfer prices have focused on imperfect competition where transfer prices are set centrally while decisions on quantities and/or prices of final products are delegated to subsidiaries' managers. It is well known in the principle-agent literature that a principal may be better off if he or she strategically delegates production responsibility to the agent (Vickers, 1985; Sklivas 1987). Strategic delegation serves as a means of strategic pre-commitment in order to induce the rival firms to behave less aggressively. This in turn provides a greater profit for the parent company. Studies by Gal-Or (1993), and Hughes and Kao (1997b) has shown that accounting data may be served similar purposes.

The primarily results of previous investigations under Cournot competition are that the transfer price is strategically set below the marginal costs (Schjelderup, 1997; Zhao, 2000; Gox, 2000) because by successfully setting a low transfer price the MNE will induce the local rival firm to behave less aggressively. These models assume that firms can commit to a certain transfer pricing policy before the downstream managers select the final product quantity, thus, firms' profit maximization problems become a two-stage game with perfect information. The intuition is that the transfer price has a strategic value in addition to being an instrument for profit shifting. Hence, by setting its transfer price centrally while delegating its quantity decision to its subsidiaries' manger, MNEs can achieve higher profits than would otherwise be the case if all decisions were undertaken centrally.

However, the above results are reversed when firms compete through prices. Alles and Datar (1998) show that price competition in an oligopolistic market with differentiated products leads firms to choose a cost-plus type of transfer price, i.e. a price greater than marginal cost (Schjelderup, 1997; Alles and Datar, 1998; Arya and Mittendorf, 2008). Setting a high transfer price (above marginal cost) will induce the subsidiary in the foreign country to set a higher price for its final product; thus the local rival's best response is to set a higher price, thereby increasing the MNE's overall profits. These results rest on the assumption that the MNE and the domestic rival firms have only one subsidiary.

However, in today's market one can find numerous examples where MNEs have several competing divisions that produce almost identical products[1]. Williamson (1975) conjectures that divisionalization is a response to the loss of operational control when an MNE becomes too large. Divisionalization can be a pre-commitment tool for producing an output level that would prevent entry (Veendorp, 1991).

It has been shown (Corchon, 1991; Polasky, 1992; Baye et al., 1996; Erickson, 2012) that firms engaged in Cournot competition would find it profitable to create intra-firm competition via the establishment of identical horizontal divisions within the firm. There are strategic incentives for oligopolists that produce homogeneous products to divide production among autonomous units, each competing independently in the market. Divisionalization allows the parent firm to unilaterally commit to a Stackelberg-type outcome in the final product market that could ultimately increase its overall profit (Baye et al, 1996).

This paper contributes to the strategic transfer pricing literature by developing a model where the multinational enterprise has multiple divisions in the foreign market that produce identical goods. They compete independently with each other as well as with local rival firms. In addition to analyzing the effects of divisionalization on the transfer price, the paper also analyzes how tax and tariff rates differentials between home and foreign countries affect MNE transfer pricing policy.

2. Optimal Transfer Pricing and Divisionalization

[1] Baye et al. (1996) provide several real world examples.

The transfer prices are modeled as outcomes of a two-stage game. We consider divisions located in two countries; the home and the foreign country. The multinational enterprise (MNE) faces corporate taxes of t_h in the home country, and t_f in the foreign country. The MNE's objective is to maximize its net global profits. The MNE has an upstream division located in the home country and its downstream division(s) located in the foreign country. The MNE can set up as many downstream divisions (outlets) as it wants in the foreign country. Let q_i denote the quantity sold by each division in the foreign market and *m* is the number of divisions the MNE has in the foreign country; thus the total quantity sold by the MNE in the foreign market is $\sum_i^m q_i$. These foreign divisions of the MNE face *n* identical local rivals, which are independent and vertically-integrated firms. Let q_j denote the quantity sold by the *j*th local rival; thus the total quantity sold by the local rivals in the foreign market is $\sum_j^n q_j$.

The two-stage game is considered as follows. In the first stage the MNE's upstream division chooses the transfer price it charges to its downstream foreign divisions for the intermediate goods. We also assume that the upstream division is the sole supplier of the intermediate goods for the downstream division(s). Each unit of the final good requires one unit of the intermediate good. It is further assumed that the transfer price set by the MNE applies to all of its downstream divisions. The marginal cost of adding a downstream division is $c > 0$. The marginal cost of the intermediate good is normalized to 0.

In the second stage, the MNE's downstream division(s) take(s) the transfer price as given and compete(s) with the foreign rivals in a Cournot manner.[2] The inverse demand in the foreign market, $P(Q)$, is linear with $P' = -1$ and $P'' = 0$, while $Q = \sum_i^m q_{mi} + \sum_j^n q_{fj}$ is the industry output. The problem of the MNE's i^{th} division is to maximize

$$\Pi_i = P(Q)q_i - (1+\tau)\theta q_i \tag{1}$$

where $\Pi_{mi}$is the profit of the MNE's i^{th} division and τ is the tariff rate, which lies in (0, 1). The j^{th} rival wants to maximize

$$\Pi_j = P(Q)q_j \tag{2}$$

where the variables are interpreted similarly to equation (1).

In the second stage, the MNE's divisions and the rivals compete in a Cournot game, simultaneously choosing the quantities to maximize their own profits. Thus, by differentiating equations (1) and (2) with respect to q_{mi} and q_{fj} we obtain the following first order conditions

$$P(Q) + P'q_i - (1+\tau)\theta = 0 \tag{3}$$

and

$$P(Q) + P'q_j = 0. \tag{4}$$

In total, there are m equations 1 and n equations 2, and the solution to this system of m+n equations is the Nash equilibrium output for each MNE downstream division and the rival firm. Solving the above system of equation by summing across all divisions, we get

$$mP(Q) + P'Q_m - m(1+\tau)\theta = 0 \tag{5}$$

and

$$nP(Q) + P'Q_n = 0 \tag{6}$$

[2] The goods in the intermediate and final markets are homogeneous. Such an assumption was used by Zhao (200)

where Q_m and Q_n denotes the quantities produced by the MNE and the rival firms. Thus the total quantity is $Q = Q_m + Q_n$.

Adding equation (5) and (6) and using $D = m + n$ yields

$$DP(Q) + P'Q - m(1+\tau)\theta = 0. \tag{7}$$

From equation (7) we can get the total output for the industry as

$$Q(m+n,\theta) = [DP(Q(\cdot,\theta)) - m(1+\tau)\theta]/[-P'(Q(\cdot,\theta))]. \tag{8}$$

From equation (8) we see that the total output in the market, as well as the output for each downstream division depends solely on the total number of competing divisions (m) and the MNE's transfer price (θ) charged to its division(s). Furthermore, as the transfer price increases the total industry output is reduced by $-(m(1+\tau))/(1+D)$, and the greater the level of divisionalization by the MNE the greater the output in the foreign market. Intuitively, when the MNE charges a high transfer price for its intermediate goods then it effectively increases the marginal cost of the downstream divisions as well as the marginal cost of the industry as a whole.

Substituting equation (8) into (3) and (4) yields expressions for $Q_m, Q_n, q_i, and\ q_j$ as follows:

$$Q_m(m+n,\theta) = [m((1+\tau)\theta - P)]/[P'(Q(\cdot,\theta))] \tag{9}$$

$$Q_n(m+n,\theta) = [nP(Q(\cdot,\theta))]/[P'(Q(\cdot,\theta))] \tag{10}$$

$$q_i(m+n,\theta) = [(1+\tau)\theta - P(Q(\cdot,\theta))]/[P'(Q(\cdot,\theta))] \tag{11}$$

$$q_j(m+n,\theta) = [-P(Q(\cdot,\theta))]/[P'(Q(\cdot,\theta))] \tag{12}$$

$$\Pi_i = [(P(Q(\cdot,\theta)) - (1+\tau)\theta)^2]/[-P'(Q(\cdot,\theta))] \tag{13}$$

$$\Pi_i \;= [P^2(Q(\cdot,\theta))]/[P'(Q(\cdot,\theta))]. \tag{14}$$

With the above Nash equilibrium quantities and profits we can express the MNE's global after–tax profit, Π_{mT}, as $\quad \Pi_{mT} = (1-t_h)m\theta\{[P(Q(\cdot,\cdot))Q(\cdot,\cdot) - (1+\tau)\theta]/[-P'(Q(\cdot,\cdot))]\}$

$$+m(1-t_f)\{[P\big(Q(\cdot,\cdot)\big)Q(\cdot,\cdot)-(1+\tau)\theta]^2\ /\ [P'\Big(Q\big((\cdot,\cdot)\big)\Big)]\ \}-mc \qquad (15)$$

By substituting $P' = -1$ into equation (15) we obtain

$$\Pi_{mT} = (1-t_h)m\theta\big[P\big(Q(\cdot,\cdot)\big)Q(\cdot,\cdot)-(1+\tau)\theta\big]$$

$$-\,d_m(1-t_f)\{[P\big(Q(\cdot,\cdot)\big)Q(\cdot,\cdot)-(1+\tau)\theta]^2-mc. \qquad (15´)$$

The first term of equation (15´) is the profit after tax of the upstream division, whereas the second term is the total after tax profit of downstream division(s). We can then differentiate equation (15´) with respect to the transfer price (θ) to get the first order condition

$$(1-t_h)m\big[(P(Q)-(1+\tau)\theta)+\theta\big(-Q_\theta-(1+\tau)\big)\big]+(1-t_f)2m[(P(Q)-$$

$$(1+\tau)\theta)(-Q_\theta-(1+\tau))]=0. \qquad (16)$$

Dividing equation (16) by $(1-t_h)m$ and defining $T=(1-t_f)/(1-t_h)$ as the tax rate differential yields

$$[(P(Q)-(1+\tau)\theta)+\theta(-Q_\theta-(1+\tau))]+$$

$$2T[(P(Q)-(1+\tau)\theta)(-Q_\theta-(1+\tau))]=0. \qquad (17)$$

Recall that $D = m+n$, and solve equation (17) for the optimal transfer price, θ, as a function of T and D to get

$$\theta(T,D)=P(Q)(2T(Q_\theta+(1+\tau))-1)/(Q_\theta(2T(1+\tau)-1)+2(1+\tau)(T+T\tau-1))$$

(18)

where Q_θ is the derivative of $Q(\theta,D)$ with respect to the transfer price (θ). From equation (8), this derivative is equal to $-(m(1+\tau))/(1+D)$.

From equation (18) we get the following proposition

PROPOSITION 1: *In the absence of tax and tariff rates,(i) the MNE will only set the transfer price below marginal cost if the MNE and the rival firm have a symmetric number of* *divisions or (ii) the MNE has a smaller number of divisions than its foreign rival firm. Otherwise it will set the transfer price at or above marginal cost.*

PROOF: See Appendix.

The first part of proposition 1 generalizes the results from Schjelderup (1997) and Zhao, (2000), which shows that if the downstream divisions compete with the foreign rivals in Cournot fashion then the MNE would want to set a low transfer price, i.e., below marginal cost, to induce the foreign firms to behave less aggressively. In Schjelderup (1997) and Zhao (2000), they assume that the MNE and its foreign rival has only one downstream division, thus according to the above proposition they would set a transfer price below marginal cost. This result also holds if the MNE has a smaller number of divisions than its foreign rivals.

The surprising result of proposition 1 is that if the MNE has more than one additional division than has its rival then it would want to charge a high transfer price, i.e. a transfer price above marginal cost. Intuitively, when the MNE has more divisions than its rival then by charging a high transfer price it induces its divisions to reduce their quantities. As the result, The MNE and the local rival can sell their final product for a higher price.

COROLLARY 1: *If the MNE is a monopolist in the foreign market then it will set the transfer price equal to its marginal cost.*

PROOF: See Appendix

It is also well known in the literature (Hirshleifer, 1956; Eden, 1998; Horst, 1971) that if the MNE is a monopolist in the foreign market then the optimal transfer price is equal to the marginal cost of the intermediate goods. The result in corollary 1 complements previous results such that if the MNE is a monopolist in the foreign market, it effectively dealt with the double marginalization problem by charging the transfer pricing at marginal cost.

If tax and tariff rates are nonnegative then we have the following cases:

Case 1a: $t_h < t_f$, $1/T < (1 + \tau)$, and $\frac{m}{1+D} \leq 1/2$.

We assume that the tariff rate imposed by the host country is not larger than 100 percent, which is a reasonable assumption since the average tariff rates in most countries do not exceed 100 percent (Kant, 1988). When $1/T < (1+\tau)$, this implies that the tax rate differential is less than the foreign tariff rate. In the literature this condition always dictates a transfer price (lower than marginal cost) under Cournot competition where firms have only one wholly-owned division (Gox, 2000; Schjelderup et al, 1997), where the expression $\frac{m}{1+D}$ measures the MNE market share in the foreign market.[3] When $\frac{m}{1+D}$ is less than or equal to $1/2$ then the MNE has a smaller market share relative to its rivals, and as a result, the tariff rate has a small impact on total industry output.

PROPOSITION 2: *Under case 1a then the MNE will set a transfer price lower than marginal cost if*

$$\frac{m}{1+D} < (2 - 2T - 2T\tau)/(2T + 2T\tau).$$

PROOF: See Appendix.

[3] This need not be the case if subsidiaries are less than wholly owned (Kant, 1988).

The result from proposition 2 suggests the transfer price not only depends on the relative tax-tariff rates differential but also on the MNE's market share. The MNE's market share in the foreign market is measured through the number of divisions, which we can think of measuring by the number of outlets that the MNE has, m, relative to the number of rival foreign firms, n. When $m/(1+D) \leq 1/2$ then $n \geq m-1$, which indicates that the MNE could have more divisions than the number of rivals; but not necessarily many more.

Under the assumptions of case 1a, when the MNE has a small market share in the foreign market then the solution for the optimal transfer price follows previous results in Gox (2000) and Schjelderup et al. (1997). Intuitively, the MNE would want to set a low transfer price to induce its downstream division(s) to behave more aggressively and thereby lower rivals' output. Because of its relatively small market share, the MNE's manupulation of the transfer price has little effect on the industry ouput, yet has a large effect on how its division(s) and the rival(s) divisions behave.

Case 1b: $t_h < t_f$, $1/T < (1+\tau)$, and $1 > \frac{m}{1+D} > 1/2$.

Under Case 1b, $1 > \frac{m}{1+D} > 1/2$ implies $m \geq n+2$. As the result, the MNE has at least two more divisions than the number of rival foreign firms. Furthermore, this condition also implies that the MNE has more than fifty percent of the foreign market, unlike the result in proposition 2 where the MNE has a relatively small market share. By having a relatively large market share in the foreign market, the MNE's transfer pricing policy has a significant effect on the industry output as well as local rivals' behavior.

In the absence of tax and tariff rates, the MNE sets a transfer price higher than marginal cost. However, once we take into the account the tax and tariff rates, the result becomes ambiguous. Under the above case, the tax and strategic incentives of manipulating the transfer price are working in opposite directions. By setting a low transfer price, the MNE saves on taxes paid to the government authorities; however, at the same time a low transfer price induces a larger industry output, which in turn a lower final product price.

Case 1c: $t_h < t_f$, $1/T$ >(1 +τ), and $1 > \frac{m}{1+D} > 1/2$.

PROPOSITION 3: *Under the conditions of case 1c, the MNE sets the transfer price above marginal cost.*

PROOF: See Appendix.

In case 1c, the strategic effects and the tax motivated incentives are working in the same direction. When the relative tax rates differential is larger than the tariff rate the MNE always sets a high transfer price to save on taxes paid to the government authorities. However, at the same time, by having a large market share (more than fifty percent) in the foreign market, the MNE would want to charge a higher transfer price paid by its foreign subsidiaries to induce a lower quantity produced in the market, thereby a higher final product price. This in turn increases overall firm profits.

Case 1d: $t_h < t_f$, $1/T$ >(1 +τ), and $\frac{1}{2} > \frac{m}{1+D}$.

The direction of the transfer price is ambiguous in this case since the tax and strategic effects of transfer prices are working in opposite directions. By having a relatively small (less than fifty percent) market share in the foreign market, the MNE would want to set a low transfer price (below margin cost) to influence its subsidiaries' output at the cost of their saving on taxes. The optimal transfer price is low (high) depended on which effect (strategic or tax) out-weighs the other.

Case 2*: $t_h > t_f$ and 0 < $\tau < 1$.*

In case 2, $T = (1 - t_f)/(1 - t_h) > 1$. If the home tax rate is larger than the foreign tax rate and full credit is granted for foreign taxes paid by the MNE then the MNE's first order condition can be written as

$$t_h m\big[[(P(Q) - (1 + \tau)\theta) + \theta(-Q_\theta - (1 + \tau))] + [2(P(Q) - (1 + \tau)\theta)(-Q_\theta - (1 + \tau))]\big] = 0. \quad (19)$$

Solving equation (19) for the optimal transfer price we get the transfer prices as a function of *D* and τ.Defining $\varphi = Q_\theta + 1$ yields

$$\theta(\tau, D) = p(2\varphi\tau - 1)/(1 + \varphi - 2\varphi\tau) \quad (20)$$

As a result of equation 20, we have the following proposition

PROPOSITION 4*:* *If the home tax rate is larger than the foreign tax rate and there is a nonnegative tariff rate then the MNE charges a low transfer price (i.e. transfer price below marginal cost) only if $m \leq n$.*

PROOF: See Appendix

When full credit is granted to the MNE on its foreign tax and firms have a symmetric number of divisions, then φ is negative, hence, the transfer price depends only on the tariff rate and the number of divisions that each firm has in the foreign market. And if the tariff rate is equal to zero then the results follow Proposition 1. In the literature, the conditions above always dictates a transfer price below marginal cost since both the strategic and tax motives work in the same direction. The MNE sets a low transfer price to reduce the cost of the tariffs and at the same time commits to a lower marginal cost for its foreign divisions.

In our model, the MNE would want to charge a low transfer price only if it has a relatively small market shares in the foreign market, lower than fifty percent. Under case 2, both the strategic and tax incentives work in the same direction. By charging a low transfer price, the MNE not only saves on tariffs paid to the foreign authority but also artificially creates low cost subsidiaries.

3. Concluding Remarks

We began out model with the assumptions that MNE is decentralized and can set up multiple identical subsidiaries in the foreign market; with final product pricing decision that are delegated to foreign subsidiaries' managers. Each subsidiary independently competes with each other as well as with local rival firms by choosing quantities. The MNE's headquarter strategically sets the transfer price for the intermediate goods to artificially creates a low (high) cost subsidiaries to induce local rival to behave less aggressively in the foreign market.

In this setting, we show that there is a strategic effect of transfer price other than the tax avoidance incentive. By strategically setting the transfer price, the MNE can induce its subsidiaries to become the Stackelberg leader in the foreign market. Our results complement previous results in the literature, incorporating the effects when the MNE has only one division in the foreign market as well as when it has multiple divisions. Our results clearly show under which conditions the MNE sets a low (high) transfer price and when the strategic effects out-weight the tax avoidance incentives.

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APPENDIX

PROOF OF PROPOSITION 1 AND COROLLARY 1

If the tariff and the tax rates of the two countries are equal to zero then the equation for the transfer price collapses to $P(1+2Q_\theta)/Q_\theta$. As we have seen, the denominator Q_θ is negative, and so long as Q_θ is greater than –1/2 then the numerator is positive; so the ratio, which is equal to θ, will be negative. Recall that Q_θ is equal to $-m/(1+m+n)$ in the absence of a tariff and is greater than –1/2 if and only if $1 \leq m < 1+n$. This is the case if and only if $m \leq n$.[4] The MNE will set the transfer price at marginal cost if $P(1+2Q_\theta)$ is equal to zero, which is true if and only if $n = m-1$. As long as the MNE has only one more division than its rival foreign firm, then it will set the transfer price at marginal cost.

It is a special case when the MNE is a monopolist the foreign market, since, by setting transfer price equal to zero, the MNE has effectively dealt with the double marginalization problem. The MNE will set the transfer price above marginal cost if $P(1+2Q_\theta)$ is positive, which is the case if $m > 1+n$. QED

PROOF OF PROPOSTION 2

In order for the transfer price to be negative, the numerator and the denominator have different signs. Under case 1a, the numerator is positive. Then in order for the transfer price to be negative the denominator has to be negative. The condition for the denominator to be negative is

$$-\frac{m}{1+D} < (2-2T-2T\tau)/(2T+2T\tau).$$ QED

PROOF OF PROPOSITION 3

The optimal transfer price can be written as

$$\theta(T,D) = P(Q)(2T(Q_\theta+(1+\tau))-1)/(Q_\theta(2T(1+\tau)-1)+2(1+\tau)(T+T\tau-1))$$

[4] We assume that both the MNE and its rival have a non-negative number of divisions in the market and the number of divisions is integers as discussed in (Baye at al, 1996).

And in order for the transfer price to be positive, both the numerator and the denominator have to be either positive or negative. Under case 1c, the numerator and the denominator are both negative which implies that the transfer price is positive. QED

PROOF OF PROPOSITION 4 When full credit is granted to the MNE on its taxes paid to the foreign country then the optimal transfer price is

$\theta(\tau, D) = p(2\varphi\tau - 1)/(1 + \varphi - 2\varphi\tau)$.

Recall that if the home tax rate is smaller than the foreign tax rate, $\varphi = Q_\theta + T$; whereas if the home tax rate is larger than the foreign tax rate and full credit is granted to the MNE then $\varphi = Q_\theta + 1$. If the MNE has the same number of divisions or fewer than its foreign competitor(s), then $-d_m/(1 + d_m + d_r) > -1/2$. This implies that the numerator is negative and the denominator is positive, which in turn implies a negative transfer price. QED