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TRADE, MULTINATIONALS, AND TRANSFER PRICING REGULATIONS

Guttorm Schjelderup
Alfons J. Weichenrieder*

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*Center for Economic Studies
University of Munich
Schackstr. 4
80539 Munich
Germany
Telephone & Telefax:
+49 (89) 2180-3112*

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Abstract

Recent years have seen the introduction of profit comparisons by national tax authorities to cope with multinationals' profit shifting activities. The paper argues that a country which switches from price related transfer pricing rules to profit related measures can reduce imports without changing firms' transfer prices. The trade effect makes the change of transfer pricing rules a potential instrument of protectionism and strategic trade policy.

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*Alfons J. Weichenrieder
Center for Economic Studies
University of Munich
Schackstr. 4
80539 Munich
Germany*

*Guttorm Schjelderup
Norwegian Research Centre in
Organization and Management
Rosenbergt. 39
5015 Bergen
Norway*

1. Introduction

In recent years there has been an increasing concern about the profit shifting activities of multinational firms. With international markets becoming more and more interlinked, tax authorities find it increasingly difficult to monitor the transfer pricing behavior of multinationals.

Traditional methods employed by national tax authorities to monitor profit shifting focus on the intra-firm prices of single transactions. The approach taken is to ask whether a certain transfer price would also have been agreed on by two completely separate units. If the transfer price is judged to be significantly different from this arm's length price, then, for tax purposes, national tax authorities will correct the transfer price accordingly. In the US, in particular, serious doubts were raised by politicians and tax authorities about whether such price oriented methods were still appropriate and whether they sufficed to preserve the US tax base.

The most radical proposals for changing transfer pricing regulations were included in Bill Clinton's 1992 economic program and formed part of his presidential campaign. According to this proposal, US tax authorities would, under certain conditions, be allowed to tax low profit subsidiaries of foreign corporations on a deemed profit equal to 75% of the average profit of comparable US resident firms.¹ The regulations that came into force, first as the Temporary Regulations of Sec. 482 (January 21, 1993), and eventually, in a slightly changed form, as the Final Regulations of July 8, 1994, partly reflect this idea. In particular, they introduce the comparable profit method (CPM) as an instrument for regulating transfer

¹For details of the proposal and the international criticism it provoked see e.g. Morrison (1993).

prices.² While price related regulations methods can still be applied, tax authorities have now the right to correct US income tax on the grounds that profitability of the firm under consideration has been less than the profitability of comparable firms in the same branch over a longer time period.

This paper tries to evaluate what the shift from price oriented to profit oriented regulation means for multinationals' decisions. In particular, the paper asks whether the different approaches have different impacts on intra-firm trade. It has been established theoretically (Itagaki 1982, Diewert 1985, Kant 1988), and confirmed empirically (Grubert and Mutti 1991), that the possibility of shifting profits using transfer prices affects trade, and it is intuitive that countries' efforts to curb profit shifting also affect trade. While a variety of papers have considered the effects of price related regulation on intra-firm trade [see, e.g., Copithorne (1971), Itagaki (1979), Kant (1989, 1995)], the analysis of profit related measures has been largely neglected.³ Even if most countries do not yet apply the CPM officially, its analysis is quite important since profit methods usually provide a useful means of identifying cases that may require further investigation (OECD 1994, p. 64).

The paper does not embark on the question of how a host country should optimally regulate foreign-owned subsidiaries. The emphasis of the paper is instead on comparing the impact on trade of the different regulations which is important for the political economy of regulation. As its main point, the paper argues that a shift from price related methods to the CPM reduces the regulating country's imports, while, in a partial equilibrium model, the impact on exports seems negligible. This insight raises doubts about whether regulating

²See Horst (1993).

³Copithorne (1971, p. 339) and Booth/Jensen (1977) offer models where the multinational maximizes profits subject to a self chosen minimum profit level for its subsidiaries. However, these papers do not impose a measure of profitability and they do not look at trade impacts of exogenous profitability requirements compared to arm's length regulation as the present paper does.

countries introduce the profit method solely to get their fair share of the tax revenue. Protectionism may be an important side aspect of changing transfer pricing regulation.

1.1 Some Preliminaries

In the following we concentrate on constellations where multinationals find it profitable to manipulate transfer prices for tax reasons.⁴ The multinational considered is assumed to maximize total net of tax profits. For ease of discussion, we call the country to which the multinational would like to channel its profits Finland and the other country the US.⁵ Like the bulk of the transfer pricing literature, the paper uses a static model.⁶ Two cases are distinguished. In the first, comparative advantage is such that the Finnish parent exports to the US, while the second part of the analysis considers the reverse case.⁷

2. Importing Subsidiaries

The starting point of the analysis is one where we consider a subsidiary located in the US. The subsidiary imports a widget S from its Finnish parent at a transfer price q . The widget S is then sold in the US market and yields revenue $R(S)$, with $R' \geq 0, R'' < 0$. We denote $c(S)$, with $c'(S) > 0, c''(S) \geq 0$, as the parent's cost of producing the widget. The firm faces income tax rates in Finland (t) and the US (T), where $t < T$. To sell abroad, the subsidiary needs a certain amount of capital, K , which is weakly convex in the amount of sales abroad, i.e., $K = K(S)$, $K'(S) > 0$, and $K''(S) \geq 0$. Examples of the subsidiary's capital requirement are the

⁴Note that Kant (1990) shows that transfer pricing under some conditions may increase the multinationals total tax payments. Thus, transfer pricing is a net profit maximizing strategy rather than a tax minimizing strategy.

⁵Currently, the income tax rate on corporations is 28% in Finland and 35% in the US.

⁶For a discussion of the possibly different transfer pricing incentives of growing firms see Weichenrieder (1995, chapt. 4).

⁷Kant (1989) emphasizes the possibility that taxes revert the direction of intra-firm trade. This possibility is not allowed for in the following. We look instead at marginal changes in trade patterns.

investment in outlet stores and the stock of finished goods abroad. The cost for the parent of endowing its subsidiary with capital equals the amount of capital, K , times the interest rate r . Unlike most of the existing literature, we allow the parent to finance the subsidiary in two different ways. The parent can endow its subsidiary with equity, or it may choose to lend to the subsidiary. In the first case, the sales revenues earned in the US must be repatriated by transfer pricing or by repatriating foreign profits. In the latter case the payment of interest is an additional instrument for repatriation. Note that the subsidiary's interest payments – unlike dividends – reduce the US (host country) tax base. Therefore, to curb this additional instrument for profit shifting, the US restricts the maximum ratio of the parent's lending to total finance.⁸ Hence, to think of an exogenously given debt to capital ratio, σ , is justified. The remaining part, $(1 - \sigma)$, of the subsidiary's capital must be financed by equity. The multinational's total after tax profits are then given by

$$(1) \quad \Pi = (1 - t)[qS - c(S) - r(1 - \sigma)K(S)] + (1 - T)[R(S) - qS(1 + \tau) - r\sigma K(S)].$$

The first part of the right hand side (RHS) denotes the parent's after tax profit. The parent's profits are given by its sales revenues, qS , minus its cost, $c(S)$, which may also include capital cost of domestic (Finnish) production, minus financing cost, $rK(S)$, of the subsidiary's capital stock, plus interest payments received from the subsidiary, $r\sigma K(S)$. The second term of the RHS denotes the subsidiary's profits which are subject to the US tax T rather than to the Finnish rate t . The US firm's imports may be subject to a tariff rate τ .

⁸For a survey of international thin capitalisation rules that limit the use of intra-company lending see IBFD (1995). We assume that the intra-firm interest rate cannot be manipulated but must equal the world market rate of interest, r . Indeed, there is evidence that tax authorities find it comparatively easy to monitor the appropriateness of the intra-firm interest rate. In the US, for example, the interest rate is the only transfer price for which there is a safe haven. Interest rates that fall within a certain band around the government borrowing rate are assumed to satisfy arm's length conditions.

If traditional price related regulation is chosen by the host government, then the transfer price is not permitted to exceed a certain level $\bar{q}$ set by fiscal authorities.⁹ Therefore, the restriction $q \leq \bar{q}$ is added to the maximization problem to capture the impact of price related regulation.

The CPM which was recently enacted in the US monitors the ratio between operating profits and operating assets. Operating profits are defined by the authorities as the subsidiary's sales revenues minus all operating expenses except interest payments. Operating assets are given by the value of all assets used in the relevant industry segment of the party examined.¹⁰ Hence, the profit related regulation can be modeled by introducing the restriction $[R(S) - qS(1 + \tau)] / K(S) \geq X$, where X denotes the US minimum profitability requirement that applies to the subsidiary. The Lagrangian with the attached Kuhn-Tucker multipliers can be written as

$$(2) \quad L = \Pi + \mu[\bar{q} - q] + \lambda \left[\frac{R(S) - qS(1 + \tau)}{K(S)} - X \right].$$

The first order conditions of the problem then are

$$(3) \quad L_S = (1 - t)[q - c'(S) - r(1 - \sigma)K'(S)] + (1 - T)[R'(S) - q(1 + \tau) - r\sigma K'(S)] \\ + \lambda \left[\frac{[R'(S) - q(1 + \tau)]K(S) - K'(S)[R(S) - qS(1 + \tau)]}{K^2(S)} \right] = 0$$

⁹Samuelson (1982) argues that the regulated transfer price, $\bar{q}$, may be endogenous to the firm if the parent sells the good S directly to third parties and this price is observable to the host country's authorities. In the following we abstract from this case and treat $\bar{q}$ as exogenous to the firm.

¹⁰Not included are investment in other firms and portfolio investment. This reduces the incentive to acquire additional assets to increase average profitability. For a detailed description of the comparable profit method see Horst (1993, p. 1448).

$$(4) \quad L_q = S(1-T)[\theta - \tau] - \mu - \frac{[\lambda S(1+\tau)]}{K(S)} = 0,$$

where $\theta \equiv (T-t)/(1-T)$ is the relative corporate tax differential between the two countries.

With a zero tariff rate, it is profitable to shift profits to the parent firm in Finland by charging a high transfer price as long as $\theta > 0$. With positive tariff rates, over-invoicing is penalized by an increased duty and profit shifting incentives are present only in the case $\theta - \tau > 0$. Algebraically, we can infer from (4) that the restriction on the transfer price can only become binding ($\mu > 0$) if $\tau < \theta$.¹¹ For the rest of the section on the importing subsidiary we shall assume this to be the case.

The Kuhn-Tucker conditions are

$$(5) \quad \begin{aligned} [q - \bar{q}] \cdot \mu &= 0, \text{ where } q - \bar{q} \geq 0, \mu \geq 0. \\ \left[\frac{R(S) - qS(1+\tau)}{K(S)} - X \right] \cdot \lambda &= 0, \text{ where } \frac{R(S) - qS(1+\tau)}{K(S)} - X \geq 0, \lambda \geq 0. \end{aligned}$$

In what follows we examine how regulation affects trade under price and profit regulation.

Case A: Price related regulation is binding ($\mu > 0; \lambda = 0$).

If $\mu > 0$ and $\lambda = 0$, then, it follows from (3) and (5) that the optimal marginal revenue under price regulation is given by

$$(6) \quad R_q'(S) = \bar{q}(1 + \tau - \psi) + \psi c' + rK'(S)[\psi - \sigma\theta],$$

where $\psi \equiv (1-t)/(1-T)$. Total differentiation of (6) yields

¹¹See Horst (1971) for the first statement of the condition for profitable transfer pricing. In principle, for $\theta < \tau$ the restriction on the transfer price can be binding if the host country's regulation forces the parent's profits to become negative and a negative income tax in the home country is ruled out. To keep the argumentation simple we do not consider this case algebraically.

$$\frac{dS}{d\bar{q}} = -\frac{(1+\tau-\psi)}{\psi c'' + rK''(\psi - \sigma\theta) - R''}.$$

It follows from $\tau < \theta$ that $(1+\tau-\psi) < 0$ and $(\psi - \sigma\theta) > 0$. Hence, from $c''(S), K''(S) \geq 0, R''(S) < 0$ we have that $dS/d\bar{q} > 0$: a tighter regulation of the transfer price (i.e. lowering $\bar{q}$) reduces the amount exported to the US subsidiary.

*Case B: Profit regulation is binding ($\mu = 0, \lambda > 0$)*¹²

Considering now how profit regulation affects trade we have from (4) that

$$(4') \quad \lambda = K(S) \left[\frac{1-t}{1+\tau} - (1-T) \right],$$

and (5) yields

$$(7) \quad q = \frac{R(S) - K(S)X}{S(1+\tau)}.$$

Using (4') and (7) in the optimality condition (3) the marginal revenue under profit regulation is

$$(8) \quad R_x' = \left[c'(S) + rK'(S) \left(1 - \sigma \frac{\theta}{\theta+1} \right) \right] (1+\tau) + K'(S) X \psi^{-1} (\theta - \tau).$$

Total differentiation with respect to S and X shows that profit regulation, like price regulation, is trade restricting. If the multinational's host country (the US) increases the minimum profitability, X , then US imports decrease:

¹²This set up assumes that the profit restriction cannot be broken, while in reality it may be possible to break the restriction at the expense of additional taxes. It can be easily shown, however, that it cannot be optimal for a multinational to violate the minimum profitability imposed by the US. Intuitively, assume the reported profitability of the subsidiary to be below the minimum profitability. Then a marginal decrease in q would be profitable since it would lower the Finnish tax bill, while it would not increase the US tax based on minimum profitability. The decrease in q , however, would, in turn, increase the reported US profitability and would eventually end the violation of minimum profitability.

$$\frac{dS}{dX} = - \frac{K' \psi^{-1}(\theta - \tau)}{\left[c' + rK' \left(1 - \sigma \frac{\theta}{\theta + 1} \right) \right] (1 + \tau) + K'' X \psi^{-1}(\theta - \tau) - R''} < 0$$

To conclude then, it follows from (6) and (8) that any binding regulation (price or profit) leads to an anti-trade bias compared to a situation without binding transfer pricing regulation. It is therefore clear that the highest amount of trade occurs if no regulation is binding and the multinational can avoid paying any of the (higher) US taxes. If, additionally, the trade reducing tariff rate is set to zero, the resulting trade is identical to the amount of trade without any taxes or tariffs ($R' = c' + rK'$). To see this, note that in a situation where all US taxes can be avoided, the only relevant tax rate would be the Finnish one which, in our model, acts like a non-distortive tax on the firm's pure profits. For further discussion, it is useful to relate this maximum level of trade (the no-tax trade amount) to regulation in the following way.

*DEFINITION 1: A trade neutral regulation system (price or profit) leads to the no-tax trade amount (NTTA), i.e., to the amount of trade the multinational would conduct in the case of zero tax and tariff rates in both countries.*¹³

As argued above, a price regulation which urges the multinational to use a less than profit maximizing price will reduce exports. The lowest price which is justifiable on the basis of the arm's length principle is the marginal cost price ($q = c'$). Hence, if price regulation is used, marginal cost pricing yields the lower boundary for trade. As a reference case to the discussion on regulation we therefore introduce a further definition:

¹³Regulation that leads to NTTA is sometimes referred to in the literature as the free trade outcome (e.g. Eden 1985).

DEFINITION 2: *The arm's length trade amount (ALTA) denotes the amount of trade that occurs if the multinational is required to trade at the marginal cost price of the supplying unit ($q = c'$), i.e., at the arm's length price that would result from perfect competition.*

In using Definition 2 we are not saying that international trade is always conducted under perfect competition. Indeed, the fact that the model's subsidiary enjoys market power in its output market suggests that this may be due to the uniqueness of the traded good S . Nevertheless, the assumption of a marginal cost price is an interesting one. First, we strongly suspect that a regulating government would not allow a regulated arm's length price that reflects monopoly power. Second, for the purposes of the following analysis the marginal cost price will prove to be a useful benchmark case for inspecting trade patterns even if the regulating government may for some reason accept market power related transfer prices.

In the next section we examine the requirements for NTTA and ALTA under price and profit regulation.

2.1 Neutral Regulation

If *price regulation* is to achieve NTTA, then R' must equal $c' + rK'$ and from equation (6) it follows that the transfer price must be set equal to

$$(9) \quad \bar{q}^{NTTA} = \frac{\theta}{\theta - \tau} [c'(\bar{S}) + r(1 - \sigma)K'(\bar{S})],$$

where $\bar{S}$ denotes the trade occurring with NTTA. Note that in this set up the multinational cannot manipulate the transfer price as it is fixed by the government.¹⁴

¹⁴In the case where marginal cost depends on the trade level, i.e., $c'' > 0$, this assumes that the government has knowledge of the cost curve. This assumption applies throughout the paper for the case of price regulation.

From (9) we see that if $\tau=0$ and $\theta>0$, then, a requirement for NTTA is $\bar{q} = c'(\bar{S}) + r(1-\sigma)K'(\bar{S})$, that is, the multinational must be allowed to shift its total marginal financing cost back to the exporting subsidiary. For $\tau>0$, NTTA can only be reached for a higher $\bar{q}$. To gain intuition for (9) first consider the benchmark case $\tau=0$. The relatively high US income tax rate reduces the subsidiary's capital stock and trade. However, if the total marginal financing cost can be shifted to Finland, either by debt finance or by using the transfer price, then the effect of the high US income tax is nullified since the marginal unit of capital escapes US taxation. An increase in the tariff rate increases the cost of importing and reduces trade. Therefore, to keep the NTTA, a higher tariff requires a loosening of regulation as the later increases trade.

In the case of *profit regulation*, the minimum profitability which leads to NTTA can be derived from (8), again using the condition $R' = c' + rK'(S)$:

$$X^{NTTA} = \frac{(1-t) \left[\tau(c'(S) + rK'(S)) - (1+\tau)r\sigma K'(S) \frac{\theta}{\theta+1} \right]}{K'(S)[(1-T)(1+\tau) - (1-t)]}.$$

Since the denominator on the RHS is negative, we see from the last term in the numerator that a sufficiently large amount of debt finance ($\sigma > 0$) is among the necessary conditions for profit regulation ($X > 0$) to achieve NTTA. Put differently, NTTA under profit regulation *cannot be achieved* if there is only equity finance. The intuition is straightforward. NTTA is only reached if no taxes and tariffs are paid to the host country. Thus, introducing a minimum profitability is only neutral if debt financing sufficient to avoid host country taxes is allowed.¹⁵

¹⁵Note that debt financing cannot avoid tariffs. Therefore, with $\tau > 0$, NTTA cannot be implemented by profit regulation. The equation which defines X in the NTTA case is only applicable if total taxable profits in the US are non-negative.

2.2 Arm's Length Trade

Most countries' tax legislation requires trade between subsidiaries to be undertaken at arm's length prices. As pointed out above, one possible way to interpret this concept is to use marginal cost prices. Therefore, the question we ask in this section is which minimum profitability X the US tax authorities must require to implement the same amount of trade, $\tilde{S}$, as under price regulation with $\bar{q} = c'(\tilde{S})$. Equating R_q' and R_x' from eqs. (6) and (8) for $\bar{q} = c'$, we derive the condition under which profit regulation leads to ALTA as

$$(10) \quad X = r \left[\frac{1-t}{1-T} - \sigma\theta \right].$$

Equation (10) shows an interesting feature of profit regulation. To achieve the same amount of trade as under marginal cost pricing, the regulator needs no information on cost or revenue curves. The information required is simply the interest rate, the tax rates, and the subsidiary's fraction of debt finance. Equation (10) makes it clear that the information requirement needed to induce arm's length trade by using profit regulation is much weaker than with direct price regulation (cf. eq. (6) which shows that the regulator must have information about the firm's cost curve). To gain intuition for eq. (10), take the pure equity case ($\sigma = 0$). If the multinational were to trade at arm's length prices it would voluntarily invest in the US until the net of tax returns on the marginal unit of capital in both countries were the same. Let $G(K)$ denote gross profits in the US, then $G'(1-T) = r(1-t)$ holds in the firm's optimum. Now compare a profit regulation which exogenously imposes the minimum profitability $X = r(1-t)/(1-T)$. For a marginal investment decision this is equivalent to a situation where all US gross profits can be repatriated by transfer pricing¹⁶ but where the marginal unit of

¹⁶Note that repatriation by using transfer pricing subjects the marginal profit to the Finnish tax rate, t .

capital pays a fee of $rT(1-t)/(1-T)$ which reduces the Finnish tax bill by $rt(1-t)/(1-T)$.

In the optimum, therefore, we have:

$$(1-t)G = r(1-t) + rT \frac{1-t}{1-T} - rt \frac{1-t}{1-T} \Leftrightarrow G = r \frac{1-t}{1-T}.$$

Since profit regulation reproduces the marginal condition under arm's length pricing, the same amount of investment and trade evolves. From equation (10) it is clear that a profit regulation scheme that disregards the income tax rates in both countries will, in general, not lead to ALTA. This would, e.g., apply for the US CPM, where the average industry profitability among US firms is used as a yardstick for X .

Having derived constellations under which price and profit regulations lead to the same trade pattern, we can now look at the differential impact on the transfer price that relates to these trade patterns under each type of regulation. In particular, we compare how the transfer price is set if ALTA is to be achieved by both types of regulations. Inserting X as given in eq. (10) into the binding Kuhn-Tucker condition (8), yields the transfer price with profit regulation and ALTA:

$$(11) \quad q_X^{ALTA} = \frac{R(S)}{S(1+\tau)} - r \frac{K(S)(\psi - \sigma\theta)}{S(1+\tau)}.$$

Conversely, if ALTA is to be achieved via price regulation, then rearranging (3) gives

$$(12) \quad q_q^{ALTA} = \frac{R'(\tilde{S})}{(1+\tau)} - r \frac{K'(\tilde{S})(\psi - \sigma\theta)}{(1+\tau)},$$

where K' and R' are evaluated at the ALTA import level, $\tilde{S}$. Since, by assumption, demand in the US market is downward sloping [i.e., $R(S)/S > R'(S)$] and the subsidiary's capital requirement is a weakly convex function of its sales in the US [$K(S)/S \leq K'(S)$], a simple comparison of (11) and (12) proves

PROPOSITION 1: *If profit regulation and price regulation are used to ensure ALTA, then profit regulation induces the multinational to ask for a higher transfer price from the importing subsidiary than price regulation does, i.e. $q_x^{ALTA} > q_q^{ALTA}$.*

Proposition 1 shows that a switch from price regulation to profit regulation which keeps the arm's length trade amount (ALTA) constant increases the transfer price. In this sense, profit regulation leads to more profits being shifted than does price regulation. Intuitively, this comes from the fact that profit regulation is a more indirect way of influencing the transfer price.

Given the higher transfer price under profit regulation, the host country may be tempted to force down the price by further tightening profit regulation. Independent of whether such a policy can succeed in implementing the marginal cost price, it will certainly lead to a lower trade level than under direct price regulation since a tighter regulation was shown to always reduce trade.

2.3 The Trade off between Regulation and Trade

Since both types of regulation are trade depressing it is obvious to ask which instrument is able to implement a given price at the highest amount of trade. This is also an interesting question since the host country may for some reason wish to implement a price which is different from the marginal cost price considered above. To simplify things, we concentrate on the plausible benchmark case of a constant marginal capital requirement for the subsidiary ($K(S)/S = K'(S)$). The next step is to calculate the transfer price as a function of trade, S , for both types of regulation:

$$q_q(S) = \frac{R'(S) - \psi c'(S) - rK'(S)(\psi - \sigma\theta)}{(1 + \tau - \psi)}$$

$$q_x(S) = \frac{K(S)\psi}{S(\theta - \tau)} \left[\frac{1}{K'(S)} \left(c' - \frac{R'(S)}{(1 + \tau)} \right) + r \left(1 - \frac{\sigma(T - t)}{(1 - t)} \right) \right] + \frac{R(S)}{S(1 + \tau)}.$$

For the linear capital requirement it can readily be shown that

$$D \equiv q_x(S) - q_q(S) = \frac{1}{1 + \tau} [R(S)/S - R'(S)] > 0.^{17}$$

Since the $q_q(S)$ function is positively

sloped and the $q_x(S)$ function lies strictly above the $q_q(S)$ function, we can prove the following proposition which is illustrated in Figure 1.

PROPOSITION 2: *If the subsidiary's capital requirement, $K(S)$, is linear in S , then any transfer price which can be implemented by both types of regulation is related to a lower amount of trade if implemented via profit regulation.*

Figure 1: Regulating the importing subsidiary

The fact that profit regulation yields less trade, i.e. fewer imports to the host country, highlights the possibility that advocates of the CPM may be found not only among those who

¹⁷Note that the price difference D may not be positive throughout if $K''(S) > 0$. As Proposition 1 makes clear, however, this holds in the proximity of ALTA.

wish to preserve the host country's tax revenues, but also among those who have protectionistic intentions.

3. Exporting Subsidiaries

In this section we consider the case where the subsidiary is producing in the US and sells to the Finnish parent. While this case may be less frequent, it obviously completes the analysis of trade flows.¹⁸ In the following, S denotes the exports of the subsidiary rather than the parent and τ is the Finnish tariff rate rather than the US rate. $R(S)$ is the Finnish parent's revenue function. The Lagrangian can be written now as

$$(13) \quad L = (1-t)[R(S) - qS(1+\tau) - rK(S)(1-\sigma)] + (1-T)[qS - c(S) - r\sigma K(S)] \\ + \mu[q - \bar{q}] + \lambda \left[\frac{qS - c(S)}{K(S)} - X \right]$$

This yields as necessary conditions for a firm optimum:

$$(14) \quad L_S = (1-T)[q - c'(S) + r\sigma K'(S)] + (1-t)[R'(S) - q(1+\tau) - rK'(S)(1-\sigma)] \\ + \lambda \frac{[[q - c'(S)]K(S) - K'(S)[qS - c(S)]]}{K^2(S)} = 0$$

$$(15) \quad L_q = S(1-t) \left[\frac{t-T}{1-t} - \tau \right] + \mu + \frac{\lambda S}{K(S)} = 0.$$

The complementary slackness conditions are stated by

¹⁸Most empirical surveys show that market access is one of the single most important motivations for foreign direct investment (Dunning 1985). This suggests that most foreign subsidiaries are net importers rather than exporters.

$$(16) \quad [q - \bar{q}] \cdot \mu = 0, \text{ where } q - \bar{q} \geq 0 \text{ and } \mu \geq 0,$$

$$\left[\frac{qS - c(S)}{K(S)} - X \right] \cdot \lambda = 0, \text{ where } \frac{qS - c(S)}{K(S)} - X \geq 0 \text{ and } \lambda \geq 0.$$

From (15) and (16) it is clear that the host country's regulation only becomes binding if $\tau > (t - T) / (1 - t)$. Since the US is assumed to be the high tax country ($T > t$) this is always the case and the subsidiary always wishes to charge a low transfer price. Moreover, we assume that the tariff rate τ is small compared with the Finnish tax rate t . More precisely, we impose $1 - (1 - t)(1 + \tau) > 0$ which, for example, is satisfied if $\tau < t$.¹⁹ In the reverse case, $1 - (1 - t)(1 + \tau) < 0$, the use of the Kuhn-Tucker approach to modeling the profit regulation is not generally valid: the multinational could be induced to reduce the profitability below the required minimum. While this would imply a tax cost, the reduced tariff could be over-compensating.

Again the requirements for NTTA and ALTA under price and profit regulation are to be compared.

3.1 Neutral Regulation

Under price regulation, NTTA is achieved if the regulated transfer price, $\bar{q}$, satisfies

$$(17) \quad \bar{q}^{NTTA} = [c'(\bar{S}) + r\sigma K'(\bar{S})] \frac{1 - \psi^{-1}}{1 + \tau - \psi^{-1}},$$

and $\bar{S}$ equals the NTTA exports.

¹⁹This is a most reasonable assumption. In 1990, e.g., the average tariff rate on EU member states' total imports was 1.1%. For imports from outside the EU the figure was 2.6%. See Weichenrieder (1995, p. 101).

From (17) it is clear that if $\tau = 0$, then NTTA requires $\bar{q}$ to equal marginal tax deductible cost, i.e., the effective marginal tax rate is zero in the host country. For $\tau > 0$, NTTA can only be reached if $\bar{q}$ is lower than marginal tax deductible cost. This result lends itself nicely to an intuitive interpretation. In the absence of a tariff, differences in national tax rates do not matter since financing costs can be shifted either by transfer pricing or by using debt finance. Comparing this result to those obtained when the US subsidiary was an importer (cf. equation (9)), we see that the policy implications are similar in the absence of tariff policy. Under positive tariffs, however, results are reversed. When the US affiliate is an importer, the transfer price under tariff policy must be above the marginal cost of exporting to achieve NTTA, while the opposite is true when the affiliate is an exporter.

Turning to the case of profit regulation it follows that with $\lambda > 0$, $\mu = 0$, from the binding Kuhn-Tucker condition (16) we have

$$(18) \quad q = X \frac{K(S)}{S} + \frac{c(S)}{S}.$$

Using (14), (15) and (18), and equating R' to $c'(S) + rK'(S)$ yields

$$(19) \quad X^{NTTA} = \frac{r\sigma[1 - \psi^{-1}] + \tau c'(S) / K'(S)}{1 + \tau - \psi^{-1}}.$$

Once more it is useful to highlight the case $\tau = 0$ first. Then, NTTA requires $X = r\sigma$, and all the subsidiary's profits are repatriated as interest payments, i.e., the host country's tax revenue is zero. At face value, equation (19) suggests that, for NTTA, X should increase in τ . However, this is misleading. Starting from $X = r\sigma$ and $\tau = 0$, an increase in the tariff rate makes taxable profits in the host country negative. Hence, the Kuhn-Tucker condition does not bind and (19) is not applicable. As a result, there is no way of counteracting the trade depressing effect of τ by manipulating X . To summarize, if profit regulation is used in the case

of an exporting subsidiary, NTTA can only be implemented with zero tariff rate and implies zero tax revenues in the host country.

Having derived the transfer price and the value of X that yields NTTA, we proceed to compare how the transfer price is set under both types of regulation if the required trade level is NTTA. Since we know from (19) that $\tau = 0$ is required for profit regulation to achieve NTTA, we can use this property in (19) as well as the binding Kuhn-Tucker condition, to obtain:

$$(20) \quad q_{x,\tau=0}^{NTTP} = \frac{K(S)}{S} r\sigma + \frac{c(S)}{S}.$$

If price regulation is used instead, from eq. (17) - setting the tariff rate equal to zero for the purpose of comparison - the transfer price is given by

$$(21) \quad q_{q,\tau=0}^{NTTP} = K'(\bar{S})r\sigma + c'(\bar{S}),$$

where $\bar{S}$ denotes NTTA exports. Comparing (20) and (21) we see that the transfer price under profit regulation is generally smaller than the transfer price under price regulation. Only in the special case of a linear capital requirement ($K/S = K'$) and a linear cost curve ($c/S = c'$), can both types of regulation end up with the same transfer price. We address this special case below.

3.2 Arm's Length Trade

To find the value of X that implements arm's length trade, we derive from (14) and (15) the marginal revenue function for profit regulation and equate it to the marginal revenue for the case in which the subsidiary is required to sell at the total marginal cost price ($q = c'(S) + rK'(S)$). We then find that

$$(22) \quad X = r$$

Thus, implementing ALTA by using profit regulation requires that the subsidiary's minimum profitability equals the interest rate, i.e., $X = r$. It is clear that requiring $X = r$ imposes a zero profit condition on the subsidiary in the sense that it is only allowed to earn the normal rate of return, r . Note that (22) is not a perfect analogy to the case of the importing subsidiary (cf. (10)). In contrast to the importing subsidiary case, implementing ALTA in the case of the exporting firm requires no information about tax rates and leverage so the information requirement is even less. This difference comes from the fact that the revenue function $R(S)$ has been dropped from the profit restriction.

Using (22) in the binding Kuhn-Tucker restriction yields the transfer price in the case of profit regulation and ALTA:

$$q_x^{ALTA} = r \frac{K(S)}{S} + \frac{c(S)}{S}.$$

In comparison, the regulated arm's length price under price regulation is

$$q_q^{ALTA} = rK'(\tilde{S}) + c'(\tilde{S}),$$

By using $c''(S) \geq 0$, $K''(S) \geq 0$, we may make the following statement

PROPOSITION 3: *If regulation leads to ALTA, then*

- (a) *If either the capital requirement or the cost function are strictly convex, the transfer price under profit regulation is smaller than the price under price regulation ($q_x^{ALTA} < q_q^{ALTA}$).*
- (b) *If the capital requirement and the cost function are linear (i.e., $K/S = K'$ and $c/S = c'$), then q is independent of the chosen regulation.*

Since the firm, for tax reasons, prefers a low transfer price, part (a) of Proposition 3 implies that profit regulation is a relatively worse instrument for preventing profit shifting. Like in the case of the importing subsidiary this comes from the fact that profit regulation is a more indirect instrument. Part (b) of the proposition indicates an exception to this if $c'(S) = K'(S) = 0$. In this linear case it follows – using $K(S) = \alpha \cdot S$ and $c(S) = \beta \cdot S$, $\alpha, \beta > 0$ in (18) – that dq/dX is a constant. As a consequence, it does not matter whether authorities regulate q directly or indirectly via X . The proportional change in q and X makes sure that any combination of trade and transfer price which can be achieved by regulating q can also be implemented by choosing X .

If costs are convex, however, the host country may be frustrated with the fact that the ALTA price under profit regulation is lower than marginal cost, $rK' + c'$. If this leads the government to tighten profit regulation, then the resulting trade will be pushed below ALTA.

Moreover, if the cost structure is convex, $\frac{K(S)}{K'(S) \cdot S} = \frac{c(S)}{c'(S) \cdot S} < 1$, we may state²⁰

PROPOSITION 4: *For any given transfer price which can be implemented by both instruments trade is lower under profit regulation than under price regulation.*

PROOF: See appendix.

Figure 2 illustrates Proposition 4 for the case of convex costs and zero tariff (i.e., the case in which NTTA can be reached by profit regulation). Note in particular that for any desired amount of trade, S , the transfer price is lower under the profit regulation scheme than the price regulation scheme. Profit regulation therefore allows the multinational to shift more profits than does price regulation. At the same time, like in the case of the importing

²⁰ A sufficient condition for Proposition 4 to hold if $K(S)/[K'(S) \cdot S]$ and $c(S)/[c'(S) \cdot S]$ differ is given in the appendix.

subsidiary, profit regulation introduces an anti-trade bias compared to price regulation if the two measure are to implement the same transfer price.

Figure 2: Regulating the exporting subsidiary

4. Conclusions

There are many ways in which a government can curb transfer pricing by multinationals. This study investigates the effect on intra-firm trade of regulating multinationals by either direct price regulation or by profit regulation. An interesting conclusion which emerges from this analysis is that profit regulation is superior in the sense that it requires less information about multinationals' cost functions to implement the amount of trade which would occur between separate firms using marginal cost prices (ALTA). We suspect fiscal authorities will, however, be more interested in fighting distorted transfer prices than in implementing neutral trade patterns. The study shows that international trade reduction is larger if arm's length prices are implemented using profit regulation rather than direct price regulation. While the trade reducing effect is possible for both an importing and an exporting subsidiary, we find it likely

that the reduction in international trade from the profit regulation is larger in the importing case. One reason is that, when an affiliate is an exporter, the profit regulation induces neutral trade if marginal costs are constant.

From the findings of the paper it is clear that the anti-trade bias of the CPM makes it a welcome instrument for protectionism and strategic trade policy. Thus, in contrast to recent discussions about the CPM and its impact on the international allocation of tax revenues, the analysis suggests that the CPM should also be discussed from a GATT perspective.

Finally, our model is clearly quite simplistic. We hope that the approach will suggest other topics for research in the field. Various generalisations of the present model may be worthwhile. One possibility is to extend the model to take into account strategic responses to regulation from other governments. In doing this it may be feasible to discover some interesting connections between incentives for limiting transfer pricing and national sovereignty in tax policy matters. It would also be of interest to see a discussion of optimal regulation rather than the stylised varieties of existing approaches. The policy tools available to the government for the purpose of counteracting transfer pricing are tax and tariff rates and various measures which compare performance relative to industry standards. To assess the efficiency of the complete set of tools, transfer pricing and profit shifting within the framework of optimal taxation theory would need to be analysed.

Appendix

Proof of Proposition 4: Define $h_K \equiv K(S) / (K'(S) \cdot S)$, $h_c \equiv c(S) / (c'(S) \cdot S)$ and $\alpha = (1 + \tau)(1 - t) - (1 - T)$. Then, from (14), (15) and (16) the difference in the transfer prices under profit and price regulation can be written as

$$\begin{aligned}
\Delta(S) \equiv q_q(S) - q_x(S) &= \frac{c'(S)}{\alpha} [(h_k - h_c)(1+\tau)(1-t) - (1-h_c)(1-T)] \\
(A1) \quad &+ \frac{1-t}{\alpha} [R'(S) - rK'(S)](1-h_k) \\
&+ \frac{r\sigma K'(S)}{\alpha} [(T-t)(1-h_k)]
\end{aligned}$$

It has been shown above that NTTA is the largest amount of trade that can be implemented by a binding profit regulation. We can therefore concentrate on trade patterns that imply less trade than NTTA. Since under NTTA we have $R' = c' + rK'$, with less trade than NTTA it follows that

$$R'(S) > c'(S) + rK'(S) \Leftrightarrow R'(S) - rK'(S) > c'(S).$$

Combining with (A1) defines a lower boundary for Δ_L which is defined as the price differential if actual trade is below NTTA level:

$$\begin{aligned}
(A2) \quad \Delta_L &> \frac{c'(S)}{\alpha} [(h_k - h_c)(1+\tau)(1-t) - (1-h_c)(1-T) + (1-h_k)(1-t)] \\
&+ \frac{r\sigma K'(S)}{\alpha} [(T-t)(1-h_k)]
\end{aligned}$$

For $h_k = h_c = 1$, $\Delta_L = 0$. For $h_k = h_c < 1$ from inspection of (A2) we have $\Delta_L > 0$ for $T > t$. ■

If h_k and h_c differ and fall short of unity, then a sufficient condition for $\Delta_L > 0$ is given if the

inequalities $\tau < \frac{T-t}{1-t} \left[\frac{1}{h_c} - 1 \right]$ and $T > t$ are satisfied simultaneously.

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