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**Tariff-induced Transfer Pricing and the CCCTB**

Ronald B Davies, University College Dublin

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# Tariff-induced Transfer Pricing and the CCCTB

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**Abstract:** The common consolidated corporate tax base has been suggested as a way to curb tax avoidance by allocating profits across borders via a formula. This paper demonstrates that when transfer pricing occurs both for tariff and tax minimization, that moving from separate accounting to formula apportionment can actually increase transfer pricing. This, combined with arm's length pricing regulations, can result in lower revenues for high-tax countries and lower overall revenues. This casts additional doubt over whether such a move would have its intended, revenue-enhancing effects.

**Key Words:** Common Consolidated Corporate Tax Base; Vertical FDI; Formula Apportionment; Transfer Pricing

**JEL Codes:** F24; F36; H25; H87

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## 1. Introduction

The use of tax planning by multinational enterprises (MNEs) to minimize tax payments continues to be a major concern for policy makers (see, for example, the OECD's recent (2013) action plan to limit profit shifting). One of the primary ways in which MNEs do so is by using internal transactions to shift profits to low-tax jurisdictions. An oft-recommended way of eliminating this transfer pricing is the creation of a common consolidated corporate tax base (CCCTB) (see, for example, Eichner and Runkel, 2008). This would move the system for taxing MNE profits from the current approach of separate accounting (SA) to formula apportionment (FA) where, rather than via transfer pricing, the firm's worldwide profits are allocated to jurisdictions by a formula that depends on factors such as sales, payroll, and investment. The claim is that doing so eliminates the use of transfer pricing to manipulate tax bases. The purpose of this paper is to demonstrate that, contrary to such expectations, a switch from SA to FA can actually increase the use of transfer pricing and reduce tax revenues for the high tax country (as well as overall). This comes about from recognition that tax minimization is but one reason why firms use internal prices. Here, an *ad valorem* tariff imposed on an internally traded intermediate good provides the MNE with a second reason to transfer price. Depending on the relative taxes of countries, the tax-minimization and tariff-minimization uses of transfer pricing run counter to one another. As such, a change from SA to FA that eliminates tax-driven transfer pricing can exacerbate the practice. When combined with the work warning that FA can result in additional distortions as firms manipulate the factors used in the formula, it is by no means clear that changing from SA to FA will have the anticipated revenue-generating effects.<sup>1</sup>

This paper's second contribution is to model FA in the context of a vertical MNE that faces both taxes and tariffs. My focus on vertical FDI is in contrast to the existing literature in

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<sup>1</sup> Empirical evidence of such distortions are provided by Hines (2010), Riedel (2010), and Mintz and Smart (2004).

two ways. First, the bulk of the current research works with a horizontal model of FDI where the firm produces in different countries in order to sell in those locations (Markusen, 1984). This is different from the vertical model (Helpman, 1984) in which the MNE carries out different activities in different countries, producing an intermediate in an upstream country which is then converted to a final good in the downstream country and then selling this final good in both. Recent empirical work indicates that although market access driven FDI is a large part of overall FDI activity, vertical FDI is non-negligible.<sup>2</sup> This distinction between FDI motivations is more than just academic to the current issue, however, since the proposed formulas often include sales shares as a determinant of what proportion of profits must be declared in each location. With horizontal FDI, sales and employment shares mirror one another as the local employment is used to create local sales. With vertical FDI, this is not true as employment in both locations is used to produce for sales in both locations. Furthermore, just as the intermediate good is subject to tariffs in the downstream location (something considered by Schjelderup and Weichenrieder (1999) for SA), final good exports to the upstream location are themselves liable to upstream tariffs. This again is important for the formula as upstream tariffs affect the benefits to upstream sales and therefore the sales share used in apportionment. Thus, with vertical FDI, the impact on transfer pricing and the tradeoffs under SA and FA for differing levels of integration is richer than that under horizontal FDI. As such, an additional contribution is to consider the extent of transfer pricing under different levels of economic integration.

Models in this horizontal FDI vein include Runkel and Schjelderup (2011), Nielsen, Raimondos-Møller, Schjelderup (2010), Riedel (2010), Riedel and Runkel (2006), and Eichner and Runkel (2008, 2011). Some of these incorporate trade in headquarter services, that is, an input required for production in the subsidiary that acts as the conduit for transfer pricing.

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<sup>2</sup> See Davies (2008), Blonigen, et al. (2007), or Braconier, Norbäck, and Urban (2005) for evidence of vertical FDI.

However, this input is modelled as a joint input as per Markusen (1984), the use of which does not impact output in the rest of the multinational. This approach has two key differences from the current paper. First, as output is sold locally in a horizontal setting, trade barriers on the finished product have no bearing on production or sales. This eliminates one avenue in which reduced trade barriers affect firm choices and thus the allocation of profits under FA. Second, it lacks the vertical aspect of FDI in which production in one portion of the firm depends on that elsewhere. This eliminates another avenue for trade barriers to affect the relative activity levels across countries (and thus the incentive to shift profits).

A second thread of the literature compares SA and FA building from the model of Kant (1990) wherein the parent of multinational provides an input to its subsidiary who then undertakes all final goods sales. Examples of this include Eggert and Schjelderup (2005) and Nielsen, Raimondos-Møller, and Schjelderup (2003). These more vertical FDI models, however, do not include tariffs and therefore only have tax motivations for transfer pricing.<sup>3</sup> Additionally, Eggert and Schjelderup (2005) do not include sales in the apportionment formula. Nielsen, Raimondos-Møller, and Schjelderup (2003) include sales, however, their comparison of FA and SA is limited to the extent of transfer pricing and does not include tax revenues.

In the end, two major themes come out of my analysis. First, the extent of transfer pricing depends on costs, of which tariffs form a part. The way in which these are related, however, depends on relative tax rates and tariffs. In particular, since internal prices can be used to manipulate tariff as well as tax payments, under some constellations of parameters, a switch to FA can actually increase price manipulation. Second, a switch to FA can lower tax revenues for

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<sup>3</sup> Kant (1990), Schjelderup and Sjørgard (1997), Schjelderup and Weichenrieder (1999), and Bernard, Jensen, and Schott (2006) do include tariffs on the intermediate good but not sales of the final good. However, none of these consider FA. Haufler, Klemm, and Schjelderup (2008) consider a political economy model with SA with a vertical multinational and consider how changes in integration – modelled as the cost of doing business overseas – affects voting behaviour.

the high-tax country, the low-tax country, and/or overall. This occurs for two reasons. First, there is the potential for increased transfer pricing under FA which results in lower tariff revenues. Second, under SA the arm's length pricing guidelines that drive the governments' preferred transfer price affects profits shifting. When these become irrelevant under FA, it can result in a smaller tax base being allocated to the high tax country. Together, these mean that although revenues in the high-tax country and both nations as a whole can increase, depending on the combination of taxes, tariffs, and preferred internal prices, this need not be true. As such, this provides an additional word of caution when considering implementing a CCCTB.

The paper proceeds as follows. Section 2 discusses the firm choices under the current practice of SA. In particular, it analyzes how these choices depend on both tariffs and taxes. Section 3 repeats this for FA. Section 4 then compares the two, with a particular eye on the extent of fiscal externalities and how these depend on trade barriers. Section 5 concludes.

## 2. Separate Accounting

In this section, I present a stylized version of a vertical MNE.<sup>4</sup> In doing so, I make several simplifying assumptions for tractability in order to compare the SA and FA cases. The firm produces an intermediate good in the upstream country. The constant marginal cost of producing the intermediate is  $d$ . This is then shipped to the downstream location incurring a per unit transport cost  $\gamma_d$  and an *ad valorem* tariff  $\tau_d$ . The intermediate is then used to produce a final good, where to produce a one unit of the final good the firm requires one unit of the intermediate good and must incur an additional per-unit cost  $c$ . This total final good output is then split

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<sup>4</sup> I take the location of the activities as given. These could be determined endogenously by allowing for cost differentials across locations. As this would necessitate the introduction of multiple factors of production, increasing the generality of the model but adding little to the intuition of the new results, I take the location of activities as given.

between sales in the upstream ( $f_u$ ) and downstream locations ( $f_d$ ). There is no additional cost for sales in the downstream location, however, sales in the upstream location incur another shipping cost  $\gamma_u$  and face *ad valorem* upstream tariffs  $\tau_u$ . These final good outputs are sold according to local inverse demand schedules  $P(f_d)$  and  $P_u(f_u)$  for the upstream and downstream respectively. These are decreasing and not too convex so that marginal revenue is strictly decreasing in output. Markets are segmented, prohibiting resale between countries.

In addition to choosing its production levels, the firm chooses an internal, transfer price for the intermediate good denoted by  $q$ . Following the literature, I assume that governments desire a reported transfer cost of  $\alpha d$  where  $\alpha > 1$  so that non-negative profits are reported upstream. This can be thought of as representing the standard of arms-length pricing in which a “normal” rate of return would be earned on production of the intermediate, thus  $\alpha$  would be the preferred markup over costs. The firm can deviate from this “preferred” transfer price, however, there is a cost to doing so is  $.5\phi(q - \alpha d)^2$  where  $\phi > 0$ .<sup>5</sup> In line with the literature, this cost is non- tax deductible and there is no dispute between the governments over  $\alpha$ .

Finally, the profit tax rate in the upstream location is  $t_u$  whereas that in downstream is  $t_d$ .

After-tax profits are then:

$$\begin{aligned} \pi = & (1-t_d)\left((1-\tau_u)P_u(f_u)f_u + P_d(f_d)f_d - c(f_d + f_u) - \gamma_u f_u - (\gamma_d + q(1+\tau_d))(f_d + f_u)\right) \\ & + (1-t_u)\left(q(f_d + f_u) - d(f_d + f_u)\right) - \frac{1}{2}\phi(q - \alpha d)^2 \end{aligned} \quad (1)$$

The first order conditions for the output decisions are:

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<sup>5</sup> This formulation of the costs of transfer pricing mirrors that used by Eichner and Runkel (2011) and Riedel and Runkel (2007) among others. It is often interpreted as the cost of concealment or the other efforts needed to justify a cost other than the governments' preferred transfer price.



$$\frac{d\pi}{df_d} : P_d + P_d' f_d = c + \frac{(1-t_u)}{(1-t_d)}(d-q) + \gamma_d + (1+\tau_d)q \quad (2)$$

and

$$\frac{d\pi}{df_u} : (1-\tau_u)(P_u + P_u' f_u) = c + \frac{(1-t_u)}{(1-t_d)}(d-q) + \gamma_d + \gamma_u + (1+\tau_d)q. \quad (3)$$

These equate marginal revenue with marginal costs with three unusual aspects. First, upstream marginal revenue accounts for the upstream tariff on the final good. Second, upstream costs include upstream transport costs. Third, profit taxes have an effect whenever they differ from one another. This is because the intermediate part of the production function is located in and taxed by the upstream country whereas the revenues from that production (after transformation into the final good) are taxed in the downstream country. Assuming that non-negative profits are reported upstream (i.e.  $q > d$  in equilibrium), an increase in  $t_u$  increases the right-hand sides of (2) and (3) while an increase in  $t_d$  lowers them. Defining  $\Omega \equiv (1-t_u) - (1-t_d)(1+\tau_d)$ , firm's transfer price is determined by:

$$\frac{d\pi}{dq} : q = \alpha d + \phi^{-1}\Omega(f_d + f_u). \quad (4)$$

The transfer price balances the reduction in tax payments – which includes both profit taxes and the downstream tariff, represented by  $\Omega$  – against changes in the cost of misreporting. Whether or not the firm chooses to overstate its transfer price depends on the sign of  $\Omega$ . In this, the downstream tariff pushes  $\Omega$  towards negative values, i.e. a transfer price below the preferred price. With respect to profit taxes, the firm prefers to shift profits to the low tax location. Thus, the tax motive is to set  $q < \alpha d$  if  $t_u > t_d$  and  $q > \alpha d$  when the reverse holds. If  $t_u > t_d$ , the tax and tariff motives work in the same direction, meaning that  $\Omega < 0$  and the firm sets a transfer price below zero. When the downstream tax is higher, the tariff and tax motives work in opposite directions. If the tax motive dominates, then  $\Omega > 0$  and the firm overstates the transfer price; if

the tariff motive dominates, the firm sets  $q < \alpha d$ . The tax motive for transfer pricing lies at the heart of the argument for a CCCTB because, by no longer allowing the firm to shift profits to low tax countries, it is assumed that transfer pricing will end. Nevertheless, inspection of (4) shows that even with tax harmonization, the tariff motive will result in transfer pricing. Note that this also implies that even with equal taxes, transfer pricing affects output.

It is important to recognize that the sign of  $\Omega$  indicates the *direction* of transfer pricing not its magnitude which is equal to  $q - \alpha d = \phi^{-1}\Omega(f_d + f_u)$ . I will refer to a fall in the absolute value of this difference as a reduction in the amount of transfer pricing whereas a reduction in  $q$  implies a reduction in the internal price (which means an increase in transfer pricing if  $q \leq \alpha d$ ). The extent of transfer pricing depends the cost of concealment ( $\phi$ ), the tax and tariff benefits of doing so ( $\Omega$ ), and output ( $f_d + f_u$ ). This last term comes about because the cost of transfer pricing is independent of output while the benefit is not. All else equal, a firm that sells more will have a greater incentive to reduce its costs (which include tariff costs) and therefore engage in more aggressive transfer pricing. As such, a change in a tax rate or the downstream tariff has both a direct effect on the transfer price via  $\Omega$  and an indirect effect on it from a change in total output. Note that since output changes in response to a change in the upstream tariff, this indicates that transfer pricing can as well.

To determine the total effect of taxes or tariffs, it is necessary to compute the comparative statics. Define:

$$\Delta = -\phi(1-t_d)^2 \left( P_d'' f_d + 2P_d' \right) (1-\tau_u) \left( P_u'' f_u + 2P_u' \right) - (1-t_d) \Omega^2 \left( \left( P_d'' f_d + 2P_d' \right) + (1-\tau_u) \left( P_u'' f_u + 2P_u' \right) \right)$$

which is negative by the second order conditions.

Fully differentiating (2) through (4), the impact of the downstream tariff on the transfer price is:

$$\frac{dq}{d\tau_d} = \Delta^{-1} (1-t_d)^2 \left( \begin{array}{l} \left( P_d'' f_d + 2P_d' \right) (1-\tau_u) \left( P_u'' f_u + 2P_u' \right) (1-t_d) (f_d + f_u) \\ - \Omega q \left( P_d'' f_d + 2P_d' + (1-\tau_u) \left( P_u'' f_u + 2P_u' \right) \right) \end{array} \right) \quad (5)$$

In this, there are two conflicting effects. First, there is an increase in the incentive to lower  $q$  to reduce tariff payments. However, the rise in costs reduces output, lowering the benefit from concealment. If  $\Omega \geq 0$ , implying that the firm wants to overstate the transfer price, then  $\frac{dq}{d\tau_d} < 0$ .

Evidence of such an effect is found in data on US multinational exports by Bernard, Jensen, and Schott (2006). On the other hand, when  $\Omega < 0$ , the effect is ambiguous.<sup>6</sup>

Turning to the upstream tariff, we see that:

$$\frac{dq}{d\tau_u} = \Delta^{-1} (1-t_d) \left( P_d'' f_d + 2P_d' \right) (1-t_d) \left( P_u' f_u + P_u \right) \Omega \quad (6)$$

which has the opposite sign as  $\Omega$ . Here, the transfer price does not directly depend on the upstream tariff. Nevertheless, a rise in the upstream tariff reduces upstream sales, lowering total output and reducing transfer pricing (i.e. if  $\Omega > 0$ , meaning that  $q > \alpha d$ , then  $q$  falls as  $\tau_u$  rises).

Since the existing literature does not consider vertical FDI, this effect has so far been overlooked. This is similar to the effects of the transport costs on the transfer price:

$$\frac{dq}{d\gamma_d} = -(1-t_d)^2 \Omega \Delta \left( (1-\tau_u) \left( P_u'' f_u + 2P_u' \right) + \left( P_d'' f_d + 2P_d' \right) \right) \text{ and } \frac{dq}{d\gamma_u} = -(1-t_d)^2 \Omega \Delta \left( P_d'' f_d + 2P_d' \right)$$

both of which also have the opposite sign of  $\Omega$ . As with the upstream tariff, increases in these trade barriers reduce output and indirectly reduce transfer pricing.

One implication of the tariff results is that the creation of a free trade area that reduces both tariffs, and therefore increases output, has an ambiguous effect on transfer pricing. When

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<sup>6</sup> This ambiguity arises again in the FA case where, as discussed below, depending on parameters the transfer price can be rising or falling in the downstream tariff.

the firm overstates costs, both tariff reductions encourage additional transfer pricing. When the firm understates costs, the decline in  $\tau_u$  exacerbates this overstatement. However, the fall in  $\tau_d$  reduces the need to understate costs to avoid tariffs. In general, it is ambiguous which effect dominates.

Turning to taxes and beginning with the upstream country:

$$\frac{dq}{dt_u} = (1-t_d)\Delta^{-1} \left( \begin{array}{l} \left( P_d'' f_d + 2P_d' \right) (1-t_d) (1-\tau_u) \left( P_u'' f_u + 2P_u' \right) (f_d + f_u) \\ -\Omega \left( P_d'' f_d + 2P_d' + (1-\tau_u) \left( P_u'' f_u + 2P_u' \right) \right) (q-d) \end{array} \right) \quad (7)$$

Since  $q > d$ , this again depends on the sign of  $\Omega$ , i.e. the direction of misrepresentation. For  $\Omega \geq 0$ , i.e. where the firm is setting  $q \geq \alpha d$ , (7) is negative and an increase in the upstream tax reduces the transfer price. This occurs for two reasons. First, it reduces the firm's desire to shift profits upstream because of the decline in that country's tax advantage. Second, the rise in  $t_u$  increases after-tax costs and reduces output. When  $\Omega < 0$ , an increase in  $t_u$  again pushes the transfer price down to minimize taxes. At the same time, the tax-induced output reduction leads to less misrepresentation (an increase in  $q$  in this range). This results in an ambiguous effect of  $t_u$  on transfer pricing.

Regarding the downstream tax, we see that:

$$\frac{dq}{dt_d} = \Delta^{-1} (1-t_d) \left( \begin{array}{l} \frac{(1-t_u)}{(1-t_d)} (q-d) \Omega \left( P_d'' f_d + 2P_d' + (1-\tau_u) \left( P_u'' f_u + 2P_u' \right) \right) \\ - (1+\tau_d) (f_d + f_u) \left( P_d'' f_d + 2P_d' \right) (1-t_d) (1-\tau_u) \left( P_u'' f_u + 2P_u' \right) \end{array} \right) \quad (8)$$

As before, there will be two effects, one arising from the desire to move profits (the second term) and the other from changes in output (the first term). In contrast to the upstream tax, an increase

in  $t_d$  lowers costs and increases output, thus leading to more transfer pricing. When  $\Omega \geq 0$ , these work in the same direction, increasing both  $q$  and the amount of transfer pricing. When  $\Omega < 0$  and the firm is understating costs, these work in opposite directions, resulting in an ambiguous effect.

### 3. Formula Apportionment

Under FA, the firm does not declare separate profits subject to local taxation, instead, worldwide profits are allocated to each jurisdiction according to a formula. Common elements of proposed formulas include payroll, capital investment, and sales. Since there is no capital/labor trade-off in this model, I consider a formula based on sales and factor expenditures. Thus, when  $\kappa$  is the weight in the formula applied to sales shares, this results in an effective tax rate,  $t^e$ , of:

$$t^e = t_d \left( \kappa \frac{P_d f_d}{P_d f_d + P_u f_u} + (1 - \kappa) \frac{c}{c + d} \right) + t_u \left( \kappa \frac{P_u f_u}{P_d f_d + P_u f_u} + (1 - \kappa) \frac{d}{c + d} \right) \quad (9)$$

i.e. a weighted average of the two countries' taxes. Note that these weights depend not just on the formula's weight  $\kappa$ , but on relative sales (which unsurprisingly depend on tariffs) and the share production costs in each country. This then results in an after-tax profit of:

$$\pi = (1 - t^e) \left( (1 - \tau_u) P_u (f_u) f_u + P(f_d) f_d - (c + \gamma_d + \tau_d q + d)(f_d + f_u) - \gamma_u f_u \right) - .5\phi(q - \alpha d)^2 \quad (10)$$

It will be useful to define  $\Pi = P f_d + (1 - \tau_u) P_u f_u - (c + \gamma_d + d + \tau_d q)(f_d + f_u) - \gamma_u f_u$  which is the world-wide tax base. From this, the first order conditions for outputs are:

$$\frac{d\pi}{df_d} : P_d + P'_d f_d = c + \gamma_d + d + \tau_d q - \Pi \frac{(t_u - t_d)}{(1 - t^e)} \kappa \frac{P_u f_u}{(P_d f_d + P_u f_u)} \frac{P'_d f_d + P_d}{(P_d f_d + P_u f_u)} \quad (11)$$

and

$$\frac{d\pi}{df_u} : P_u' f_u + P_u = (c + \gamma_d + d + \tau_d q) - \gamma_u + \Pi \frac{(t_u - t_d)}{(1 - t^e)} \kappa \frac{P_d f_d}{(P_d f_d + P_u f_u)} \frac{P_u' f_u + P_u}{(P_d f_d + P_u f_u)}. \quad (12)$$

Again, these equate marginal revenues and marginal costs. A new consideration, however, is that since sales in one location increase the tax base allocated to that location, it creates a new marginal cost of selling in a particular market. When  $t_u > t_d$ , this reduces tilts sales towards the downstream country. When  $t_u < t_d$ , it gives the firm an added incentive to sell upstream. Turning to the transfer price:

$$\frac{d\pi}{dq} : q = \alpha d - \phi^{-1} (1 - t^e) \tau_d (f_d + f_u). \quad (13)$$

Unlike the SA case, the firm will always understate the internal price for a positive downstream tariff. This is because under FA, there is no tax motive to transfer pricing. This is commonly taken to mean that transfer pricing is mitigated by FA. However, as is shown in the next section, this need not be the case, particularly when the desire to shift profits works counter to the desire to avoid tariffs under SA. Nevertheless, this indicates that transfer pricing will persist as long as tariffs are positive.

As before, how firm choices move in tax and tariff space is generally ambiguous.

Although there is no longer any ambiguity about the direction of misrepresentation, it again depends on both the downstream tariff and total output. Further, the complications introduced by changes in the effective tax rate make it impossible to find analytic comparative statics.

Nevertheless, utilizing the intuition from the SA case gives some guidance on *a priori* expected effects. First, an increase in the upstream tariff lowers output and reduces the desire to transfer price. Second, an increase in the downstream tariff has an ambiguous effect on the transfer price because it both increases the tariff motive for setting a low  $q$  and reduces output, pushing  $q$  towards  $\alpha d$ . Third, an increase in the effective tax (holding the tax difference constant) reduces

output. Via both this mechanism and its direct effect, an increase in the effective tax would reduce transfer pricing. In order to examine these further, I turn to simulations. To do so, I assume that both are linear where  $P_d(f_d) = A - Bf_d$  and  $P_u(f_u) = A_u - B_u f_u$ . Table 1 lists the baseline parameter values for these simulations. As will be seen, the impact is often dependent on parameter values. Thus, my goal in these simulations is to illustrate the counter-intuitive possibilities arising from a move from SA to FA, not to make predictions on the potential effects from a particular situation.

Figure 1 illustrates the transfer price as a function of taxes. It does so by considering a range of  $t_d$  and three values of  $t_u$ , .2, .3, and .4. As can be seen, an increase in either tax rate increases the transfer price, bringing it closer to the preferred price (which in these simulations is 20). This is because increases in either tax increase the effective tax (although, due to the ability to manipulate the weights, the firm can partially mitigate this by shifting sales). This reduces the benefit to misrepresentation but not its cost, resulting in a transfer price closer to  $\alpha d$ .

Figure 2 considers the impact of the downstream tariff. From this, three things are seen. First, when  $\tau_d = 0$  and there is no tariff motive for transfer pricing, the transfer price equals the preferred price. Second consistent with Figure 1, for  $\tau_d > 0$ , higher upstream taxes result in less transfer pricing. Third, as  $\tau_d$  rises,  $q$  falls in order to minimize tariff payments. This latter result, however, is sensitive to parameter values. Increasing the upstream cost from 10 to 30 results in Figure 3.<sup>7</sup> Now the transfer price can be increasing in  $\tau_d$  for higher downstream tariffs. This is because output levels are increasingly sensitive to tariffs, meaning that output effect dominates the tariff motive for transfer pricing. This illustrates the ambiguous effects discussed above.

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<sup>7</sup> Note that as the upstream cost is higher, so too is the governments' desired transfer price (now equal to 90).

Figure 4 illustrates the impact of the upstream tariff.<sup>8</sup> Unlike  $\tau_d$ ,  $\tau_u$  affects transfer pricing only via the volume of production. As such, as this tariff rises, output and transfer pricing fall.<sup>9</sup> Combining this with the downstream tariff results indicates that a mutual reduction in tariffs will have an ambiguous effect on transfer pricing even under FA (and even when ignoring potential non-monotonicities in the downstream tariff's effect).

#### 4. A Comparison of SA and Formula Apportionment

The above illustrates how firm choices move in the various government policies under a given system. This, however, is not the true heart of the calls for a CCCTB. Instead, proponents hail the reductions in transfer pricing (and attendant increases in tax revenues) for given tax parameters, in particular for the high-tax country. Such a move is criticized by those who suggest that FA can result in additional distortions and potential increases in tax competition. In this section, I compare the two systems.

##### *4.1 Transfer Pricing Under Separate Accounting versus Formula Apportionment*

To begin with, Figure 5 compares the transfer price for SA and FA as it varies with the downstream tariff. The top panel is where the upstream tax is higher than the downstream tax and the bottom is where the upstream country is the low tax nation. I omit the case of equal taxes because in that situation, there is no tax motive for transfer pricing under SA, resulting in equal transfer prices (and outputs) under SA and FA for a given  $\tau_d$ . In both cases, an increase  $\tau_d$  reduces the transfer price as the firm seeks to lower tariff payments. When  $t_u > t_d$ , the firm sets a lower transfer price under SA than FA. This is because, in addition to tariff avoidance, SA

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<sup>8</sup> Although omitted for space, comparable to the SA case, the effects of the upstream and downstream transport costs look similar to the upstream tariff since they operate only via the change in output.

<sup>9</sup> Note that here, because the downstream tariff is positive, the firm is setting  $q < ad$ .



encourages a low transfer price for tax avoidance. Recalling that the preferred transfer price is 20, this reflects the belief that a switch from SA to FA reduces transfer pricing. However, when  $t_u < t_d$ , this is no longer true. Here, the conflicting tariff and tax motives under SA result in a higher transfer price than under FA. Further, the extent of transfer pricing can rise or fall when switching from SA to FA. When the tariff motive for transfer pricing is small (i.e.  $\tau_d$  is low), FA again has less transfer pricing. However, when the non-tax motives for transfer pricing are large, SA results in a smaller deviation between  $q$  and  $\alpha d$ , i.e. less transfer pricing.

Figure 6 repeats this exercise but allows the upstream tariff to vary (with  $\tau_d = .1$ ). As before, the transfer price is higher under FA than SA when  $t_u > t_d$  and lower under FA when  $t_u < t_d$ . Further, a rise in  $\tau_u$ , which reduces output, reduces transfer pricing in both cases.<sup>10</sup> As can be seen, comparable to Figure 5, when  $t_u < t_d$ , a switch from SA to FA increases transfer pricing (i.e.  $q$  is further from 20) because the tax motive is no longer offsetting the tariff motive for lowering  $q$ .

#### *4.2 Tax Revenues under Separate Accounting versus Formula Apportionment*

Although part of the debate has been on the ability of FA to limit transfer pricing, the reason for this focus is because of the effect of transfer pricing on tax revenues. In particular, high tax locations believe that if the tax motive for transfer pricing is eliminated via FA, that this will increase their tax revenues. In fact, however, whether or not this holds depends on parameter values, in particular on the preferred markup  $\alpha$ . To formulate some intuition for this, consider a special case in which demands are identical, taxes are equal, there are no tariffs, and there is no

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<sup>10</sup> Although I do not present them here for space, a similar result is found for increases in either transport cost.

upstream transport cost ( $\gamma_u = 0$ ). In this case, under both SA and FA, there is no incentive to transfer price and  $q = \alpha d$ . Furthermore, sales in each location are given by:

$$f_d = f_u = \frac{A - c - \gamma_d - d}{B}$$

and worldwide pre-tax profits under each method are:

$$\pi_d + \pi_u = \frac{(A - c - \gamma_d - d)^2}{B}.$$

What does differ between methods, however is the income allocated to each country for taxation.

With SA,  $\alpha$ , the preferred markup over marginal cost of the intermediate, determines this resulting in an upstream tax revenues ( $R_u$ ) of:

$$R_u = t_u 2(\alpha - 1)d \left( \frac{A - c - \gamma_d - d}{B} \right) \quad (14)$$

which is increasing in  $\alpha$ . Under FA, the income allocated is determined by the formula, which in this special case means that half of worldwide profits are taxable in the upstream location, resulting in revenues of

$$R_u = \frac{(A - c - \gamma_d - d)^2}{2B} \quad (15)$$

which no longer depends on  $\alpha$ . Comparing (14) and (15), the upstream country loses by

switching from SA to FA when  $\alpha > \frac{A - c - \gamma_d + 3d}{4}$ . In addition, as the worldwide tax base is

the same across cases, if upstream revenues rise, this implies downstream revenues fall.

Allowing for tariffs (which enter into revenues and affect sales and transfer pricing) and upstream transport costs complicates this comparison. Therefore I again use simulations to consider how changes in trade barriers impact the revenue comparison.

Figure 7 illustrates the difference in revenues (including tariff revenues) for each country (where the difference is revenues under FA minus those under SA). In this case, the downstream

country loses revenues from the switch whereas the upstream country gains revenues. Note that this occurs even when the downstream country is the high-tax nation. This occurs for two reasons. First, the switch results in more downstream tariff-avoiding transfer pricing. However, it holds even with no tariff and equal taxes. This is because, as noted above, the shift to formula apportionment can shift the tax base to the upstream country when  $\alpha$  is low. It is important to recognize that even combined tax revenues can fall from the switch. When  $t_u = t_d$ , there is no tax motivated transfer pricing and worldwide revenues are the same across methods. When  $t_u > t_d$ , moving to FA increases worldwide revenues both because the transfer price increases (increasing downstream tariff revenues) and because more income is allocated to the high tax country. However, when  $t_u < t_d$ , the increase in transfer pricing works to reduce overall revenues.

As the above discussion suggests, the impact on a country's revenues depends on the preferred transfer price, i.e.  $\alpha$ . Figure 8 repeats the exercise of Figure 7 but with a value of  $\alpha = 3$ , i.e. with a higher preferred markup over the intermediate good's marginal cost. Now we see that which country sees a boost in revenues depends very much on the constellation of taxes and tariffs. In fact, in line with the above special case, with a higher preferred markup the upstream country can lose by the switch to FA. Furthermore, as shown in the bottom panel, worldwide tax revenues can fall under FA when the upstream country is the low tax location and tariffs are high. This is because under SA, tax avoidance keeps the transfer price – and tariff revenues – higher. The downstream tariff level also affects whether the downstream country gains or loses revenues from a switch to FA. When  $\tau_d$  is low, it benefits from FA if it is the high-tax country but loses if it is the low-tax country. These come about because of the reduction in tax motivated transfer pricing. When  $\tau_d$  is large, however, the reverse occurs because of the large reduction in the transfer price and its tariff-generated revenues.

Putting the above results together indicates that the revenue implications of moving from SA to FA depend on parameter values. In particular, they depend on the combination of tariffs and taxes (which governs changes in transfer pricing) and the preferred markup over intermediate marginal costs (which influences the allocation of profits under SA).

## **5. Conclusion**

This paper adds to the debate on the relative merits of FA and SA by considering vertical FDI which allows for a richer role for tariffs. Further, although horizontal FDI is a major component of FDI activity, recognizing the vertical nature of investment is important for understanding potential impacts of policy changes because this highlights the role of trade barriers on final goods as well as intermediates as well as the role of sales in the apportionment rule.

This distinction points out two important key points. First, transfer pricing is not driven solely by tax differentials. Indeed tariffs also lead to the manipulation of internal prices. As such, the degree of misrepresentation under SA and FA depends on taxes and tariffs. Second, the benefits in terms of tax revenue generation depend highly on parameter values. In particular, simulations find that revenues, including those for the high-tax country, can fall. Whether this occurs depends on the combination of taxes and tariffs – which together determine the direction of transfer pricing – and on the regulations determining the governments' preferred transfer price under SA. Although the model is a stylized one, the results stemming from the counteracting effects of different motives for transfer pricing would extend to more complex settings.

As a final note, in the current analysis, tariffs provide the non-tax rationale for transfer pricing. However, internal prices also play several additional roles for firms. For example, as

discussed in the overview of Hiemann and Richelstein (2012), internal prices provide a crucial means of conveying information and coordinating decisions across different parts of the firm. Furthermore, because transfer pricing affects profitability, which is often a key part of executive compensation packages, the use of internal prices is part of a firm's strategy of achieving profit-maximizing, but unobservable, effort levels from its workforce. Therefore, just as tariffs can reinforce or counter the taxes in transfer pricing, so too can managerial motives. As such, the cautions over moving towards FA provided by the current model would be found there as well.

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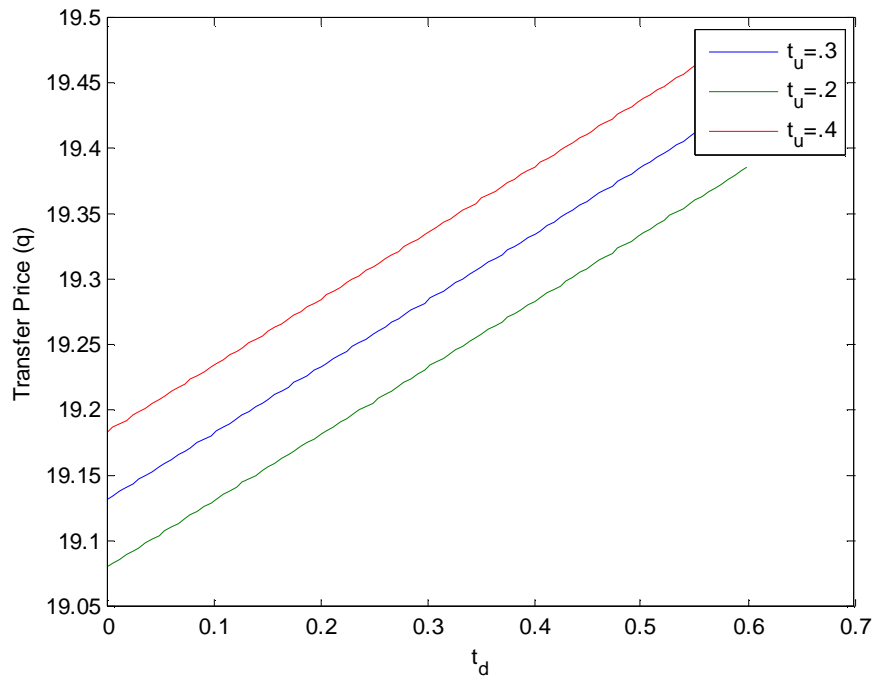
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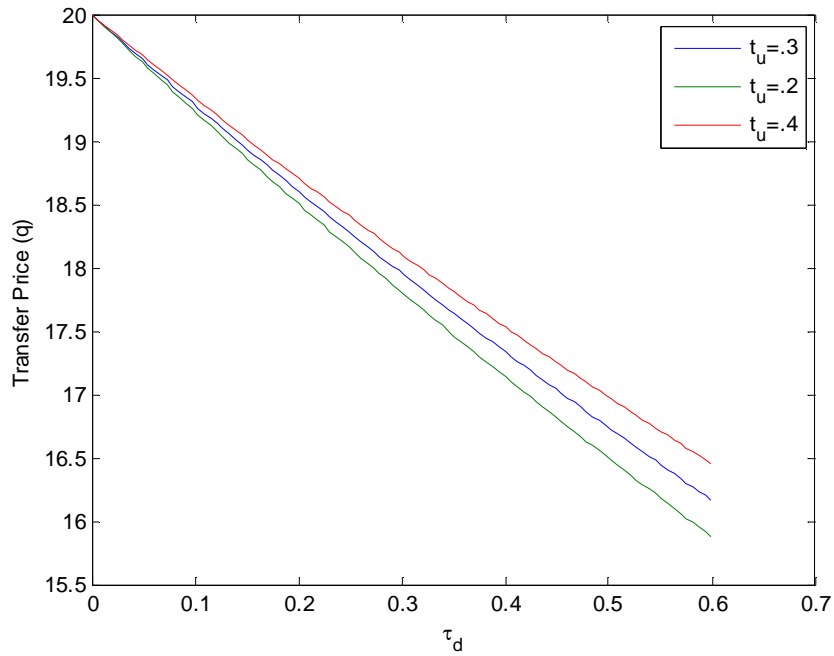
**Table 1: Baseline Parameter Values**

Parameter	Description	Baseline Value
$t_d$	Downstream profit tax	.3
$t_u$	Upstream profit tax	.3
$\tau_d$	Downstream tariff on intermediate good	.1
$\tau_u$	Upstream tariff on final good	.1
$A_d$	Intercept for downstream inverse demand	100
$B_d$	Slope for downstream inverse demand	1
$A_u$	Intercept for upstream inverse demand	100
$B_u$	Slope for upstream inverse demand	1
$\kappa$	Weight of sales in effective tax formula	.5
$c$	Downstream per-unit cost of transforming intermediate to final good	10
$d$	Upstream cost of producing intermediate	10
$\gamma_d$	Per-unit shipping cost of intermediate good	.1
$\gamma_u$	Per-unit shipping cost of final good	.1
$\phi$	Cost parameter in cost of transfer pricing	15
$\alpha$	Extent above $d$ governments want $q$	2

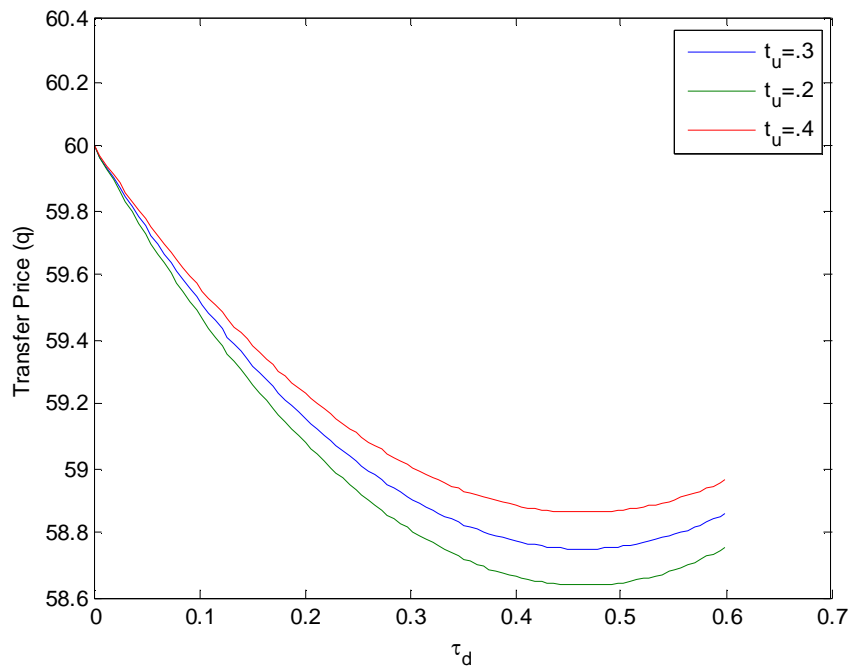
**Figure 1: Transfer Pricing under Formula Apportionment (Changes in Taxes)**



**Figure 2: Transfer Pricing Under Formula Apportionment (Changes in  $\tau_d$ )**

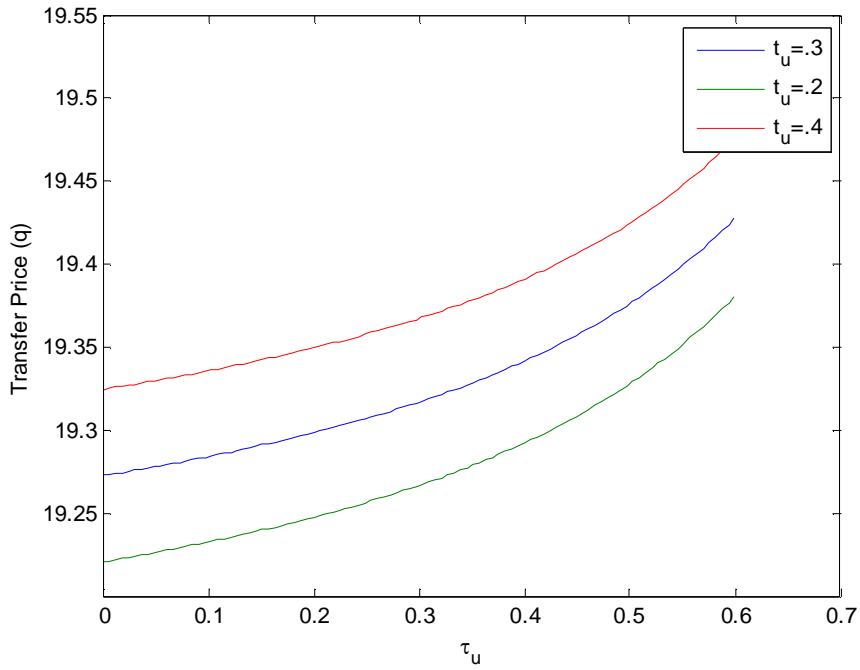


**Figure 3: Transfer Pricing Under Formula Apportionment (Changes in  $\tau_d$ ,  $c = 30$ )**

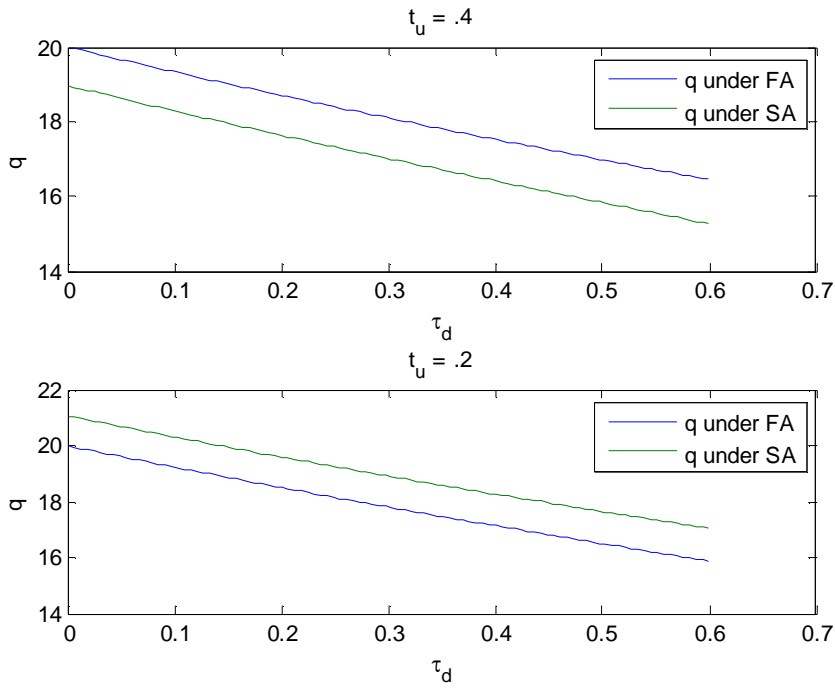




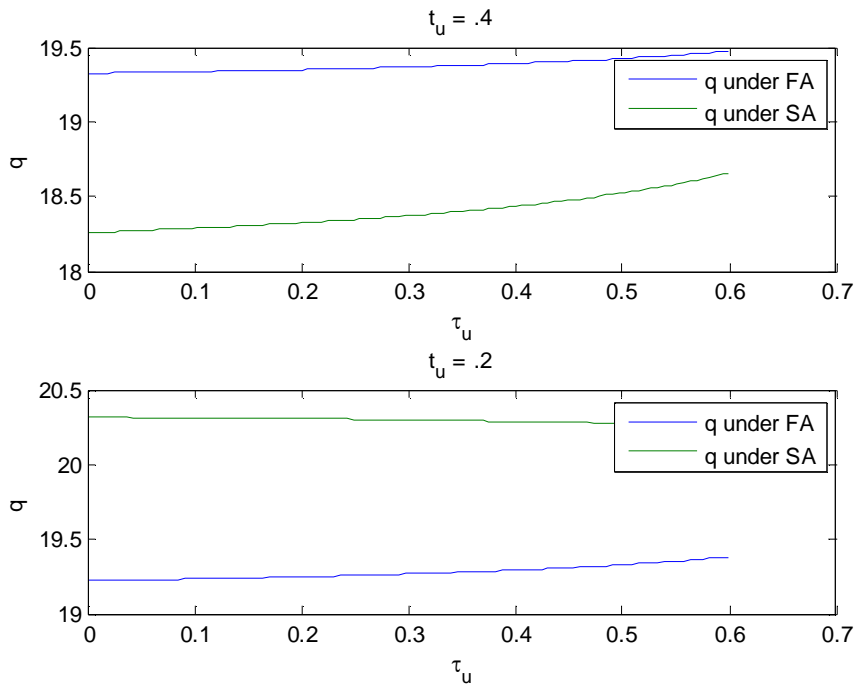
**Figure 4: Transfer Pricing Under Formula Apportionment (Changes in  $\tau_u$ )**



**Figure 5: Transfer Pricing Under SA and FA (Changes in  $\tau_d$ )**



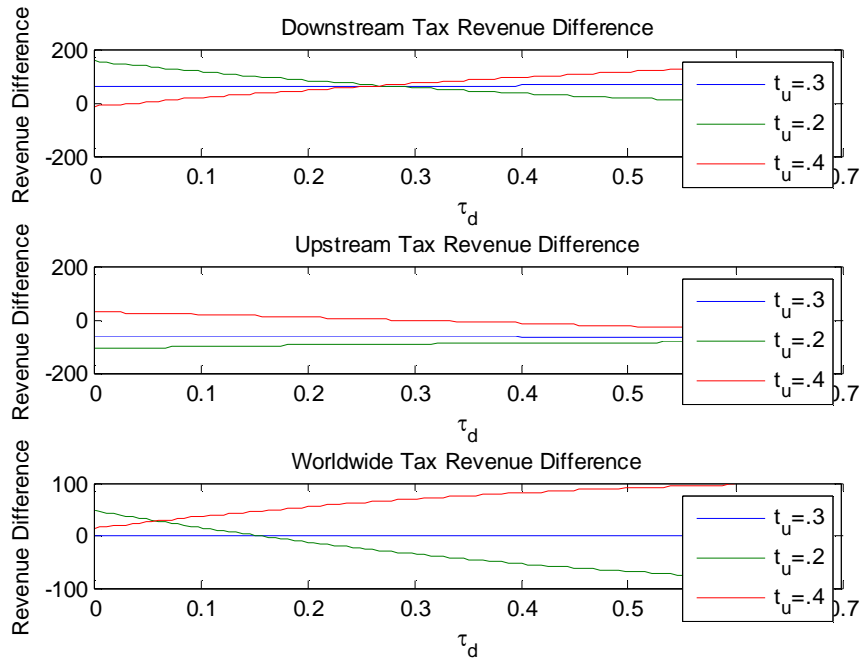
**Figure 6: Transfer Pricing Under SA and FA (Changes in  $\tau_u$ )**



**Figure 7: Revenue Difference (FA – SA) (Changes in  $\tau_d$ )**



**Figure 8: Revenue Difference (FA – SA) with  $\alpha = 3$  (Changes in  $\tau_d$ )**



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