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ABSTRACT

Corporate Taxation, Multinational Enterprise and Economic Integration*

This Paper studies how economic integration affests transfer pricing, tax policy and welfare, when multinationals are taxed either according to formula apportionment (FA) or separate accounting (SA). It is shown that economics integration induces multinationals to lower their transfer prices under both tax systems, but that transfer prices become less tax sensitive under FA than under SA. A main result of the paper is that economic integration lowers tax rates in the Nash equilibrium under SA, but leads to higher taxes in the Nash equilibrium under FA.

JEL Classification: F15, F23, H25, H87
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NON-TECHNICAL SUMMARY

This Paper addresses the outcome of international tax competition in the presence of multinationals that use transfer pricing for strategic purposes as well as to reduce their tax burden. In particular, we examine how economic integration affects tax levels, transfer pricing behaviour and national welfare under different corporate taxation regimes.

It is well known in the literature on multinationals that firms may use transfer pricing as a strategic device to increase profits in foreign markets. To see the strategic motive for transfer pricing, consider a multinational enterprise (MNE) that has a foreign subsidiary, which is active in markets with Cournot competition. Essential intermediates are supplied by the headquarters to the foreign affiliate. If the MNE sets low prices, the foreign affiliate becomes a low cost firm that behaves aggressively by selling a large quantity. Such aggressive behaviour under Cournot competition induces its local rival to behave softly by setting a low quantity. The soft response from the rival is beneficial and leads to higher profits in the foreign market as well as to increased profits for the multinational enterprise as a whole.

It is also well known from the literature that MNEs may use transfer pricing as a means of shifting profits to low tax countries. From a policy point of view transfer pricing to shift profits to low tax countries is worrisome, since the profit shifting activities threaten to undermine the fiscal autonomy of high tax countries. At least two policy options exist to curb transfer pricing. The first measure is to enforce arm's-length prices on intra-firm transactions. Not only is this difficult to achieve, but the administrative costs are also considerable. The second solution pertains to the choice of tax system. If, by choosing the 'right' system for corporate taxation, one can reduce the disparities in countries' tax bases and tax rates, incentives to shift profits would be diminished. Currently, most OECD countries use separate accounting as a foundation for their corporate tax system. Under this system accountants and tax authorities try to identify the exact receipts and expenditures attributable to the corporation's activities in each country. A problem with the separate accounting system is that the globalization of the world economy has made it ever more difficult to disentangle individual operations of multinational corporations. The alternative corporate tax system is formula apportionment, where the total income of a corporation is apportioned on the basis of a weighted formula, where the weights are, say, sales, payroll or property. Variants of formula apportionment are used in Canada, Switzerland and the US.

In our analysis we explore the interaction between corporate taxation, transfer pricing and welfare. We show that the relationship between these factors depends on the degree of economic integration and the choice of tax regime.

We show that the transfer price of a multinational is actually independent of the prevailing tax regime, separate accounting or formula apportionment. Nonetheless, the tax elasticity of the transfer price depends on the tax system and on the extent of economic integration. One important result that emerges is that the effect of increased economic integration on equilibrium taxes depends crucially on the tax regime in force. We show that the transfer price is relatively tax elastic for a high degree of economic integration under a separate accounting (SA) regime, while the opposite is true under a formula apportionment (FA) regime. As a consequence, the impact of economic integration on welfare and on the intensity of tax competition depends crucially on the choice of tax scheme. While under SA, increased economic integration leads to lower tax revenue, the opposite is true under FA.

To make a full welfare assessment it should be noted that economic integration under any tax regime affects consumer surplus positively due to enhanced competition leading to lower prices and larger quantities sold. Thus, under SA we have two opposing effects of increased integration; rising consumer surplus and falling tax rates. In contrast, with FA, consumer surplus and tax rates rise. Figure 4 indicates that an SA regime provides the highest welfare level for a low degree of integration (high trade costs), while the FA regime becomes more attractive as integration proceeds. Thus, for a high degree of economic integration, the FA regime may come to dominate the SA regime from a welfare perspective.

We find that the impact of increased economic integration on the intensity of international tax competition hinges on the choice of tax regime. Under separate accounting increased integration leads to intensified tax competition, while under formula apportionment increased integration actually reduces the intensity of tax competition. These relationships are mirrored in the relationship between economic integration and welfare under the two different tax regimes. In terms of national welfare, the SA system dominates for low degrees of integration, while the FA system becomes dominant as an integration process proceeds. Hence, our results support the view brought forward by many other economists that increased economic integration may call for a substantial reform of the corporate tax system.

1 Introduction

Foreign direct investment (FDI) ‡ows grow at record breaking numbers each year. In 1999, global in‡ows reached $86 billion, an increase of 27 percent over the previous year. At the end of 1997, the gross product (value added) of all multinational corporations (MNCs) including parent …rms stood at an estimated $8 trillion, comprising roughly a quarter of the world's gross domestic product.[1] MNCs are thus of considerable importance to the world economy. The growing importance of MNCs in the world economy poses challenges to the design of national corporate tax systems. One problem is how to disentangle operations of subsidiaries from the activities of the MNC as a whole. Another is how to prevent pro…t shifting to low tax countries by transfer pricing.

The evidence for tax-motivated transfer pricing is substantial. Grubert and Mutti (1991), Hines and Rice (1994), Harris et al. (1993), and Collins, Kemsley and Lang (1998) study U.S. data and …nd evidence in support of pro…t shifting to low tax countries. Broader data are analyzed by Bartelsman and Beetsma (2001) who …nd evidence for transfer pricing in most OECD countries. [2] Transfer pricing in Europe is documented by Weichenrieder (1996) who shows that German …rms have shifted pro…ts to the manufacturing sector in Ireland thereby taking advantage of the low Irish tax rate. From a policy point of view the pro…t shifting activities of MNCs threaten to undermine the …scal autonomy of high tax countries.[3] At least two policy options exist to curb transfer pricing. The …rst measure is to enforce arm's length prices on intra-…rm transactions. Not only is this di¢cult to achieve, but the administrative costs are also considerable. The second solution pertains to the choice of tax system. A central question here is if countries by choosing the "right" system for corporate taxation can reduce or even eliminate the problem of pro…t shifting.

Currently, most OECD countries use separate accounting as a foundation for their corporate tax system. Under this system accountants and tax authorities try to identify the exact receipts and expenditures attributable to the corporation's

[1] World Investment Report 2000, ch. 1, United Nations.

[2] For a survey of this literature, see Hines (1999).

[3] For theoretical studies of transfer pricing behavior see e.g., Horst (1971) and Kant (1990).

activities in each country. The alternative corporate tax system is formula apportionment, where the total income of a corporation is apportioned on the basis of a weighted formula, where the weights are, say, sales, payroll or property. Variants of formula apportionments are used in Canada, Switzerland and the US.

In this paper we formally analyze the e¤ect of economic integration in a setting of MNCs and tax competition. Our analytical framework allows the transfer price to take on a dual role. It can be used either as a pro…t shifting device or as a strategic device. The strategic role of the transfer price has been observed in the car industry where it is often the case that the headquarters of the MNC determine the export price (transfer price) to its foreign subsidiaries, but delegate decisions about the …nal price or the quantity supplied to the market to its subsidiary. By committing to a transfer price the headquarters can enhance the competitive position of the subsidiaries thus allowing them to win market shares that bene…t the subsidiary and the MNC as a whole.[4] The game we study has three stages. Before the game starts governments coordinate which corporate tax system to use. At the …rst stage governments choose tax rates simultaneously. At stage two the headquarters of the multinational set the transfer price. Finally, a the third stage of the game there is quantity competition between …rms in each country.

Several recent papers have addressed corporate tax competition in the presence of multinational …rms under separate accounting.[5] Transfer pricing behavior is explicitly introduced by Mansori and Weichenrieder (1997) and Raimondos-Møller and Scharf (1997). In these papers there is competition in transfer pricing regulations between the two governments. Elitzur and Mintz (1996) discuss corporate tax competition under alternative transfer pricing rules when the transfer price a¤ects both the overall tax payment and the incentives for the subsidiary's managing partner. More recently, Hau‡er and Schjelderup (2000) analyze the optimal taxation of corporate pro…ts under separate accounting when …rms can shift pro…ts between countries by transfer pricing. They …nd that recent corporate tax reforms in the

[4] See Elitzur and Mintz (1997) and Schjelderup and Sørgard (1997) for how incentives of this type can a¤ect the performance of multinationals. Basu (1993) provides a survey of the literature on delgation in Industrial Organization.

[5] See e.g. Janeba, 1995, 1996; Konan, 1997.

OECD where corporate tax rates have been reduced while the tax base has been broadened are optimal responses to the increased presence of multinationals. Finally, Nielsen, Raimondos-Møller and Schjelderup (1999) compare basic properties of separate accounting and formula apportionment when the multinational …rm can shift some pro…ts by transfer pricing. They show that if the pure pro…ts harvested by multinationals are either very low or very high, and at the same time the costs of engaging in transfer pricing are of intermediate size, then a switch from separate accounting to formula apportionment will lower tax revenue and welfare in the two countries.

A critical di¤erence between previous work and our paper is that we study how economic integration under tax competition a¤ects equilibrium tax rates, transfer prices and national welfare. We show that the transfer price is relatively tax elastic for a high degree of economic integration under a separate accounting regime, while the opposite is true under formula apportionment. As a consequence, the impact of economic integration on welfare and on the intensity of tax competition depends crucially on the choice of tax scheme. Under separate accounting the conventional wisdom that increased economic integration forces government to reduce tax rates is supported by our …ndings. However, this is not true under formula apportionment, where increased integration reduces the tax elasticity of the transfer prices and indeed allows governments to levy higher tax rates.

The outline of the paper is as follows. Section 2 presents the model. Sections 3 and 4 investigate transfer pricing and non-cooperative tax policy under separate accounting and formula apportionment, respectively. Finally, section 5 concludes.

2 The model

Firms We consider two countries, A and B, which are identical in all respects. Each country is host to the headquarters of a multinational corporation (MNC), and the headquarters commands two plants, one in each country. The plant located in i produces quantities x_{ii} and x_{ij} with zero unit costs (where the …rst subscript

indicates where the headquarter is located).[6] Quantity x_{ii} is sold in country i at a price p_i, while quantity x_{ij} is exported to the affiliate in country j at a transfer price g_i and resold in country j at price p_j: A positive g_i implies that the transfer price is higher than the marginal cost of production, while a negative g_i signifies underinvoicing. Quantity is the strategic variable and profits before tax for the home and foreign MNCs are the sum of revenues from the affiliates,

$$\begin{aligned}\Pi_i &= \pi_{ii} + \pi_{ij} = [p_i x_{ii} + g_i x_{ij} - C(g_i)] + [p_j - g_i - \tau] x_{ij};\\ \Pi_j &= \pi_{jj} + \pi_{ji} = [p_j x_{jj} + g_j x_{ji} - C(g_j)] + [p_i - g_j - \tau] x_{ji} \qquad i = A, B; i \neq j \end{aligned} \tag{1}$$

where τ denotes trade costs and $C(g_i)$ is concealment costs of transfer pricing. It is assumed that the good is specialized so that the true cost of exporting cannot be directly observed by tax authorities. Hence, g_i becomes an additional choice variable for the multinational firm, which is determined by the headquarters of each multinational. In line with most of the literature on transfer pricing we make the realistic assumption that it is costly to conceal deviations in the transfer price from the true costs of exporting. The concealment cost function has the following properties

$$C(0) = C'(0) = 0; \quad \text{sign}(C') = \text{sign}(g_i); \quad C''(g_i) > 0.$$

This means that the concealment costs are a convex function of the difference between the declared and the true price of the exported good.[7]

Separate Accounting (SA) Under the SA method of taxation each country imposes a tax on the profits generated within its borders. The aim of the tax code is therefore to identify the precise receipts and expenditures attributable to the corporation's activities in each jurisdiction. Although repatriated profits in principle are taxed in the country of residence, there is general agreement that due to deferral

[6] It can be shown that allowing positive unit costs does not affect results qualitatively.

[7] This assumption can be interpreted either as an increased probability of detection by the tax authorities (see, e.g. Kant, 1988) or as costs that need to be incurred in order to conceal the true price of the product for example by hiring of lawyers and accountants (see, e.g., Haufler and Schjelderup, 2000).

possibilities and limited tax credit rules, the source principle of taxation is effectively in operation (Keen, 1993, and Tanzi and Bovenberg, 1990). Taking this into account, global after tax profits of a multinational firm with headquarters in country i are

$$\Pi_i^{SA} = (1 - t_i)\pi_{ii} + (1 - t_j)\pi_{ij}; \quad i = A; B \tag{2}$$

Formula Apportionment (FA) Under the FA scheme the tax liability is apportioned to each country based on the activities of the MNC in each country relative to the MNC's world-wide activities.[8] The activity measure used in this model is sales in each country, and after tax profits of the MNC with headquarters in country i are

$$\Pi_i^{FA} = (1 - t_i)\left(\frac{x_{ii}}{x_{ii} + x_{ij}}\right)\Pi_i + (1 - t_j)\left(\frac{x_{ij}}{x_{ii} + x_{ij}}\right)\Pi_i; \quad i = A; B \tag{3}$$

The Game In the following we study a three-stage game under separate accounting and formula apportionment respectively. The game leads to endogenous determination of tax rates and transfer prices, and the action by each government is observable in subsequent stages. The structure of the game is as follows: At the first stage the two governments choose tax rates simultaneously. Then, at the second stage the headquarters of each MNC set the transfer price. Finally, at the third stage there is quantity competition between plants in each country. Solving the game backwards, we start by the third stage, which is independent of the tax system.

Stage 3: Quantity competition between plants in each country Domestic and foreign plants maximize their profit with respect to quantities. For simplicity we will assume that the firms produce homogenous goods, but this has no qualitative implications for our results. The inverse demand functions faced by the firms are given by

$$p_i = \theta - (x_{ii} + x_{ji}); \qquad p_j = \theta - (x_{ij} + x_{jj}); \quad \theta > 0:$$

[8] The FA system is currently used in the US, Canada, and Switzerland.

The …rst order conditions can be readily found from $@¼_{ii}=@x_{ii} = 0$ and $@¼_{ij}=@x_{ij} = 0$ as

$$x_{ii} = p_i, \qquad \text{and} \qquad x_{ij} = (p_j \text{ i } g_i \text{ i } ¿); \tag{4}$$

which allows us to express equilibrium quantities at the third stage as

$$x_{ii} = \frac{® + ¿ + g_j}{3}; \qquad x_{ij} = \frac{® \text{ i } 2(¿ + g_i)}{3}: \tag{5}$$

Using (5) we derive the partial e¤ects for an enterprise of increasing its transfer price. It is straightforward to verify that a change in the transfer price of a …rm k does not a¤ect demand in the domestic market, that is, $@x_{ii}=@g_i = @x_{jj}=@g_j = 0$. However, an increase in the transfer price a¤ects the demand in the foreign country as follows:

$$@x_{ij}=@g_i = \text{ i } \frac{2}{3}; \quad @x_{jj}=@g_i = \frac{1}{3}; \tag{6}$$

From (6) we see that a marginal increase in the transfer price decreases the importing a¢liate's sales by 2=3 units, and increases the local competitor's sales by 1=3 unit: Hence, the response to an increase in the transfer price by the local competitor is to expand sales and win a greater share of the market.

Turning to stages 2 and 1, we consider the outcomes under Separate Accounting (SA) and Formula Apportionment (FA) separately. We start by investigating transfer pricing and optimal tax rates under SA.

3 Transfer pricing and non-cooperative tax policy under SA

At stage 2 the central authority within the multinational …rm determines how the transfer price should optimally be set, taking the tax rates as given.

Stage 2: The headquarters set transfer prices The global after tax profits of a multinational are equal to

$$\Pi_i^{SA} = (1 - t_i)\pi_{ii} + (1 - t_j)\pi_{ij}; \tag{7}$$

The problem of the headquarters is to maximize (7) subject to (4) and (5), and this yields the first order condition

$$\frac{\partial \Pi_i^{SA}}{\partial g_i} = (1 - t_i)\left[x_{ij} - \frac{2}{3}(g_i - C')\right] - (1 - t_j)\frac{4}{3}x_{ij} = 0; \tag{8}$$

where we have used (4) to rewrite the first order condition in terms of x_{ij}: Solving equation (8) we can express the transfer price as

$$g_i = \frac{3(x_{ij} - C')(1 - t_i) - 4x_{ij}(1 - t_j)}{(1 - t_i)2}; \tag{9}$$

From (9) it is seen that the transfer price can be above or below the marginal cost of production. Assuming that there is only one Nash equilibrium in tax rates, the assumption of identical countries means that in the Nash equilibrium, each country sets the same tax rate (i.e. $t_i = t_j$).[9] The absence of a profit shifting in the Nash equilibrium means that equation (9) reduces to

$$g_i = -\frac{x_{ij} + 3C'}{2} < 0 \tag{10}$$

Equation (10) shows that when strategic considerations are the only determinant of the transfer price, it should be set below marginal costs. The reason is that a low transfer price turns the foreign affiliate into a low cost firm that behaves aggressively by increasing its sales in the foreign market. The response of the competing local firm is to scale down its sales thus allowing the foreign affiliate to capture a larger share of the market.

We now turn to examine how economic integration affects foreign sales and the transfer pricing behavior. From (5) and (10) we obtain

$$\frac{dx_{ij}}{d\tau} = \frac{d(p_j - g_i - \tau)}{d\tau} = -\frac{2}{3}\left[1 + \frac{2}{4 + 9C_i''}\right] < 0; \tag{11}$$

[9] See e.g., Zodrow and Miezskowski (1986), Wildasin (1988), and Bucovetsky and Wilson (1991) for an elaboration of the symmetry result in the tax competition literature.

and

$$\frac{dg_i}{d¿} = \frac{2}{4 + 9C_i^{\beta\beta}} > 0; \tag{12}$$

which leads us to state:

PROPOSITION 1: Under separate accounting, economic integration lowers the transfer price.

The intuition is straightforward. A reduction in trade costs enhances the pro…t margin from foreign sales (p_i ¡ g_i ¡ ¿) and thus increases the volume and pro…tability of foreign sales. Hence, it becomes more attractive to use the transfer price as a strategic device to win foreign market shares. Economic integration, thus, increases pro…ts from sales abroad and makes it more attractive to underinvoice, thereby enhancing the competitiveness of the foreign a¢liate. For illustrative purposes and later comparisons we show the relationship between trade costs and the transfer price in Figure 1. The curve is drawn using equation (10) with a quadratic concealment function of $C(g_i) = 2g_i^2$ (see the Appendix for parameter values).

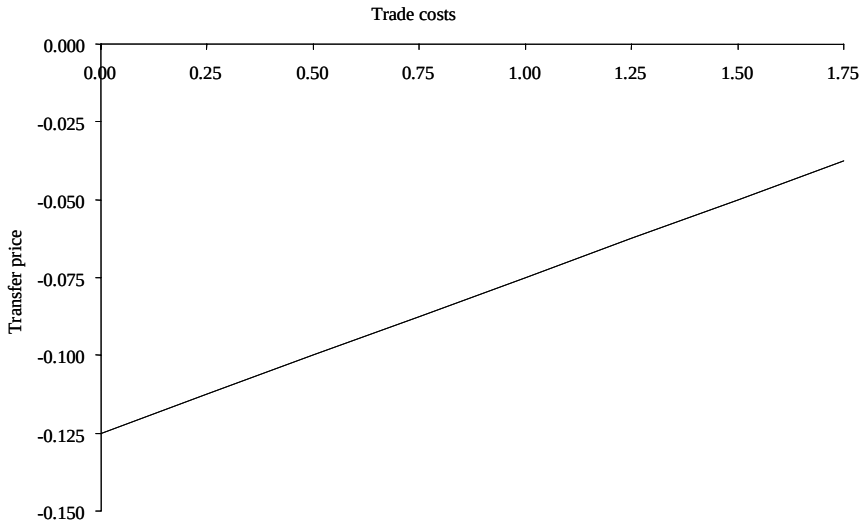

Figure 1: Equilibrium transfer prices.

Stage 1: The optimal choice of tax rates At the …rst stage each government sets the tax rate in order to maximize national welfare, taking the taxes of the other country as given. For simplicity, we assume that the multinational …rms are owned by third country residents so welfare equals the sum of consumer surplus (CS) and tax income (TR), which respectively are given by:[10]

$$CS_i = \frac{1}{2}[(® - p_i)x_{ii} + (® - p_j)x_{ji}]; \tag{13}$$

and

$$TR_i^{SA} = t_i(p_i x_{ii} + g_i x_{ij} - C_i + ¼_{ji}): \tag{14}$$

The problem of the government is thus to maximize

$$W_i^{SA} = \max_{t_i} \left\{ CS_i + TR_i^{SA} \right\}; \tag{15}$$

subject to (8).

It is not possible to derive explicit analytical expressions to the problem outlined in (15). However, we are able to …nd the qualitative relationship between equilibrium tax rates and trade costs, since equilibrium taxes are restricted by the tax elasticity of the transfer price. Other things being equal, a low tax elasticity means that taxes can be set high and vice versa. In order to derive how the transfer price set by the MNC with headquarters in country i is a¤ected by changes in tax rates we use equations (8) and (6) to …nd how the transfer price in the symmetric equilibrium is a¤ected by a marginal change in tax rates (derivation is given in the Appendix):

$$\frac{@g_i}{@t_j} = (p_j - g_i - ¿)\frac{12}{(1-t)[9C^{00}+4]} > 0; \qquad \frac{@g_i}{@t_i} = -\frac{@g_i}{@t_j} < 0 \tag{16}$$

where t is the common tax rate in the symmetric Nash equilibrium. Notice …rst that a marginal deviation in the tax rate of country i from the symmetric Nash equilibrium rate makes it less attractive to accumulate pro…ts in country i. Equation (16) states

[10]Excluding producer surplus from the welfare function does not a¤ect the main conclusions of the analysis. An early version of this paper showing this is available from the authors upon request.

that the response of the headquarters in country i to an increase in t_i (t_j) is to reduce (increase) the transfer price, thereby saving tax payments by shifting pro…ts to country j (i).

Using (12) in (16) we obtain the following result:

PROPOSITION 2: Under Separate Accounting, other things being equal, transfer prices are more tax sensitive the lower the level of trade costs.

The numerator in (16) equals the pro…t margin of the foreign a¢liate, which we have shown to be greater the lower are trade costs. An increase in t_j means that the MNC wants to shift pro…ts to country i by increasing the transfer price. The increase in the transfer price is larger, the greater is the pro…t margin (i.e., the lower is tau), since this implies that MNC needs to shift more pro…ts per unit back to country i. Conversely, if t_i increases, the MNC wants to shift sales to the foreign a¢liate by underinvoicing. A large pro…t margin abroad (low trade costs) provides a stronger incentive to underinvoice than if pro…ts from foreign sales are low. Thus, economic integration increases the pro…t shifting activities of MNCs and the tax sensitivity of national tax bases. We may therefore state:

PROPOSITION 3: Under Separate Accounting, other things being equal, equilibrium tax rates are lower the lower the level of trade costs.

Proposition 3 is parallel to the results found in the tax competition literature.[11] Lower trade costs increase the mobility of the tax base and make it more attractive for each country to lower its tax rate. In doing so each country neglects the …scal externality that arises from a change in the tax rate. Hence, tax rates will fall as economic integration proceeds (and will be too low in the tax equilibrium compared to the outcome under coordination). Proposition 3 is illustrated by the upward-sloping tax curve in Figure 2, which is found by solving (15) numerically (see the Appendix for the parameter values used in the simulations).

[11] See e.g. Zodrow and Mieszkowksi (1986) and Wildasin (1988), and Bucovetsky and Wilson (1991).

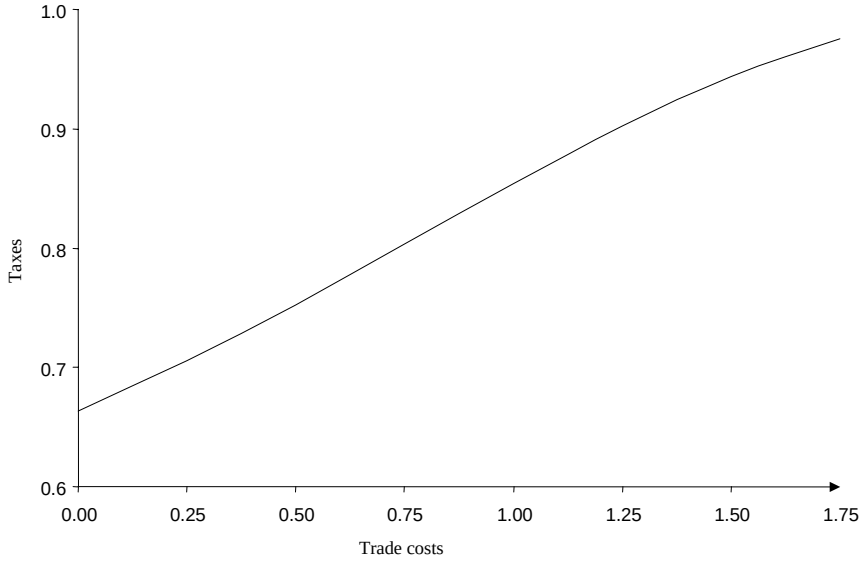

Figure 2: Equilibrium tax rates under Separate Accounting.

4 Transfer pricing and non-cooperative tax policy under FA

Just as under an SA regime the central authority within the multinational …rm decides at stage 2 how the transfer price should be set optimally. In doing so it takes the tax rates as given.

Stage 2: The headquarters set transfer prices At the second stage the MNC with headquarters in country i has the following maximization problem

$$\Pi_i^{FA} = \max_{g_i} \left[(1 - t_i) \left(\frac{x_{ii}}{x_{ii} + x_{ij}} \right) \Pi_i + (1 - t_j) \left(\frac{x_{ij}}{x_{ii} + x_{ij}} \right) \Pi_i \right]; \qquad (17)$$

where $\Pi_i = \pi_{ii} + \pi_{ij}$; c.f. equation (1), and the quantities are given by equation (5). It is now useful to de…ne

$$\Delta_i \equiv \frac{\partial}{\partial g_i} \left(\frac{x_{ij}}{x_{ii} + x_{ij}} \right) = \frac{x_{ii}}{(x_{ii} + x_{ij})^2} \left(\frac{\partial x_{ij}}{\partial g_i} \right); \qquad (18)$$

The variable Δ_i measures by how much the foreign a¢liate's share of total sales, $x_{ij}/(x_{ii} + x_{ij})$, increases if the transfer price g_i is reduced by one unit.[12] From equation

[12] Equivalently, since $\partial(x_{ii}^k/(x_{ii}^k + x_{ij}^k))/(\partial g_i) = \Delta_i^k$; the variable also measures the corresponding fall in the share of domestic sales.

(6) we know that a marginal reduction in the transfer price leads to a rise in foreign sales by 2=3 units : The resulting increase in the foreign a¢liate's share of total sales is thus higher the smaller the initial value of x_{ij}. Since the export quantity x_{ij} is decreasing in ¿ it follows that

$$@Á_i=@¿ > 0: \tag{19}$$

Inserting $@x_{ij}=(\ i\ @g_i)$ by use of (6) in (18) we have that

$$Á_i = \frac{2x_{ii}}{3(x_{ii} + x_{ij})^2}: \tag{20}$$

Under FA, the tax payment of the multinational …rm abroad depends on its foreign sales in proportion to world-wide sales. $Á_i$ is an indirect measure of how the share of foreign sales, and thus foreign tax payments, are in‡uenced by a change in the transfer price. If $Á_i$ is large, a marginal change in the transfer price has a signi…cant e¤ect on the apportionment on pro…ts between the two countries. Hence, the larger is $Á_i$; the more e¤ective will the transfer price be as a pro…t shifting device.

In order to derive the optimal transfer price we maximize (17) with respect to g_i, and by inserting for (20) we …nd that

$$(t_j\ i\ t_i)\,Á_i\,¦_i + \left[(1\ i\ t_i)\frac{x_{ii}}{x_{ii} + x_{ij}} + (1\ i\ t_j)\frac{x_{ij}}{x_{ii} + x_{ij}}\right]\frac{@¦_i}{@g_i} = 0 \tag{21}$$

in optimum. From (1), (4), and (6) it follows that

$$\frac{@¦_i}{@g_i} = i\frac{1}{3}x_{ij}\ i\ g_i\frac{2}{3}\ i\ C_i^{\emptyset}: \tag{22}$$

Note that (21) reduces to $@¦_i=@g_i = 0$ in the symmetric tax equilibrium since $t_i = t_j$. Solving for g_i yields

$$g_i = i\frac{x_{ij} + 3C^{\emptyset}}{2} < 0; \tag{23}$$

which is identical to the expression we found under the SA tax system, (c.f. equation (10)). At …rst glance it may seem a bit surprising that the transfer price is independent of the tax system in use. However, equation (23) simply re‡ects that with identical countries ($t_i = t_j$), only the strategic motive matters for the transfer pricing behavior of the …rm: Since transfer prices are the same regardless of tax regime, it also follows that the impact of economic integration on transfer prices and exports, $dg_i=d¿$ and $dx_{ij}=d¿$; is the same under SA and FA.

Stage 1: The optimal choice of tax rates The welfare level in country i is

$$W_i^{FA} = \max_{t_i} \left(CS_i + TR_i^{FA} \right); \tag{24}$$

where consumer surplus is still given by (13), and tax revenue equals

$$TR_i^{FA} = t_i \left(\frac{x_{ii}}{x_{ii} + x_{ij}} \phi_i + \frac{x_{ji}}{x_{jj} + x_{ji}} \phi_j \right): \tag{25}$$

The government in each country thus maximizes (24) subject to (21). In order to examine the solution to this maximization problem, we shall again use the method of examining how sensitive the transfer prices are to changes in the tax rates. Differentiating equation (21) around $t_i = t_j$ we find that

$$\frac{\partial g_i}{\partial t_i} = - \frac{\partial \acute{A}_i}{\partial \theta + 4} < 0 \tag{26}$$

and

$$\frac{\partial g_i}{\partial t_j} = \frac{\partial \acute{A}_i}{\partial \theta + 4} > 0: \tag{27}$$

We see from (26) and (27) that the signs of $\partial g_i / \partial t_i$ and $\partial g_i / \partial t_j$ are the same as under SA: a higher tax rate in one country encourages firms to use the transfer price as a device to shift profits to the other country. From (19) we note that Á is an increasing function of ¿: Using this result in equations (26) and (27) we may state:

PROPOSITION 4: Under Formula Apportionment, other things being equal, transfer prices are less tax sensitive the lower the level of trade costs.

The result is the opposite of what we found under SA. But the intuition is straightforward. If the transfer price is tax sensitive, it means that the MNC can easily shift profits to the low tax country. The ease by which the MNC can shift profits under FA is given by $\acute{A}_i$; which gives the impact of a change in the transfer price on the apportionment of profits across countries. From (18) and (20) it is seen that a change in the transfer price has a significant impact on $\acute{A}_i$ if the foreign affiliate's share of total sales is small initially. In this case a given change in g_i (and thus in x_{ij}) has a large effect on the (relative) share of sales abroad, since the increase in foreign sales starts from a very low level due to high trade costs. On the

other hand, for low levels of trade costs, the foreign a¢liate's share of total sales are quite large, and the relative share of sales will therefore not change very much in response to a change in the transfer price. Thus, the tax gain from changing the transfer price is small, implying that g_i is relatively insensitive to changes in either of the tax rates. To conclude, economic integration reduces the e¤ectiveness of the transfer price as an instrument for pro…t shifting under FA, and there is an inverse relationship between trade costs and equilibrium taxes:

PROPOSITION 5: Under Formula Apportionment, other things being equal, equilibrium tax rates are higher the lower the level of trade costs.

Proposition 5 is illustrated by the downward-sloping tax curve in Figure 3, which is found by solving (24) numerically.

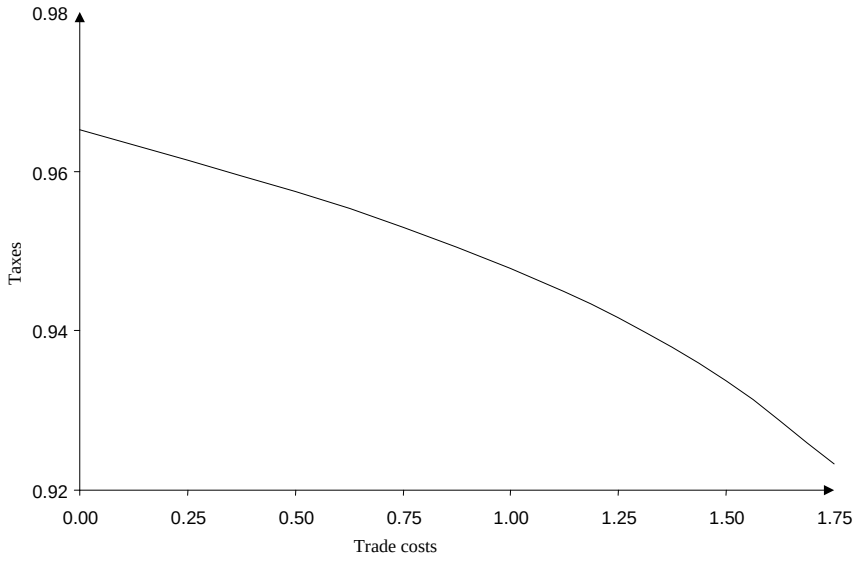

Figure 3: Equilibrium tax rates under Formula Apportionment

5 Final remarks

One important result that emerges from our analysis is that the e¤ect of increased economic integration on equilibrium taxes and tax revenue depends crucially on the tax regime in force. While under SA increased economic integration leads to lower tax revenue, the opposite is true under FA. To make a full welfare assessment it

should be noted that economic integration under any tax regime a¤ects consumer surplus positively due to enhanced competition leading to lower prices and larger quantities sold. Thus, under SA we have two opposing e¤ects of increased integration; rising consumer surplus, falling tax rates, and as a consequence, lower tax revenue. In contrast, with FA, both consumer surplus and tax rates rise, implying higher tax revenues. Figure 4 indicates that an SA regime provides the highest welfare level for a low degree of integration (high trade costs), while an FA regime becomes more attractive as integration proceeds. Thus, for a high degree of economic integration, the FA regime may come to dominate the SA regime from a welfare perspective.

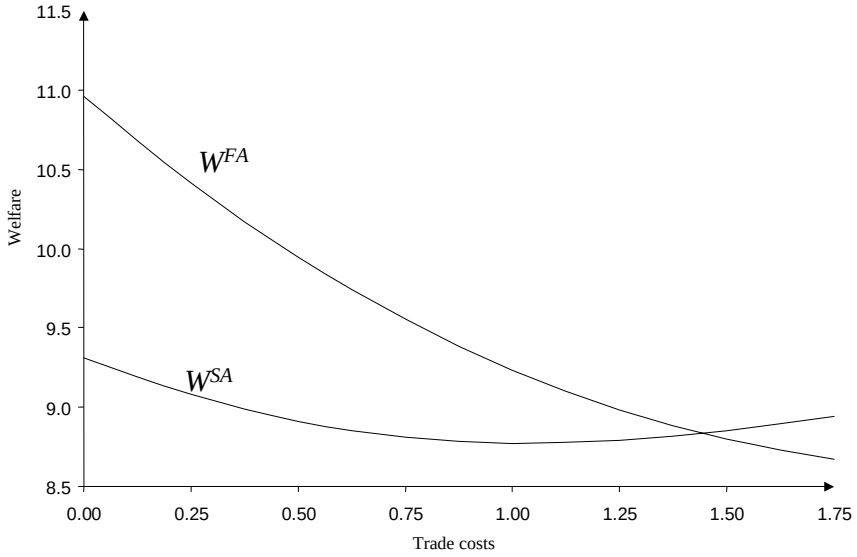

Figure 4: Welfare comparison; SA versus FA

To conclude; we have shown that the impact of increased economic integration on the intensity of international tax competition hinges on the choice of tax regime. Economic integration under SA intensi…es tax competition while FA reduces the intensity of tax competition. These relationships are mirrored in the relationship between economic integration and welfare under the two di¤erent tax regimes. In terms of national welfare, the SA system dominates for low degrees of integration, while the FA system becomes dominating as an integration process proceeds. Hence, our results support the view brought forward by many other economists[13] that in-

[13] See, e.g. Musgrave (1973), Bird and Brennan (1986), McLure (1989), Bucks and Mazerov (1993) and Shakelford and Slemrod (1998).

creased economic integration may call for a substantial reform of the corporate tax system.

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A Appendix

Derivation of equations (16):

By differentiating the first-order condition in equation (8) with respect to t_i we find

$$-(x_{ij}^k - \frac{2}{3}g_i^k - C') + (1 - t_i)\left(\frac{\partial x_{ij}^k}{\partial g_i^k} - \frac{2}{3} - C''\right)\frac{\partial g_i^k}{\partial t_i} - (1 - t_j)\frac{4}{3}\frac{\partial x_{ij}^k}{\partial g_i^k}\frac{\partial g_i^k}{\partial t_i} = 0: \quad (28)$$

Note from equation (8) that around $t_i = t_j$ we have

$$x_{ij}^k - \frac{2}{3}g_i^k - C' = \frac{4}{3}x_{ij}^k: \quad (29)$$

Inserting for (29) into (28), we find (16). The corresponding expressions under the FA tax regime, are found in a similar way.

Parameter values employed in the numerical simulations:

$\alpha = 5$; $c_h = c_f = 0$; $n_h = n_f = 1$

Concealment function: $C(g_i) = 2g_i^2$: