CORPORATE TAX SYSTEMS, MULTINATIONAL ENTERPRISES, AND ECONOMIC INTEGRATION

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CESIFO WORKING PAPER NO. 1241
CATEGORY 1: PUBLIC FINANCE
JULY 2004

CESifo *Working Paper No. 1241*

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Abstract

Multinational firms are known to shift profits and countries are known to compete over shifty profits. Two major principles for corporate taxation are Separate Accounting (SA) and Formula Apportionment (FA). These two principles have very different qualities when it comes to preventing profit shifting and preserving national tax autonomy. Most OECD countries use SA. In this paper we show that a reduction in trade barriers lowers equilibrium corporate taxes under SA, but leads to higher taxes under FA. From a welfare point of view the choice of tax principle is shown to depend on the degree of economic integration.

JEL Code: F15, F23, H25, H87.

Keywords. multinational enterprises, economic integration, trade costs, international tax competition, tax regimes.

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1 Introduction

The rise in FDI and multinational firm activity is one of the most pronounced trends in the world economy over the last two decades.[1] This trend has worried policymakers and academics, since multinationals are known to shift profits to low tax countries and governments are prone to compete for shifty profits.[2] In response to these problems the European Commission has focused on "harmful" tax competition (as in the "Monti Package"), and has more recently published a study on corporate taxation. The latter study aims at finding a system for corporate taxation that prevents profit shifting, reduces compliance costs for firms, and preserves national tax autonomy (Commission of the European Communities, 2001).

One of the main proposals emerging from the Commission's corporate tax study is a switch from the corporate tax system employed by most European countries - called Separate Accounting (SA) - to a system of Formula Apportionment (FA). Apportionment systems are already in use internally among states, provinces, and cantons in federal countries such as the United States, Canada, and Switzerland, where its introduction has been motivated by the need to disentangle the activities of state subsidiaries from the activities of multistate enterprises as a whole in order to secure a tax base in all states where the enterprise has ongoing activities.

Under Separate Accounting (SA) taxable income of a corporation's activity in each jurisdiction is based on computing the value of transactions between related affiliates as if they had occurred by independent parties in the market place (so called arm's length pricing). The obvious weakness of this system is that it can be difficult to obtain market parallels on which such prices can be established. In particular, there is substantial evidence that Multinational Corporations (MNCs) arise because they possess firm-specific assets that are intangible in nature and difficult to trade at arm's length (Markusen (1995)). In practice, multinationals therefore have signifi-

[1] See Markusen (ch. 1, 2002).

[2] The profit shifting activities of MNCs are well documented. Grubert and Mutti (1991), Hines and Rice (1994), Harris et al. (1993), and Collins, Kemsley and Lang (1998) study U.S. data and find strong evidence in support of profit shifting to low tax countries. Broader data are analyzed by Bartelsman and Beetsma (2001) who find evidence for tax avoiding transfer pricing in most OECD countries. For Europe Weichenrieder (1996) shows that German firms have shifted profits to the manufacturing sector in Ireland, thereby taking advantage of the low Irish tax rate. For a survey of this literature, see Hines (1999).

cant discretion when setting their transfer prices. The competing alternative to SA, Formula Apportionment (FA), implies that the corporate group combines the income of each of its operatives into a single measure of taxable income. The group then uses a formula to apportion taxable income to each of the jurisdictions in which the group has activities.[3] The advantage of this approach is that manipulation of income between affiliates by use of transfer prices does not have an impact on the single measure of income for the corporate group.

Given the growing importance of multinationals worldwide and the attention by policymakers to the issue of company taxation, it is perhaps surprising that very little work has been done to compare separate accounting to formula apportionment. Our objective in this paper is to undertake such a comparison in a framework that also allows us to investigate the impact of economic integration on tax policy, the choice of corporate tax system, and welfare.

Our paper relates to a small literature that has mainly addressed corporate tax competition in the presence of multinational firms and transfer pricing under SA.[4] Konan (1996) models strategic taxation policy of home and host governments under SA when a multinational enterprise sets transfer prices on globally joint inputs. She finds that an equilibrium home-tax solution is to tax foreign earned profits at a higher rate than domestically earned profits. In Elitzur and Mintz (1996) the transfer price takes on a dual role affecting both the amount of profits shifted and incentives for the subsidiary's managing partner. Using a framework of separate accounting governments compete over MNC profits and impose corporate income taxes subject to a rule that approximates what the government believes is the arm's length price. In the tax competition equilibrium tax rates are affected by home country production costs, agency costs, and the productivity of the subsidiary, and it is shown that tax harmonization is likely to reduce tax rates. Haufler and Schjelderup (2000) analyze the optimal taxation of multinational profits under SA when firms can shift profits between countries

[3] In the United States, for example, some of the states that levy a corporate income tax determine taxable income within their state on the basis of the state's shares of the corporation's total property, payroll and sales.

[4] Related are Janeba (1995, 1996) and Konan (1997) who study social welfare effects of multinational enterprise taxation under SA in relation to double taxation treaties and FDI. Neither of these papers, however, considers transfer pricing nor the impact of economic integration on policy.

by transfer pricing. They consider a setting where countries compete over corporate profits by choosing both the tax rate and the tax base (depreciation allowances) simultaneously. They find that recent corporate tax reforms in the OECD where corporate tax rates have been reduced while the tax base has been broadened, are optimal responses to the increased presence of multinationals and transfer pricing.[5]

Studies that compare the welfare or revenue effects of a switch from SA to FA are scant.[6] Slemrod and Shackelford (1998) examine financial reports from U.S. based multinationals for the period 1989-1993 to estimate the revenue implications of implementing a U.S. federal formula apportionment system. They find that a switch from SA to FA using an equal three-weighted, three factor formula would have increased US tax liabilities by 38 percent. Nielsen et al (1999) use a two-country setup to compare SA to FA. In their model each MNC consists of a parent firm in one country and a subsidiary in the other. Both the parent firm and its subsidiary produce an output using a public input and (plant-specific) capital, and the public input is acquired by the parent company and made available to the subsidiary at a (transfer) price. They find that if the pure profits of multinationals are either very low or very high, and at the same time the costs of engaging in transfer pricing are of intermediate size, a switch from SA to FA reduces tax revenue and welfare. Finally Anand and Sansing (2000) show that a harmonized apportionment rule can prevail as the cooperative solution to a game between states (as can a system under SA), but a state can increase its welfare by deviating from the cooperative solution. This incentive gives rise to a Prisoner's Dilemma type of problem under FA. We emphasize that none of the papers reviewed above focuses on economic integration (taken to imply a reduction in trade costs) and transfer pricing, nor on how the interaction between the two may affect tax competition and the choice of tax system.

Our analysis is related to Nielsen et al (1999) in the sense that we study the effect of competition over corporate profits in the presence of multinationals and transfer pricing. Different from their analysis (and previous studies) is that the transfer price applies to a traded commodity that can only be

[5]There is also a small literature studying the regulation of transfer prices under SA when countries compete for corporate profit (see Mansori and Weichenrieder (2001) and Raimondos-Møller and Scharf (2002)).

[6]Separate papers by Gordon and Wilson (1986), McLure (1987), and Mintz (1999) study distortions under FA. Goolsbee and Maydew (2000) provide evidence for negative externalities between jurisdictions under FA.

shipped to the subsidiary at a (trade) cost. This allows us to analyze the impact of economic integration. Furthermore, we also take into account the fact that the transfer price as well as being a tax saving device gives rise to strategic effects.[7] The latter is in contrast to the traditional literature on transfer pricing where monopoly is most often assumed. Under oligopoly, it has been shown by Schjelderup and Sørgard (1997) for SA and by Nielsen et al (2003) for FA that transfer prices trade off tax incentives against strategic incentives. The strategic role of the transfer price is similar to the role of export (or import) subsidies (taxes) in strategic trade policy models (see e.g. Brander, 1985), but with the difference that the transfer price can be used either as a profit shifting device or as a strategic trade instrument. The strategic effect of the transfer price is as follows: if affiliates of an MNC face oligopolistic competition, the MNC can gain by setting the transfer price of internationally traded goods at a central level and delegating decisions about quantities (or prices) to its local affiliates. Such a strategy is beneficial to the MNC as a whole if it triggers favorable responses by local competitors. For example, under Cournot competition, a low transfer price set by the headquarters, turns the importing affiliate into a low cost firm that behaves aggressively by selling a large quantity. Such aggressive behavior induces the local rival to behave softly by setting a low quantity.[8] The soft response from the rival is beneficial to the MNC as a whole. Hence, delegation can achieve higher profits than would arise if all decisions were undertaken centrally. The implication is that the transfer price has a strategic value in addition to being an instrument for profit shifting. Furthermore, since it is the headquarters of the MNC that conducts trade policy, the chosen transfer price is both credible and consistent with international trade agreements.

To sum up, this paper differs from previous studies in that it analyzes how economic integration affects equilibrium tax rates, transfer prices and national welfare under SA and FA. Another novelty of the analysis is that we allow transfer prices to take on a dual role in the sense that they are both tax saving and strategic devices in markets with oligopolistic competition. We show that the transfer price is relatively tax sensitive for a high degree of

[7] The strategic role of the transfer price has been observed in the car industry and the petroleum industry. In the car industry it is often the case that the headquarters of the MNC determines the export price on cars, but delegates decisions about the final price of the car to its subsidiary.

[8] The opposite result would be true under price competition (i.e., a high transfer price would be preferable - see Schjelderup and Sørgard 1997).

economic integration under SA, while the opposite is true under FA. Hence, the conventional wisdom in the tax competition literature that increased economic integration leads to lower tax rates is supported by our findings under SA. However, under FA where increased integration reduces the tax sensitivity of the transfer price, increased competition over shifty profits allows governments to levy higher tax rates. A basic message that emerges from our analysis is therefore that from a welfare point of view the choice of system for corporate taxation hinges on the level of economic integration.

2 The model

We consider two countries, 1 and 2, which are identical in all respects. Each country is host to the headquarters of a multinational corporation, 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 (the first subscript indicates where the headquarters is located and the second where sales occur). The assumption of zero unit costs is made for the sake of technical simplicity, and does not affect results qualitatively.[9] 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 that country 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. The inverse demand functions faced by the firms are given by

$$p_i = \alpha - \beta\left(x_{ii} + x_{ji}\right), \qquad i = 1, 2, i \neq j. \quad \alpha, \beta > 0. \tag{1}$$

Profits before tax for the MNC's domestic (π_{ii}) and foreign (π_{ij}) plants are respectively,

$$\begin{aligned} \pi_{ii} &= p_i x_{ii} + g_i x_{ij} - C(g_i), \\ \pi_{ij} &= \left[p_j - g_i - \tau\right] x_{ij}, \qquad\qquad i = 1, 2, i \neq j. \end{aligned} \tag{2}$$

where τ denotes trade costs and $C(g_i) = \delta g_i^2$ is a concealment cost of transfer pricing, with $\delta \geq 0$. The higher the value of δ, the more expensive it is for the firm to deviate from the true production costs when it sets the transfer price. This assumption can be interpreted as costs related to concealing the true

[9] A proof of this is obtainable from the authors upon request.

nature of the transaction by making it harder to compare the two products across markets (for example by incurring costs related to the use of lawyers, and/or accountants, see, e.g., Haufler and Schjelderup, 2000). If it is not costly to shift profits, transfer pricing may imply that one of the plants ends up with negative profits ($\pi_{ii} < 0$ or $\pi_{ii} < 0$). It is reasonable to assume that such transfer pricing would not go undetected by the governments. In order to ensure non-negative profits for each plant, we configure the concealment cost function so that profits by the parent firm are non-negative. This can be shown to hold if $\delta = 1/(9\beta)$, where $\beta > 0$. Note, however, that all our results are robust to changes in δ and do also hold even in the case of $\delta = 0$.[10]

The transfer price is set by a central authority within the multinational firm (to be called the *headquarters*), which maximizes global after tax profits. The headquarters delegates decisions about quantities to its affiliates. Hence, the plants are independent decision makers which maximize before tax profits with quantity as their strategic variable. In what follows, we study a three-stage game in which quantities, transfer prices, and tax rates are endogenously determined. The structure of the game is as follows: At the first stage the two governments choose tax rates simultaneously, and at the second stage the headquarters of each MNC sets the transfer price to maximize total after tax profits of the corporation, taking into account how tax payments should be minimized globally. Finally, at the third stage there is quantity competition between plants in each country. Solving the game backwards, we start at the third stage, which is independent of the tax system.

Before we proceed, we would like to comment on why we assume in the third stage of the game that the affiliates maximize profit before tax rather than after tax. Under SA economic profit equals taxable profit so maximization of pre-tax and after-tax profit yields the same outcome. However, under FA economic profit differs from taxable profit. Thus, if each affiliate maximizes after-tax profit, a tax distortion arises, which gives each affiliate an incentive to reduce the apportionment weight that determines its tax payment. This opens up for a game between affiliates of the same multinational firm, where each affiliate wants to minimize its tax apportionment weight (i.e., its relative activity level in proportion to the total activity level of the multinational as a whole). Such a game does not seem very plausible. Furthermore, maximization of after tax profit by each affiliate may result in the

[10] For a proof: see
http://www.nhh.no/sam/res-publ/supplements/AppendixKMS.pdf.

payment of too much tax by the multinational as a whole, since each affiliate disregards how its tax saving actions affect the tax payments of related affiliates. Consequently, we make the more realistic assumption that the affiliates maximize before tax profit, while the headquarters uses the transfer price to maximize global after tax profits under both SA and FA.

3 The three stage game

3.1 Stage 3: Quantity competition

At the third stage, the domestic and the foreign plant of each MNC maximize before-tax profits in the two segmented markets in countries 1 and 2, and set quantities. Equilibrium quantities at the third stage are given by

$$x_{ii} = \frac{\alpha + \tau + g_j}{3\beta}, \qquad x_{ij} = \frac{\alpha - 2(\tau + g_i)}{3\beta}. \tag{3}$$

From (3) it follows that the transfer price set by MNC_i does not affect its domestic sales, that is, $\partial x_{ii}/\partial g_i = \partial x_{jj}/\partial g_j = 0$. However, an increase in the transfer price affects sales in the foreign country:

$$\partial x_{ij}/\partial g_i = -\frac{2}{3\beta}, \quad \partial x_{jj}/\partial g_i = \frac{1}{3\beta}. \tag{4}$$

From (4) we see that a marginal increase in the transfer price g_i reduces the foreign plant's sales by $2/(3\beta)$ units, and increases the local competitor's sales by $1/(3\beta)$ unit. The transfer price thus introduces a fundamental asymmetry on sales in different markets; it has no effect on domestic sales, but is negatively correlated to sales abroad. Qualitatively the transfer price has the same effect on sales abroad as an export subsidy set by the home government; it increases the home firm's market share abroad (see Brander, 1995). In the next sections we investigate transfer pricing and tax policy under Separate Accounting and Formula Apportionment.

3.2 Stage 2: Optimal transfer prices

Under delegation of authority, headquarters choose the transfer price in order to maximize after-tax global profits. From (3) we know that a change in

the transfer price influences the competitive behavior of the affiliates of the multinational firm. The idea of delegation, well known from the Industrial Organization literature, is that it may give the affiliates a strategic advantage that benefits the corporation as a whole (see e.g. Sklivas, 1987 and Fershtmann and Judd, 1987). Since each headquarters maximizes global profits after tax, we start this section by deriving the full expressions for after-tax global profits under SA and FA.

Separate Accounting Under Separate accounting each country imposes a tax on the profits generated within its borders. The aim of the tax code is 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 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

$$\Pi_i^{SA} = (1 - t_i)\,\pi_{ii} + (1 - t_j)\,\pi_{ij}, \quad i = 1, 2. \tag{5}$$

Formula Apportionment Under Formula Apportionment (FA) the tax liability of a multinational corporation is apportioned to each country based on the activities of the MNC in each country relative to the MNC's worldwide activities.[11] In general, the FA scheme may utilize information on the relative stock of capital employed in each country, relative sales, and/or relative payroll. For simplicity we consider only a simplified version here, in which the activity measure is revenue from sales.

Global after tax profits of the MNC with headquarters in country $i = 1, 2$ are

$$\Pi_i^{FA} = [(1 - t_i)\,S_i + (1 - t_j)\,(1 - S_i)]\,\pi_i, \tag{6}$$

where $S_i \equiv p_i x_{ii} / (p_i x_{ii} + p_j x_{ij})$ and $\pi_i \equiv \pi_{ii} + \pi_{ij}$.

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

Optimal transfer price The optimal transfer price under SA and FA is found by computing how a marginal change in g_i affects global after tax profits (i.e., the effect on (5) and (6)), taking into account the fact that the plants take transfer prices as given (i.e., by using (3) in the first order condition for the headquarters).

The transfer price potentially serves two purposes in this model; it can be used as a strategic trade instrument and as an instrument to reduce tax payments if the countries have different tax rates. The strategic incentive is best seen by setting $t_i = t_j \equiv t$, in which case the multinationals would set the same transfer price ($g_1 = g_2 \equiv g$) under both tax regimes (see the Web-Appendix for a full derivation). We then have[12]

$$g|_t = -\frac{\alpha - 2\tau}{6} < 0 \qquad \text{and} \qquad \left.\frac{dg}{-d\tau}\right|_t = -\frac{1}{3} < 0, \tag{7}$$

The fact that the transfer price is set below marginal cost of production ($g < 0$) means that the headquarters subsidizes exports to its foreign affiliate. Such a pricing strategy 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. From (7) we further see that increased economic integration in the form of reduced trade costs lowers the transfer price. A reduction in trade costs enhances the profit margin of foreign sales, and thus increases the volume and profitability of foreign sales. Economic integration, therefore, means that it becomes more attractive to use the transfer price as a strategic device.

The easiest way to see how the multinationals can possibly use the transfer price as a tax reducing instrument, is to assume that we initially have $t_i = t_j \equiv t$, and then to consider the effect of a marginal increase in one of the tax rates. In this case we have that (the derivation is given in the Web-Appendix),

$$SA: \left.\frac{\partial g_i}{\partial t_i}\right|_t = -\left.\frac{\partial g_i}{\partial t_j}\right|_t = -\frac{8(\alpha - 2\tau)}{9\,(1-t)} < 0. \tag{8}$$

Equation (8) reflects the fact that under the SA tax regime the multinationals will use the transfer price to shift profit to the country with the lower tax rate.

[12] The transfer price in equation (7) is always negative, since trade will only take place if $a > 2\tau$.

Under FA the multinationals pay taxes according to their relative activity levels S_i and $(1-S_i)$ in the two countries, as shown by equation (6). This gives them an incentive to have the higher activity level in the low-tax country. Hence, the multinationals use the transfer price to shift activity from country i to country j if t_i increases (and vice versa if t_j increases). In the Web-Appendix we show formally that this implies

$$FA: \left.\frac{\partial g_i}{\partial t_i}\right|_t = -\left.\frac{\partial g_i}{\partial t_j}\right|_t = \frac{3\beta\pi_i}{2(1-t)}\left(-\frac{\partial S_i}{\partial g_i}\right) < 0, \tag{9}$$

where the derivative $\partial S_i/\partial g_i$ is positive, since a higher transfer price reduces export and thus increases the ratio between domestic sales and total sales for the firm.

To sum up, equations (8) and (9) make it clear that, under both tax regimes, an increase in the tax rate of country i reduces the transfer price set by the MNC with headquarters in country i, while an increase in the tax rate of country j increases the same MNC's transfer price.

3.3 Stage 1: Optimal tax rates

At the first stage each government sets the tax rate in order to maximize national welfare (W), taking the tax rate of the other country as given. For simplicity, we assume that the multinational firms are owned by third country residents. This means that welfare equals the sum of consumer surplus (CS) and tax income (T).

Each government's welfare maximization problem is

$$W_i = \max_{t_i}\left\{CS_i + T_i^k\right\}, \qquad k = SA, FA \tag{10}$$

with consumer surplus (CS_i) given by

$$CS_i = \frac{1}{2}(\alpha - p_i)\left(x_{ii} + x_{ji}\right). \tag{11}$$

The equilibrium tax rates are determined through the countries' competition for tax revenue. The tax competition game between the two governments is qualitatively different under the two tax regimes we consider. Under SA the multinationals want to shift profit to a (possible) low-tax jurisdiction, as shown by equation (8). This generates an incentive for the governments

to compete for shifty profit. Under FA, on the other hand, the governments compete to attract sales revenue, since the multinationals want to shift the larger share of their activity to a low-tax jurisdiction (c.f., equation (9)).[13] Technically, the derivation of the optimal tax rates is found by maximizing welfare subject to the reaction functions of the plants and the headquarters from stages 3 and 2, respectively.

Separate Accounting From (5) we see that tax revenue under SA can be expressed as

$$T_i^{SA} = t_i(\pi_{ii} + \pi_{ji}). \tag{12}$$

Solving the governments' maximization problem we derive the optimal tax rate $t_i = t_i\left(t_j, \tau\right)$. A symmetric equilibrium is characterized by $t \equiv t_1 = t_2$, and using the symmetry condition yields (see the Web-Appendix for derivation):

$$t^{SA} = \min\left\{1, \frac{-4\alpha^2 + 79\alpha\tau + 101\tau^2}{3\left(88\alpha^2 - 355\alpha\tau + 439\tau^2\right)}\right\} \tag{13}$$

Before investigating the impact of reduced trade barriers on the tax rate, we derive the equilibrium transfer price and tax rate under FA.

Formula Apportionment As in the case of SA, the government maximizes $W_i = \max_{t_i}\left\{CS_i + T_i^{FA}\right\}$. The expression for consumer surplus is given by (11) as before, while tax revenue under FA equals

$$T_i^{FA} = t_i\left[S_i\pi_i + \left(1 - S_j\right)\pi_j\right]. \tag{14}$$

In a similar fashion as under SA, we first solve for the optimal tax rate t_i and then use the symmetry condition $t_1 = t_2$. This gives the equilibrium tax rate (see the Web-Appendix for calculations):

$$t^{FA} = \frac{2\left(19\alpha - 20\tau\right)\left(13\alpha - 8\tau\right)^3}{84\,281\alpha^4 - 225\,760\alpha^3\tau + 296\,688\alpha^2\tau^2 - 358\,144\alpha\tau^3 + 512\,000\tau^4}. \tag{15}$$

In the next section we study the implications of economic integration on transfer prices, equilibrium tax rates, and national welfare under Separate Accounting and Formula Apportionment.

[13] Whether we use output or sales revenue as activity measure does not influence the qualitative results. A proof of this is obtainable from the authors.

4 Economic integration, tax regimes and welfare

In order to understand how economic integration affects tax rates and welfare, we need to explore the link between trade costs, transfer prices, and tax rates. First, recall from equation (7) that the transfer price is the same under SA and FA if $t_i = t_j$. However, the sensitivity of the transfer price with respect to changes in the tax rates is qualitatively different under the two tax regimes. In particular, the tax sensitivity is higher the lower the level of trade costs under SA, while the opposite is true under FA (see Web-Appendix for a proof):

$$SA: \frac{\partial}{\partial \tau}\left(\frac{\partial g_i}{\partial t_i}\right) = -\frac{\partial}{\partial \tau}\left(\frac{\partial g_i}{\partial t_j}\right) > 0 \tag{16}$$

$$FA: \frac{\partial}{\partial \tau}\left(\frac{\partial g_i}{\partial t_i}\right) = -\frac{\partial}{\partial \tau}\left(\frac{\partial g_i}{\partial t_j}\right) < 0 \tag{17}$$

To see the intuition for equation (16), assume that there is a small increase in t_j from the symmetric equilibrium. The higher tax rate in country j implies that MNC_i has an incentive to shift profits to country i by increasing the transfer price, and this incentive is stronger the greater is the profit margin of exports. Since the profit margin is higher the lower the level of trade costs, the tax sensitivity of the transfer price rises as economic integration proceeds. Conversely, if t_i increases, MNC_i shifts sales to the foreign affiliate by underinvoicing. The greater the profit margin of exports (i.e. the lower is τ), the stronger the incentive to underinvoice. Hence, under SA economic integration increases the profit shifting activities of MNCs and thereby the tax sensitivity of national tax bases.

Under Formula Apportionment, the relationship between transfer pricing, tax sensitivity, and trade costs is the opposite of that under SA. A tax sensitive transfer price implies that the MNC can easily shift profits to the low tax country. The ease with which the MNC can shift profits under FA depends on the effect of a change in the transfer price on the apportionment of tax liability across countries. If the foreign affiliate's share of total sales – due to high trade costs – is small initially, a given change in g_i has a large effect on the (relative) share of sales abroad, since the increase in foreign

sales starts from a very low level. On the other hand, for low levels of trade costs, the foreign affiliate's share of total sales is quite large, and the relative share of sales will therefore not change significantly in response to a change in the transfer price. The lower the trade costs, the smaller the tax gain from changing the transfer price, and the relatively less sensitive is the transfer price to changes in either tax rate. This explains the sign of equation (17).

The impact of economic integration on equilibrium tax rates is a function of the tax sensitivity of the transfer prices. Formally, the relationship between trade costs and equilibrium tax rates is found by differentiating t^{SA} and t^{FA} in equations (13) and (15), respectively, with respect to τ. The analytical expressions are presented in the Web-Appendix, while Figure 1 provides a graphical illustration.

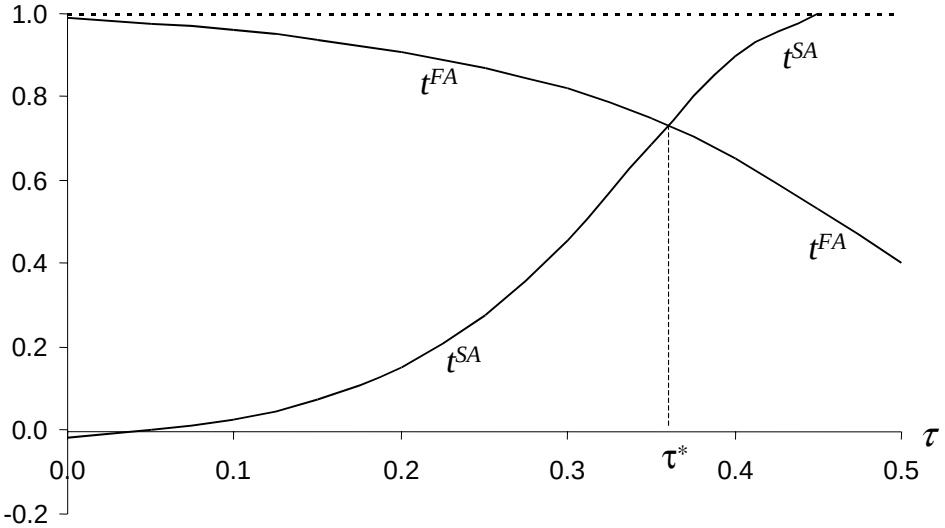

Figure 1: Equilibrium tax rates and economic integration; SA versus FA.

Figure 1 shows that equilibrium tax rates under SA are lower, the lower the level of trade costs. From (16) we know that under SA economic integration makes the transfer prices more tax sensitive and therefore increases the mobility of the tax base. This puts a downward pressure on tax rates as trade costs are reduced.[14]

[14]This result is similar to the standard tax competition result, see e.g., Zodrow and Mieszkowksi (1986), Wildasin (1988), and Bucovetsky and Wilson (1991).

Economic integration has a very different implication under FA. As seen from Figure 1 the relationship between trade costs and equilibrium taxes is the opposite under FA: a reduction in trade costs leads to higher tax rates. Recall that transfer prices under FA are less tax sensitive the lower the level of trade costs (cf. (17)). Consequently, economic integration reduces the effectiveness of the transfer price as an instrument for profit shifting and lowers the tax sensitivity of the national tax base, thereby allowing each country to increase its tax rate.

The implication of differences in the tax sensitivity of the transfer prices under the two tax regimes is that there exists a level of trade costs where tax rates are equal (see the Web-Appendix for a formal proof). In Figure 1 this is illustrated by the fact that $t^{FA} > t^{SA}$ for $\tau < \tau^*$ and $t^{FA} < t^{SA}$ for $\tau > \tau^*$.

Welfare The effect of increased economic integration on equilibrium taxes and tax revenue depends on the choice of tax regime as is illustrated in Figure 2. Recall that we have shown that the transfer price in equilibrium is independent of the choice of tax regime (c.f. (7)). This in turn implies that consumer surplus and taxable profit in equilibrium profit are also independent of the tax regime in place. Thus, the tax regime that yields the higher tax rate (and revenue) will also yield the higher welfare. Since we know that the tax rate under SA is lower than the tax rate under FA if and only if $\tau < \tau^*$, it follows that welfare under FA is higher than under SA for $\tau < \tau^*$. To sum up, Separate Accounting is preferred for high levels of trade costs, while Formula Apportionment is preferable for low levels of trade costs.[15]

[15] To make a full welfare assessment of the effect of economic integration, one needs to take into account the fact that trade liberalization reduces consumer prices. This explains the non-monotonic form of the SA welfare curve; economic integration increases consumer surplus but reduces tax revenue due to falling tax rates.

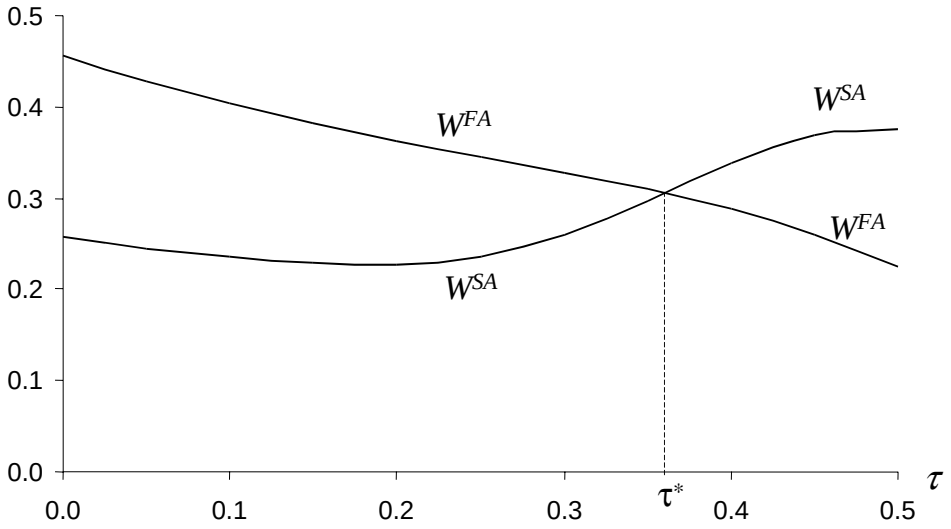

Figure 2: Welfare comparison; SA versus FA

5 Concluding remarks

This paper has demonstrated that the transfer price of multinationals is relatively tax sensitive for high degrees of economic integration under separate accounting. Separate accounting is the corporate tax system used by most OECD countries. In contrast, the transfer price is not very tax sensitive for closely integrated countries under a formula apportionment tax system, which is used in the USA and Canada, and proposed by the recent EU Commission report on corporate taxation.[16] These findings are mirrored in the welfare analysis, where we find that a system of formula apportionment (separate accounting) dominates for high (low) degrees of economic integration. Thus, the choice of corporate tax system depends crucially on the perceived degree of economic integration, and our findings give support to the view brought forward by many other economists that increased economic integration may call for a substantial reform of the corporate tax system.[17]

[16] European Commission (2001a). Company taxation in the internal market. Commission Staff. Working SEC (2001) 1681 Brussels.

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

In our model we have made a number of simplifying assumptions, two of which we would like to discuss in more detail. The first relates to trade costs, where we have assumed that it is the foreign subsidiary that pays these expenses. An alternative formulation is to let the exporting plant pay the trade costs. Everything else being equal, the importing plant is more competitive (has lower costs) when it does not pay trade costs. This implies that the transfer price needs not be set as low as in the case when the importing plant pays the trade costs. The alternative modelling assumption thus amounts to a scaling of the transfer price that does not qualitatively affect the tax sensitivity of transfer prices under SA and FA, nor our welfare analysis.[18]

The second simplifying assumption refers to the use of tax revenues. Would our results change if we allowed tax revenues to be used for public good production? Our analysis shows that tax revenues differ under SA and FA and a reasonable conjecture is therefore that this difference would be reflected in differences in the provision of public goods under the two tax schemes. For public consumption goods one would not expect our results to change qualitatively, but if there is decreasing utility from consuming public goods, the relative benefit of one scheme to the other would be less pronounced. If instead tax revenue could be used to enhance the productivity of firms, one would expect, depending on the cross derivative between private and public input goods, that the preference for one tax scheme would increase. However, the main thrusts of our arguments should survive, but this is an obvious topic for future research.

[18] A proof is obtainable from the authors upon request.

References

[1] Anand, B., Sansing, R., 2000. The weighting game: formula apportionment as an instrument of public policy. National Tax Journal 53, 183-99.

[2] Bartelsman, E., Beetsma, R., 2001. Why pay more? Coporate tax avoidance through transfer pricing in OECD countries. CEPR Discussion paper no. 2543.

[3] Basu, K., 1993. Lectures in Industrial Organization Theory, Blackwell.

[4] Bird, R.M., Brean, D.J.S., 1986. The interjurisdictional allocation of income and unitary taxation debate. Canadian Tax Journal 34, 1377-1416.

[5] Brander, J.A., 1995. Strategic trade policy, in Grossman, G., Rogoff, K. (Eds.), The Handbook of International Economics, Vol. 3, North-Holland, pp. 201-218.

[6] Brander, J.A., Spencer, B., 1984. Tariff protection and imperfect competition, in: Kierzkowski, H. (Ed.), Monopolistic competition and international trade. Oxford University Press, pp. 194-206.

[7] Brander, J.A., Spencer, B., 1985. Export subsidies and international market share rivalry. Journal of International Economics 18, 83-100.

[8] Bucks, D.R., Mazerov, M., 1993. The state solution to the federal government's transfer pricing problem. National Tax Journal 46, 385-392.

[9] Bucovetsky, S.,Wilson, J. D., 1991. Tax competition with two tax instruments. Regional Science and Urban Economics 21, 333-350.

[10] Caillaud, B., Julien, B., Piccard, P., 1995. Competing vertical structures: precommitment and renegotiation. Econometrica 63, 621-646.

[11] Collins, J.H., Kemsley, D., Lang, M., 1998. Cross-jurisdictional income shifting and earnings valuation. Journal of Accounting Research 36, 209-229.

[12] Commission of the European Communities, 2001. Company Taxation in the Internal Market (SEC (2001) 1881), Brussels.

[13] Eaton, J., Grossman, G. M., 1986. Optimal trade policy under oligopoly. Quarterly Journal of Economics 101, 383-406.

[14] Fersthmann, C., Judd, K., 1987. Equilibrium incentives in oligopoly. American Economic Review 77, 927-940.

[15] Gabrielsen, T., Schjelderup, G., 1999. Transfer pricing and ownership structure. Scandinavian Journal of Economics 101, 673-688.

[16] Goolsbee, A., Maydew, E., 2000. Coveting thy neighbor's manufacturing: the dilemma of state income apportionment. Journal of Public Economics 75, 125-143.

[17] Gordon, R., Wilson, J. D., 1986. An examination of multijurisdictional corporate income taxation under formula apportionment. Econometrica 54, 1357-1373.

[18] Grubert, H., Mutti, J., 1991. Taxes, tariffs and transfer pricing in multinational corporate decision making. Review of Economics and Statistics 73, 285-293.

[19] Harris, D., Morck, R., Slemrod, J., Yeung, B., 1993. Income shifting in U.S. multinational corporations, in: Giovannini, A., Hubbard, R. G., Slemrod, J. (Eds.), Studies in international taxation, University of Chicago Press, Chicago, pp. 277-302.

[20] Haufler, A., Schjelderup, G., 2000. Corporate tax systems and cross country profit shifting. Oxford Economic Papers 52, 306-325.

[21] Hines, J.R., 1999. Lessons from behavioral responses to international taxation. National Tax Journal 52, 304-322.

[22] Hines, J.R., Rice, E. M., 1994. Fiscal paradise: Foreign tax havens and American business. Quarterly Journal of Economics 109, 149-182.

[23] Janeba, E., 1995. Corporate income tax competition, double taxation, and foreign direct investment. Journal of Public Economics 56, 311-25.

[24] Janeba, E., 1996. Foreign direct investment under oligopoly: Profit shifting or profit capturing? Journal of Public Economics 60, 423-45.

[25] Kant, C., 1990. Multinational firms and government revenues. Journal of Public Economics 42, 135-147.

[26] Keen, M., 1993. The welfare economics of tax co-ordination in the European Community: A survey. Fiscal Studies 14, 15-36.

[27] Kind, H.J, Midelfar, K.H., Schjelderup, G, 2004. Web-Appendix to "Corporate Tax Systems, Multinational Enterprises, and Economic Integration". http://www.nhh.no/sam/respubl/supplements/AppendixKMS.pdf.

[28] Konan, D.E., 1996. Transfer pricing and strategic taxation of globally joint inputs. Review of International Economics 4, 202-210.

[29] Konan, D.E., 1997. Strategic taxation of the multinational enterprise: A new argument for double taxation. Journal of Public Economics 63, 301-309.

[30] Mansori, K.S., Weichenrieder, A. J., 2001. Tax competition and transfer pricing disputes. FinanzArchiv 58, 1-11.

[31] Markusen, J., 1995. The boundaries of multinational enterprise and the theory of international trade. Journal of Economic Perspectives 9, 169-189.

[32] Markusen, J., 2002. Multinational firms and the theory of international trade. MIT Press, Cambridge.

[33] McLure, C.E., 1987. Economic integration and European taxation of corporate income at source: Some lessons from the US experience, in Grammie, M., Robinson, B. (Eds), Beyond 1992: A European Tax System. Institute For Fiscal Studies, London, pp. 39-51.

[34] Mintz, J., 1999. Globalization of the corporate income tax: the role of allocation. FinanzArchiv 56, 389-423.

[35] Musgrave, P., 1973. International tax base division and the multinational corporation. Public Finance 27, 394-411.

[36] Nielsen, S. B., Raimondos-Møller, P., Schjelderup, G., 1999. Tax spillovers under separate accounting and formula apportionment. Mimeo, EPRU.

[37] Nielsen, S. B., Raimondos-Møller, P., Schjelderup, G., 2003. Formula Apportionment and transfer pricing under oligopolistic competition. Journal of Public Economic Theory 5, 417-435.

[38] Raimondos-Møller, P., Scharf, K., 2002. Transfer pricing rules when governments compete. Oxford Economic Papers 54, 230-246.

[39] Schjelderup, G., Sørgard, L., 1997. Transfer pricing as a strategic device for decentralized multinationals. International Tax and Public Finance 4, 277-290.

[40] Schjelderup, G., Weichenrieder, A., 1999. Trade, multinationals and transfer pricing regulation. Canadian Journal of Economics 33, 817-834.

[41] Shakelford, D., Slemrod, J., 1998. The revenue consequences of using formula apportionment to calculate U.S. and foreign-source income: A firm-level analysis. International Tax and Public Finance 5, 41-59.

[42] Sklivas, S.D., 1987. The strategic choice of managerial incentives. Rand Journal of Economics 18, 452-458.

[43] Tanzi, V., Bovenberg, L. A., 1990. Is there a need for harmonizing capital income taxes within EC countries? in: Siebert, H. (Ed.), Reforming capital income taxation. Mohr, Tubingen, pp. 171-197.

[44] Weiner, J., 1996. Estimates of how the unitary tax affects business investment, Manuscript.

[45] Wildasin, D. E., 1988. Nash equilibria in models of fiscal competition. Journal of Public Economics 35, 229-240.

[46] Wilson, J.D., 1991. Tax competition with interregional differences in factor endowments. Regional Science and Urban Economics 21, 423-45.

[47] Zodrow, G., Mieszkowski, P., 1986. Pigou, Tiebout, property taxation and the underprovision of local public goods. Journal of Urban Economics 19, 356-370.

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