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Centralized vs. de-centralized multinationals and taxes

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CENTRALIZED VS. DE-CENTRALIZED MULTINATIONALS AND TAXES

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Abstract

The paper examines how country tax differences affect a multinational enterprise's choice to centralize or de-centralize its decision structure. Within a simple model that emphasizes the multiple conflicting roles of transfer prices in MNEs - here, as a strategic pre-commitment device and a tax manipulation instrument -, we show that (de-)centralized decisions are more profitable when tax differentials are (small) large.

JEL Code: H25, F23, L23.

Keywords: centralized vs. de-centralized decisions, taxes, MNEs.

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1 Introduction

A central authority in a vertically integrated company has by definition joint profit maximization as its goal. That definition, however, says nothing on whether *all* decisions in integrated companies should be taken at the central authority level. Actually, it is widely recognized that some decisions should be delegated to a de-centralized authority level. The theoretical underpinnings of this so-called delegation principle are described in the industrial organization (IO) literature, where a principal may benefit from hiring an agent and giving him/her the incentive to maximize something other than the welfare of the principal.[1] These precommitment gains have been shown to exist even if one allows for renegotiation of the contract between the principal and the agent (Caillaud et al., 1995).

A multinational enterprise (MNE) is an integrated, global profit maximizing company and as such it also faces the choice of delegating some authority to its subsidiaries. Whether it does so or not depends on institutional and structural issues that are specific to the MNE activity that we focus on. For example, for the case of R&D activities, there exists a large literature that both documents and explains the extent of de-centralization that takes place within MNEs.[2]

Our paper contributes to the literature on the degree of (de-)centralization in MNEs by drawing attention to the importance of corporate tax differences across countries as determinants of MNEs' delegation decisions. The general implications of such tax differences are a central theme in the public finance literature on MNEs.[3] It is well known in that literature that a MNE uses transfer prices to shift profit to low tax

[1] See e.g. Vickers (1985), Sklivas (1987), Fershtmann and Judd (1987), and Katz (1991).

[2] See e.g. Grandstrand et al. (1992), Almeida (1996), Papanastasiu and Pearce (2005) for empirical evidence, and Petit and Sanna-Randaccio (2000), Sanna-Randaccio and Veugelers (2002) for theoretical considerations.

[3] The international taxation of MNEs is based on the so-called Separate Accounting tax system. Under this system, each country can tax the profits of the firms that operate within its borders. This requires that the MNE accounts for the profits that its entities make in each country of operation.

jurisdictions.[4]. Our paper shows that the incentive to use transfer prices to save tax payments can counteract the strategic delegation incentive, rendering the centralization vs. de-centralization choice of a MNE a function of the tax differential.

In presenting our argument as clearly as possible, we choose a simple model where the absence of tax differentials leads the MNE to delegate some authority to its subsidiaries. While the subsidiaries are delegated the authority to choose output and sales levels, the MNE centrally decides the (transfer) price a subsidiary will have to pay for its input purchases. Assuming that the subsidiary operates in a market with Cournot competition, such a decision structure will lead to a higher market share in the subsidiary's market, and thus to higher joint profits. This is exactly the essence of the delegation principle: by introducing a pre-commitment device (here, a low transfer price), the centralized authority can induce the de-centralized authority to take global profit maximizing actions.[5]

Tax differentials, however, can alter the story: If the subsidiary faces sufficiently higher taxes, then earning high (pre-tax) profits in that country due to a strategically set low transfer price will not be profit-maximizing for the MNE anyway. A high and not a low transfer price is needed to shift profits out of the high-tax country. But the high transfer price inevitably interferes with the market share game of the subsidiary. Consequently, a reconsideration of the delegation decision is called for, and possibly the resolution is centralization in lieu of de-centralization.

In fact, it is straightforward to show that the outcome of the delegation decision becomes an endogenous function of the tax differential. In our example, small tax differentials lead to de-centralization, while large tax differentials (with the subsidiary taxed more heavily) will lead to centralization.

We recognize that the issue that we describe above arises due to the fact that there is one instrument (the transfer price) addressing two targets (minimizing tax

[4] Weichenrieder (1996) studies European multinationals and their transfer pricing behavior, and Hines (1999) surveys the literature on U.S. multinational behavior.

[5] Our product market competition set-up resemples that of Sanna-Randaccio and Veugelers (2002), who also compare the centralized and de-centralized profits in a model with R&D choices.

payments and providing a strategic advantage to the subsidiary). A solution may be to introduce an instrument other than the transfer price, e.g. a monetary incentive to the manager of the subsidiary firm, and assign each instrument to a particular target. While such a procedure could be possible, it does not eliminate the fact that transfer prices do have multiple and sometimes conflicting roles. Our choice of model is motivated exactly by our desire to bring out this conflict and relate it to the MNE's de-centralization decision.

There exists some relevant literature on the effect of taxes on a MNE's setting of transfer prices. Mintz and Elizur (1996) model the transfer price as a tax-minimizing instrument and as an instrument to influence the decisions of a self-maximizing manager in the subsidiary company. However, by imposing a transfer pricing rule, i.e. by fixing the transfer price to a level acceptable to the tax authorities, they focus mostly on the second attribute of transfer prices and how tax competition affects the MNE. More closely related papers are Schjelderup and Sørgaard (1997) and Zhao (2000), where the transfer price takes on the same dual role as in this paper, i.e. both as a strategic device and as a tax-minimizing instrument. However, in both papers delegation is taken as given and is not a matter of choice. In a related paper, Nielsen et al. (2003), we also assume delegation, but point out the possibility that delegation may not be profit maximizing when tax differences are large. In the present paper we examine this particular issue in detail.

2 The model

Consider a MNE that operates in two countries: country A, where the parent firm is located, and country B, where the subsidiary firm is located. The parent produces a product that is sold directly to the consumers in country A, and is also sold to the consumers in country B through the subsidiary firm, which here takes the form of a retailer. The market in country A is assumed to be monopolistic, while the market in country B is characterized by Cournot competition between the subsidiary and a

local firm.[6] To simplify but without impact on the qualitative insight of our results, we assume that demand in both countries is linear and all production costs are constant and normalized to zero. Based on these assumptions the firms' profits (absent taxes) are the following:[7]

$$\Pi^A = (1 - Q_A)Q_A + qQ_B \tag{1}$$

$$\Pi^B = (1 - Q_B - Q_B^*)Q_B - qQ_B \tag{2}$$

$$\pi^{B^*} = (1 - Q_B - Q_B^*)Q_B^* \tag{3}$$

The quantity sold in country i ($i = A, B$) is denoted by Q_i, while an asterisk (*) denotes variables for the local competitor in country B. The transfer price is denoted by q. As is seen, the parent firm has revenues from selling directly to country A's consumers and to the subsidiary in country B (while the costs of producing Q_A and Q_B are zero by assumption). The subsidiary's revenue depends on the sales of the local competitor, while its costs are determined by the transfer price which it has to pay to the parent firm. Finally, the foreign local firm has revenues from selling in its local market (while the costs of producing Q_B^* are zero).

Accounting for taxes, the MNE maximizes after-tax global profits, while the local competitor maximizes its after-tax local profits Π^{B^*}. In each country there is a company tax (t_A, t_B) that falls on the profits of the firms that operate within the country, i.e. taxation is based on the separate accounting system.[8] It is also assumed that in the case where the transfer price deviates from its true (arm's length) value of zero, the MNE faces a non-tax-deductable transfer pricing cost.[9] We assume that this cost is quadratic and based on the actual difference between the chosen price and the

[6] This set-up is the simplest possible to portray the strategic considerations involved in setting transfer prices. None of the qualitative results that we present here depends on the Cournot assumption (except for the sign of the transfer price under de-centralization).

[7] Since for our purpose there is no need for general intercept and slope parameters in demand expressions, we take all of them to be unity.

[8] In addition, we assume that the exemption principle of international taxation is in force, so that the subsidiary's income is not liable to tax in the parent's country. In essence, this requires the subsidiary to be a separate legal entity.

[9] These costs can be thought of as real resource costs that the MNE pays to experts (lawyers,

true price (which is zero here), viz. $q^2/2$.[10] That is, if the transfer price is not zero, the MNE incurs costs that are an increasing function of the deviation from zero.[11]

We proceed by examining, in turn, a centralized and a de-centralized decision structure of the MNE. The option of centralization implies that the MNE chooses both its transfer price, output and sales simultaneously (subsection 2.1). We derive the endogenous variables and find the centralized MNE's profits as a function of tax rates t_A and t_B. We then examine the de-centralization option (subsection 2.2), where the MNE chooses centrally only its transfer price, while its entities choose output and sales decentrally. Again we derive the endogenous variables and find the de-centralized profits as functions of t_A and t_B. We then compare the MNE's profits in the two equilibria (subsection 2.3) and determine the effect of the tax differential on the MNE's organizational structure, viz. centralization or de-centralization.

2.1 Centralized choices

This is the case where the MNE chooses centrally all its decision variables in order to maximize after-tax global profits (Π^C, where superscript C denotes centralized). In doing so, the MNE takes into account the Cournot competition in country B and the cost of transfer-price distortion. The maximization problems of the centralized MNE

accountants) in order to argue to authorities for the particular level of the transfer price chosen. One can also perceive these costs as an expected penalty that tax authorities impose on distorted transfer pricing.

[10] Including a convex transfer price is necessary in order to obtain an internal solution for the transfer price (see Kant, 1988, and Haufler and Schjelderup, 2000).

[11] One might argue that transfer pricing costs/penalties should depend not only on the extent of transfer pricing distortion, i.e. the difference between q and 0, but also on the volume of the intra-firm transactions Q_B and/or on the actual tax rates t_i. The implications of different transfer price penalty schemes are an interesting topic in itself that has only rarely been touched upon; see Nielsen et al. (2004). Here, however, alternative formulations of the cost/penalty scheme have no qualitative effect on the issue which we examine. Thus, we choose to proceed with the simple quadratic transfer pricing cost function.

and its competitor in country B are:

$$\begin{aligned}\max_{q,Q_A,Q_B} \Pi^C &= (1-t_A)\Pi^A + (1-t_B)\Pi^B - \frac{1}{2}q^2 \\ \max_{Q_B^*} \Pi^{B^*} &= (1-t_B)\pi^{B^*}\end{aligned}$$

Deriving the first order conditions we get:[12]

$$q \quad : \qquad q = (t_B - t_A)\, Q_B \tag{4}$$

$$Q_A \quad : \qquad Q_A = \frac{1}{2} \tag{5}$$

$$Q_B \quad : \qquad (t_B - t_A)q + (1-t_B)(1 - 2Q_B - Q_B^*) = 0 \tag{6}$$

$$Q_B^* \quad : \qquad Q_B^* = \frac{1-Q_B}{2} \tag{7}$$

Substituting (4) into (6) we derive:

$$(t_B - t_A)^2 Q_B + (1-t_B)(1 - 2Q_B - Q_B^*) = 0, \tag{8}$$

which we then solve together with (7) to derive the equilibrium values for the Cournot quantities and the transfer price:

$$Q_B = \frac{1-t_B}{3(1-t_B) - 2(t_B - t_A)^2} \tag{9}$$

$$Q_B^* = \frac{(1-t_B) - (t_B - t_A)^2}{3(1-t_B) - 2(t_B - t_A)^2} \tag{10}$$

$$q = \frac{(1-t_B)(t_B - t_A)}{3(1-t_B) - 2(t_B - t_A)^2} \tag{11}$$

It is immediately seen that in the case where the tax rates are equal in the two countries ($t_A = t_B$), the choice variables take on the anticipated values, i.e. the transfer price will be set equal to the true price ($q = 0$) and $Q_B = Q_B^* = \frac{1}{3}$, the standard expressions for Cournot duopoly quantities.[13] However, when $t_A \neq t_B$, the tax-manipulation incentive enters. Starting from equal tax levels we can show that

[12] From (5) we see that the sales in country A are independent of taxes and transfer prices. This is due to the assumption of constant marginal costs which effectively separates the two sales decisions.

[13] The intuition behind setting $q = 0$ is easy to grasp when one notices that the parent firm avoids double marginalization issues by charging the retailer a wholesale price equal to the marginal cost of production.

$\left.\frac{dQ_B}{dt_B}\right|_{t_A=t_B} < 0$ and $\left.\frac{dq}{dt_B}\right|_{t_A=t_B} > 0$, i.e. when taxes become higher in the foreign country (B), then the MNE will reduce sales in that country by overinvoicing in the internal transaction.

Evaluating total centralized profits $\Pi^C = (1-t_A)\Pi^A + (1-t_B)\Pi^B - \frac{1}{2}q^2$ at the equilibrium choices Q_A, Q_B, q gives:

$$\Pi^C = \frac{(1-t_A)}{4} + \frac{(1-t_B)^2\left[2(1-t_B) - (t_B-t_A)^2\right]}{2\left[3(1-t_B) - 2\left(t_B-t_A\right)^2\right]^2} \tag{12}$$

For $t_A = t_B = t$, we get

$$\Pi^C = (1-t)(\frac{1}{4} + \frac{1}{9}). \tag{13}$$

2.2 De-centralized choices

We now consider the case where the MNE chooses its transfer price centrally, but decentralizes production and sales decisions to its entities. In order to depict the benefits from pre-commitment, we first consider production and sales decisions given a fixed transfer price.

From the maximization problems $\max_{Q_A} \Pi^A, \max_{Q_B} \Pi^B, \max_{Q_B^*} \Pi^{B^*}$, where the profits are defined in (1)-(3), we derive the following equilibrium sales choices:

$$Q_A = \frac{1}{2} \tag{14}$$

$$Q_B = \frac{1-2q}{3} \tag{15}$$

$$Q_B^* = \frac{1+q}{3} \tag{16}$$

which are the standard monopoly, respectively Cournot duopoly sales choices.

However, the transfer price q is determined centrally by the (headquarters of the) MNE which can behave strategically. Maximizing $\Pi^{DC} = (1-t_A)\Pi^A + (1-t_B)\Pi^B - \frac{1}{2}q^2$ with respect to q, we derive:

$$q = \frac{4t_B - 3t_A - 1}{13 + 8t_B - 12t_A} \tag{17}$$

In the absence of tax differentials $t_A = t_B = t$, the above becomes:

$$q = \frac{t-1}{13-4t} < 0$$

that is, the strategic delegation effect alone leads to underinvocing. This is exactly what we should expect in our Stackelberg-Cournot equilibrium.[14] Setting a low transfer price makes the subsidiary sell a larger quantity. The competitor anticipates this and its best response is to limit its own sales.[15]

We now move on to calculate the de-centralized profits Π^{DC}. Using (1), (2), (14), (15) and (17), gives:

$$\Pi^{DC} = \frac{1-t_A}{4} + \frac{1-t_B}{9} + \frac{(4t_B - 3t_A - 1)^2}{18\,(13 + 8t_B - 12t_A)} \tag{18}$$

For $t_B = t_A = t$ the above expression reads

$$\Pi^{DC} = (1-t)\left(\frac{1}{4} + \frac{1}{9}\right) + \frac{(t-1)^2}{18(13-4t)} \tag{19}$$

In what follows we compare the MNE's (after-tax) profits under centralization and de-centralization, stressing the intuition for our results.

2.3 Comparing centralized and de-centralized profits

For equal taxes, and by comparing (13) and (19), it is straightforward to see that de-centralized global profits are always higher than centralized profits. In particular, $\Pi^{DC} - \Pi^{C} = \frac{(t-1)^2}{18(13-4t)} > 0$ for $t \in (0,1)$. This is exactly as expected: without any tax

[14] This strategic delegation effect is absent in the centralized equilibrium. Due to it, we expect the de-centralized transfer price to generally be lower than the centralized transfer price, even in the face of tax differences. For realistic tax levels, i.e. $0 \leq t_i < 1$, our simulations indeed confirm this conjecture; see figure 2 below.

[15] By observing the low transfer price the local competitior anticipates the subsidiary's production decision and, thus, reduces its own quantity. Observability of the transfer price may seem like a strong assumption. However import prices, for example, are public information in many countries due to the calculation of duties and tariffs. Furthermore, the MNE has an incentive to make this type of information publicly available. Katz (1991) discusses observability issues in delegation.

saving incentive, pre-commitment to a low transfer price provides a credible incentive to expand sales in the subsidiary's market, and thus win the market-share game in that country. Thus, de-centralized decisions are more profitable than centralized decisions in the absence of tax differences.[16]

However, for unequal taxes, the result of the comparison becomes ambiguous and a function of the specific tax levels in the two countries. The incentive to save tax payments works against the strategic effect of transfer prices, in which case it is not obvious that the firm should make use of its delegation opportunity. A simple numerical example is sufficient for illustrating and providing the main intuition.

Setting $t_B = 0.3$ in (12) and (18) and allowing t_A (t in the figure) to vary, we obtain the following picture:[17]

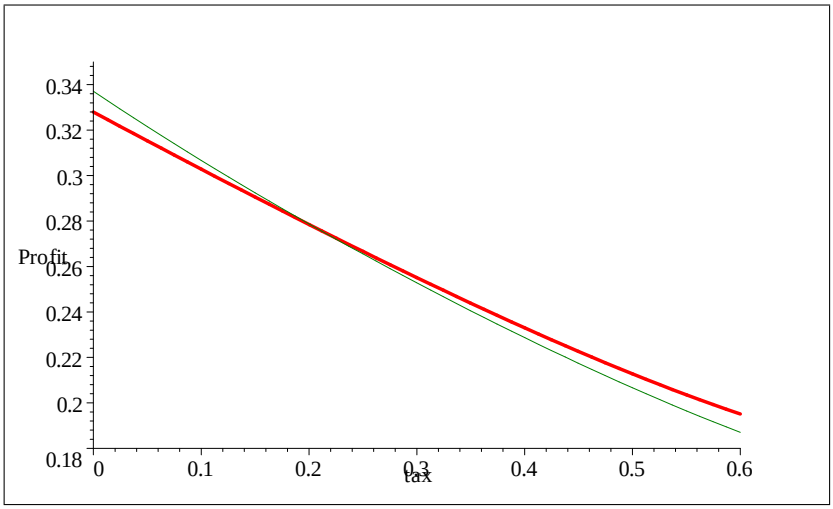

Figure 1: Centralized vs. de-centralized profits

The bold/red curve depicts the de-centralized profits, while the thin/green

[16] Clearly, this result rests on the fact that there is oligopolistic competition in the foreign country. Altering the competition assumption can certainly eliminate the result, making centralized decisions at least as profitable as de-centralized decisions.

[17] We depict the profit curves only up to $t_A = 0.6$, as after that level of taxes negative equilibrium quantities appear.

curve depicts the centralized profits. The two profit functions are equal at $t_A^* \simeq 0.208$. For $t_A < t_A^*$, centralized profits are higher than de-centralized profits, while the opposite holds for $t_A > t_A^*$.

Performing a similar exercise for the transfer price functions (11) and (17), we get the following picture:

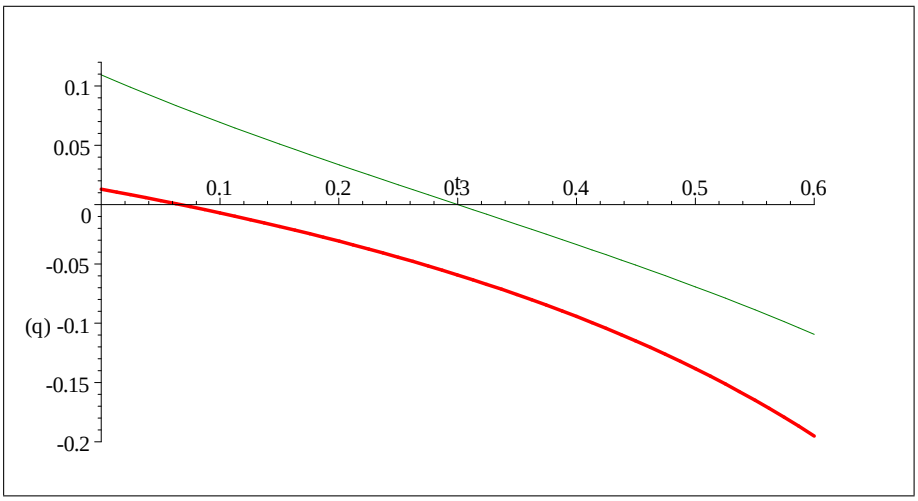

Figure 2: Centralized vs. de-centralized transfer prices

As expected the de-centralized transfer price (bold/red curve - y-axis) is always below the centralized transfer price (thin/green curve) (see footnote 14).

To explain what is happening in the Figures, note first that, as discussed above, equal taxes entail that the MNE always chooses a de-centralized decision structure. However, if the tax in the subsidiary's home country is higher than the tax in the parent's country, i.e. $t_B = 0.3 > t_A$, the MNE will want to underinvoice in order to save tax payments abroad. Thus, the tax saving incentive dictates a high transfer price, while the strategic delegation effect favors a low transfer price. As t_A falls, the desire to save tax payments strengthens; unfortunately, doing so interferes with the market-share game that the subsidiary is involved in. The result is that at some point it becomes unprofitable to use the transfer price as an instrument to implement de-centralized

decisions. In our example, this point is reached at $t_A \simeq 0.208$. Below this tax level it is more profitable for the MNE to exclusively focus on saving tax payments, and the way to accomplish this is to eliminate the de-centralization option and instead choose sales in a centralized manner. In a sense, the problem of the conflicting roles of the transfer price is resolved by moving all decisions to the central level.

Having explained the intuition for the case of a Cournot duopoly, we can now briefly address the effects of alternative assumptions. First note that if the duopoly in the foreign country was characterized by Bertand competition and differentiated products, then the MNE would have an incentive to set a high transfer price. The intuition is that the Bertrand competition is too intense to start with, and a high transfer price enables a higher price for the subsidiary's product (as well as that of the competitor).[18] A high transfer price will not interfere with the tax saving incentive as long as the tax in the foreign country is higher than the tax in the parent's country. When $t_B > t_A$, the two concerns of the MNE are not in conflict with each other, and de-centralization is clearly to be preferred. The conflict, however, will arise if $t_B < t_A$, where tax saving demands a low transfer price and strategic delegation (under Betrand competition with differentiated products) requires a high transfer price. Beyond a certain critical value of the tax differential, centralized decisions will become more profitable than de-centralised decisions. A figure similar to figure 1 can still be drawn for this case. It will feature a profits curve for de-centralization which will lie above the profits curve for centralization for all values of t_A to the left of some intersection point at a value t_A^*, which itself lies to the right of $t_B = 0.3$.

The number of competitors in the foreign market also has an intuitive effect on our results. Assuming a larger and fixed number of firms in country B, or a free entry and exit Cournot game, will reduce the profits that strategic delegation can provide to the MNE's subsidiary. Reducing theses profits weakens the strategic delegation incentive, making it less worthwhile to use transfer prices for that purpose. Centralization, allowing clear focus on tax manipulation, will be more profitable than de-centralization,

[18] If the two companies' products were homogeneous and they competed in Bertrand fashion, then the strategic motive for setting the transfer price would vanish.

even for small tax differentials.[19]

To sum up, de-centralization allows the MNE to aggressively pursue competition in the subsidiary's market, but only halfheartedly manipulate its tax payments. Centralization allows full devotion to tax manipulation, but no strategic precommitment in the subsidiary's market. The size of tax differentials determines how important pursuing a tax saving strategy is and therefore the most appropriate decision structure of the MNE.

3 Conclusions

A MNE's choice of organization of its decision making is complex and depends on a host of considerations. The theoretical guidelines on this issue are laid out in the principal-agent theory of the firm, where it is widely recognized that de-centralization of decision-making offers a number of advantages to the firm (the precommitment/delegation argument). In this paper we focus on this de-centralization choice, but in addition we underline an issue, namely national tax differentials, which is specific to MNEs as they operate in different tax jurisdictions.

We argue that tax differentials have an important bearing on whether a MNE chooses to make all its decisions at the central level or not. By emphasizing the centralization vs. de-centralization decision as a choice that the MNE must make in its efforts to maximize profits, we have shown that while small tax differentials favor de-centralized decisions, large tax differentials may render centralized decisions preferable. In modeling this issue, we choose to focus on the conflicting roles that transfer prices can have within a MNE, and on how centralizing decision-making can help overcome these problems.

An important assumption in our analysis is that the transfer price addresses two targets (minimizing tax payments and providing a strategic advantage to the sub-

[19] Similar intuition can be applied to the case of assymetric production costs. Further, the importance of the strategic transfer price motive and thus the precise break-even point between centralization and de-centralization obviously hinges on the exact demand conditions in country B.

sidiary). At the face of it one might think that one solution could be to introduce an instrument other than the transfer price, e.g. a monetary incentive to the manager of the subsidiary firm, and assign each instrument to a particular target. Alternatively, two transfer prices could address the tax saving and the strategic incentive separately. We would, however, like to stress that neither of these two suggested schemes would eliminate the problem at hand namely that any transfer price set-up has two conflicting roles. To understand why, consider the case where the parent firm exports goods to its foreign subsidiary at a (transfer) price, using the transfer price as a strategic pre-commitment device. At the same time the parent charges the subsidiary an overhead charge and this takes on the role of shifting profit to the low tax country. Such a scheme is in violation with the OECD transfer pricing guidelines, which state that any transfer (cost or income) must reflect real activity between the parties.[20] Thus, the size of the overhead charge must be related to the size of export (i.e. real activity between the two parties). Effectively then the same problem arises as in the case of a single transfer price. This is the legal tax reason for why the transfer pricing problem in essence can be compounded into a single transfer price transaction, where the transfer price must deal with conflicting incentives.

Finally, whether or not MNEs in reality change their organizational structure in response to tax differentials is an empirical issue that is certainly worth pursuing. Our theoretical arguments (albeit based on a number of assumptions) entail that MNEs may be less likely to delegate decision-making to subsidiaries which are located in countries with either very high or very low tax rates, depending on the nature of competition for local market shares. It would be interesting to see whether this tendency can be found in the data.

[20] OECD 1979/1985.

References

[1] Almeida, P., 1996, Knowledge sourcing by foreign MNEs: patent citation analysis in the US semiconductor industry, *Strategic Management Journal* 17, 155-165.

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

[3] Elitzur, R. and J. Mintz, 1996, Transfer pricing rules and corporate tax competition, *Journal of Public Economics* 60, 401-422.

[4] Fershtman, C. and K. Judd, 1987, Equilibrium incentives in oligopoly. *American Economic Review* 77, 927-940.

[5] Grandstrand, O., L. Håkanson, and S. Sjolander, 1992, (eds.) *Technology Management and International Business,* Wiley & Sons.

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

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

[8] Kant, C., 1988, Endogenous transfer pricing and the effects of uncertain regulation, *Journal of International Economics* 24, 147-157.

[9] Katz, M., 1991, Game-playing agents: unobservable contracts as precommitments, *Rand Journal of Economics* 22*, 307-328.*

[10] Mintz, J. and with R. Elitzur, 1996, Transfer Pricing Rules and Corporate Tax Competition," *Journal of Public Economics*, Vol.56, 401–422.

[11] Nielsen, S.B., P. Raimondos-Møller, and G. Schjelderup, 2003, Formula apportionment and transfer pricing under oligopolistic competition, *Journal of Public Economic Theory* 5, 419-437 .

[12] Nielsen, S.B., P. Raimondos-Møller, and G. Schjelderup, 2004, Company taxation and tax spillovers: separate accounting versus formula apportionment, mimeo.

[13] OECD 1979/1995, Transfer Pricing Guidelines for Multinational Enterprises and Tax Administrations, Paris.

[14] Papanastasiu, M. and R. Pearce, 2005, Funding sources and the strategic roles of de-centralized R&D in multinationals, *R&D Management* 35, 89-99.

[15] Petit, M.L. and F. Sanna-Randaccio, 2000, Endogenous R&D and foreign direct investment in international oligopolies, *International Journal of Industrial Organization* 18, 339-367.

[16] Sanna-Randaccio, F. and R. Veugelers, 2002, Multinational knowledge spillovers with centralized versus decentralized R&D: a game theoretic approach, CEPR Discussion Paper 3151.

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

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

[19] Vickers, J., 1985, Delegation and the theory of the firm. *Economic Journal* 95, 138-147.

[20] Weichenrieder, A., 1996, Fighting international tax avoidance: The case of Germany, *Fiscal Studies* 17, 37-58.

[21] Zhao, L., 2000, Decentralization and transfer pricing under oligopoly, *Southern Economic Journal* 67, 414-426.

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