

# Tax-Induced Transfer Pricing and Corporate Agency Costs

Marko Koethenbueger  
ETH Zurich and CESifo<sup>‡</sup>

Michael Stimmelmayer  
University of Bath  
and ETH Zurich<sup>‡</sup>

February 15, 2021

## Abstract

Corporate agency conflicts are widespread, but their relations to taxation are rarely explored. The paper analyzes the implications of tax-induced transfer pricing when corporate agency problems between the headquarter and division managers of a multinational enterprise (MNE) exist. Possibly surprisingly, tax and incentive considerations might not be conflicting in the choice of transfer prices. Compared to divisional bargaining, a centralized choice of transfer prices, where tax savings considerations are dominant, might not dilute, but strengthen incentives of managers to provide essential inputs to local production. The tax-related incentive effects spill over to government incentives to compete for MNE profits. We relate the analysis to the current OECD initiatives on transfer pricing regulation and identify welfare effects of regulatory measures hitherto unnoticed.

**JEL-Classification:** H25, D21, H87

**Keywords:** profit taxation, (de)centralization, multinational firm, managerial effort, decision rights.

---

<sup>‡</sup>Department of Management, Technology and Economics, Leonhardstr. 21, CH-8092 Zurich, Phone: +41 44 6325446, Email: koethenbueger@ethz.ch.

<sup>‡</sup>Department of Economics, Claverton Down, Bath, BA2 7AY, UK, Phone: +44 1225 38 5817, Email: ms3127@bath.ac.uk.

# 1 Introduction

There is considerable evidence that cross-country tax rate differences incentivize multinational enterprises (MNEs) to adopt tax avoidance strategies. MNEs have an advantage in relocating profits compared to stand-alone firms. MNEs may shift profits by strategically pricing internally traded goods and services or by using internal debt finance.<sup>1</sup> Such tax avoidance strategies severely constrain the ability of governments to impose taxes on profits of MNEs as these firms try to locate profits in countries where taxes are low. To limit the outflow of the tax base, governments are reluctant to tax profits and, as a consequence, will set taxes at an inefficiently low level. See Keen and Konrad (2014) for a review of the literature. There are numerous highly publicised cases where MNEs appear to aggressively engage in tax avoidance strategies. Most notably, MNEs like Apple, Google and Starbucks have been publicly accused to locate essential firm resources (like patents) in low-tax jurisdictions and to strategically price these resources so as to reduce the tax liability in high-tax jurisdictions possibly to zero. In response, various countries as well as the OECD have implemented policy measures with the intention to constrain MNEs in their ability to engage in profit shifting. Most notably, the policy measures include recommendations as to the way transfer prices ought to be set for tax purposes. See OECD (2010, 2013), for instance.

In this paper we analyze tax-induced transfer pricing incentives of MNEs in an environment in which transfer pricing also has a non-tax purpose, namely to induce optimal decision making in a decentralized organization in which agency conflicts exist. In particular, we depart from most of the existing literature by analyzing the way transfer pricing interacts with managerial behavior that is unrelated to tax avoidance and how this interaction depends on whether transfer prices are chosen (de)centrally. The (de)centralized choice of transfer prices is widespread in MNEs where, depending on the organizational structure, either the headquarter or divisions of MNEs have the decision right to set the transfer prices that are used for internal transactions. In our model, division managers exert two types of effort which influence either the cost of the division or the final sales of the MNE. Managerial effort is unverifiable and cannot be controlled by a contract. However, the MNE might use an incentive contract that is conditioned on division profit to influence the effort choice of managers. In this setting, we show that the (de)centralization of

---

<sup>1</sup>Hines (1999) and Gresik (2001), among others, provide an overview of how decisions of MNEs are influenced by tax avoidance considerations. A recent overview of the empirical literature on transfer pricing is provided in Dharmapala (2014).

transfer pricing influences the profitability of the MNE and the aggressiveness of tax avoidance behavior. In particular, a decentralized choice of transfer prices yields better incentive provision for managers, while a centralized system gives the MNE more direct control over tax avoidance behavior.<sup>2</sup> Interestingly, we show that the importance of effort provision and the benefits of tax avoidance do not always trade-off in the determination of the optimal mode of transfer pricing. Provided the effort choices of the downstream division are sufficiently more important compared to the choices of the upstream division, incentive provision and tax minimization favor a centralized choice of the transfer price. We also relate the analysis to the current OECD initiative on transfer pricing and characterize efficiency implications of transfer pricing regulation hitherto unnoticed. We find that transfer pricing regulation such as cost-plus transfer pricing might yield efficiency costs that undermine the desirability of such a rule, while a profit-split method might well enhance efficiency above and beyond its intended effects on fiscal resources.

Many papers have derived optimal transfer pricing policies when agency conflicts within the MNE are absent. In this body of literature, the MNE faces either an interval of permissible transfer prices, among which it chooses the highest or lowest permissible transfer price (depending on the tax differential across jurisdictions), or a concealment cost which implies that deviations from the true economic price are costly to the MNE. See Samuelson (1982) and Haufler and Schjelderup (2000) and, for a review of the literature, Gresik (2001) and Griffith et al. (2010). In such an environment, OECD transfer pricing regulation such as cost-plus policies limit aggressive tax avoidance behavior and increase welfare. Differently, accounting for agency conflicts, transfer pricing might be used to incentivize managers through the decentralization of transfer pricing where the transfer price might be negotiated between division managers (Holmstrom and Tirole, 1991; Anctil and Dutta, 1999; Baldenius et al., 1999, among others). Centralization of transfer pricing choices might also provide incentives to managers provided the headquarter administers formula-based transfer pricing schemes which, in combination with incentive contracts, let managers participate in the return to their managerial effort (Smith, 2002).

There are only a few contributions that analyze the way managerial incentive provision and

---

<sup>2</sup>The finding that a decentralized choice of transfer pricing implies less tax aggressiveness is consistent with empirical findings. The more autonomy divisions of MNEs in China have in terms of making pricing decisions for intra-firm sourcing the lower are audit adjustments (reflecting tax aggressiveness) by tax authorities (Chan et al., 2006).

profit shifting trade off.<sup>3</sup> With a centralized choice of a formulaic transfer price, the headquarter might more strongly incentivize the division manager through a higher apportionment of taxable revenues once that division faces a rise in the profit tax rate (Smith, 2002). In this case, managerial incentive provision dominates tax avoidance incentives in setting multinational transfer prices although the headquarter uses two transfer prices, one for tax purposes and one for managerial performance evaluation. In Elitzur and Mintz (1996) the headquarter chooses only the internal, non-tax transfer price, while the transfer price that is used for tax purposes is fixed by regulation. Since only the manager in the division that receives the internal input exerts effort to reduce own costs, the transfer price is not used for incentive provision and equals the marginal cost of production adjusted for profit taxes.<sup>4</sup> The decentralization of decision rights within multi-unit firms and its economic consequences has received increasing attention in the literature, albeit mostly from a non-tax perspective. See Acemoglu et al. (2007) and Mookherjee (2006), among others. Nielsen et al. (2008) relate the decentralization decision to tax avoidance behavior. Cross-country tax differentials influence the decentralization of decision rights to gain a strategic advantage in the product market. Decentralization turns out to be more profitable when tax differentials and thereby potential tax savings are low.

The remainder of the paper is organized as follows. In Section 2 we present a model of MNE behavior followed by an analysis of transfer pricing in Section 3 and 4. In Section 5 we relate the analysis to the current OECD initiative on transfer pricing. Finally, in Section 6 we summarize our findings and draw some conclusions.

## 2 Model

We consider a multinational enterprise (MNE) with two divisions. The divisions are located in different countries which we denote North (N) and South (S). The division in the South produces an intermediate input at a cost  $C_S(s_S, e_S) + \varepsilon_S$  which is used by the division in the North to

---

<sup>3</sup>A growing strand of literature analyzes the interaction between corporate tax avoidance and non-tax costs of tax aggressiveness that follow from the separation of ownership and control, see Chen and Chu (2005), Crocker and Slemrod (2005) and Desai and Dharmapala (2006, 2009), for instance. Issues of transfer pricing are not considered.

<sup>4</sup>There is a body of literature which emphasizes the role of transfer prices to coordinate the quantity of inputs that is traded internally. Therein, the conflict of interest between divisions and the headquarter is related to the profit metrics that is used for decision making by the division managers and the headquarter (division profit vs. MNE profit). See Halperin and Srinidhi (1991), Harris and Sansing (1998), Baldenius et al. (2004) and Hyde and Choe (2005), for instance. In our setting, the quantity is fixed and we focus on managerial effort choices as the source of agency conflict.

assembly a final product at a cost  $C_N(s_N, e_N) + \varepsilon_N$ . The cost of production is stochastic with  $\varepsilon_i \sim \mathcal{N}(0, \sigma^2)$ ,  $i = N, S$ . The quantity that is internally traded is normalized at unity and the final product is sold at a price  $\phi(s_N) + \phi(s_S)$  in an external market.

Each division is run by a manager who might exert value-creating effort  $s_i$  and cost-reducing effort  $e_i$ ,  $i = N, S$ . The value-creating effort increases the market price  $\phi(s_N) + \phi(s_S)$  at a decreasing rate,  $\phi' > 0 > \phi''$ . Exerting effort  $s_i$  is costly to the manager. The production costs of division  $i$  is increasing in this type of effort at an increasing rate, while the cost-reducing effort  $e_i$  reduces own-division costs at a decreasing rate. Hence, we assume  $\partial C_i / \partial s_i > 0$ ,  $\partial^2 C_i / \partial s_i^2 > 0$ ,  $\partial C_i / \partial e_i < 0$  and  $\partial^2 C_i / \partial e_i^2 > 0$ . Exerting effort also incurs a non-pecuniary cost to the manager  $c_i(s_i, e_i)$  which is increasing in the two types of effort at an increasing rate,  $\partial c_i / \partial s_i > 0$  and  $\partial^2 c_i / \partial s_i^2 > 0$ ,  $\partial c_i / \partial e_i > 0$  and  $\partial^2 c_i / \partial e_i^2 > 0$ ,  $\iota = e, s$ . We further impose INADA conditions with respect to the limit of the first derivatives of the revenue and cost functions.

Before-tax accounting profits of the two divisions are

$$\pi_N = \phi(s_N) + \phi(s_S) - p_M - C_N(s_N, e_N) - \varepsilon_N \quad (1)$$

in the division in the North and

$$\pi_S = p_M - C_S(s_S, e_S) - \varepsilon_S \quad (2)$$

in the division in the South.  $p_M$  is the transfer price at which the internal accounting system of the MNE values the trade of the intermediate product between the two divisions.

The two types of effort are non-verifiable such that a contract cannot be conditioned on these choice variables of the manager. However, the MNE might use a performance-based contract to incentivize the manager of each division. The wage payment of the manager hence includes a fixed wage  $\alpha_i$  and a performance-based wage payment  $w_i = \alpha_i + \beta_i \pi_i$ . The parameter  $\beta_i$  is the fraction of division profit that accrues to the manager in division  $i$ . The performance-based component renders the wage payment stochastic. The manager is risk averse and derives utility from wage income net of the non-pecuniary cost of effort provision  $E(U_i) = E(u(w_i)) - c_i(s_i, e_i)$ . Assuming utility over income to be CARA, we can simplify manager utility to

$$E(U_i) = E(w_i) - r \text{Var}(w_i) - c_i, \quad r > 0, \quad (3)$$

where the variance of wage income is  $\text{Var}(w_i) = \beta_i^2 \sigma^2$ . Each division manager's outside option value is 0. Hence, the wage contract satisfies  $E(U_i) = 0$ .

Profits of the two divisions are taxed at source at rate  $t_i$ . The MNE might use a transfer price  $p_T$  for tax purposes that deviates from the transfer price  $p_M$  that the MNE uses internally. With a set of two transfer prices, expected net-of-tax profit of the MNE is:<sup>5</sup>

$$\begin{aligned}
\Pi &= \sum_i ((1 - t_i)E(\pi_i) - E(w_i)) + (t_S - t_N)(p_M - p_T) - \gamma(p_T) \\
&= \sum_i ((1 - t_i)E(\pi_i) - \beta_i E(\pi_i) - \alpha_i) + (t_S - t_N)(p_M - p_T) - \gamma(p_T) \\
&= \sum_i ((1 - t_i)E(\pi_i) - r\beta_i^2\sigma^2 - c_i(s_i, e_i)) + (t_S - t_N)(p_M - p_T) - \gamma(p_T) \quad (4)
\end{aligned}$$

The second equality follows from  $E(w_i) = \alpha_i + \beta_i E(\pi_i)$  and the last equality follows from  $E(U_i) = 0$  and, hence,  $\beta_i E(\pi_i) = r\beta_i^2\sigma^2 + c_i(s_i, e_i) - \alpha_i$ . The term  $(t_S - t_N)(p_M - p_T)$  corrects MNE net-of-tax profits for the use of a different transfer price for tax purposes and for internal accounting purposes.

In the following we distinguish between different scenarios how transfer prices are set. We distinguish between a centralized and decentralized choice of transfer prices as well as between a one-book system, which uses the same transfer price for tax and internal accounting purposes ( $p_M = p_T$ ), and a two-books system, which uses different transfer prices ( $p_M \neq p_T$ ).

### 3 One-book system ( $p_M = p_T$ )

We start out with the assumption that the MNE only uses one transfer price which we denote by  $p = p_M = p_T$ . One book systems are widely used in practice and are less costly to implement. For instance, a survey by Ernst & Young (2003) indicates that over 80% of surveyed firms use a single price for tax and internal accounting purposes. As reported by the firms, the main reason for this choice is that tax authorities may interpret a dual price system as tentative evidence for aggressive tax-motivated transfer pricing and may require additional evidence to defend the price that the MNE uses for the calculation of the profit tax base. Using the internal price also for tax purposes corresponds to a recent transfer pricing norm, the Performance Related Principle, suggested by Desai and Dharmapala (2011).

---

<sup>5</sup>For analytical simplicity, it is assumed that the fixed wage  $\alpha_i$  is not tax deductible. The results are unaffected by this assumption.

### 3.1 Transfer prices are determined centrally

Assume that, in line with most of the literature on transfer pricing, the price at which goods are traded within the MNE is centrally determined. The associated sequence of decisions is

stage 1: The headquarter chooses the incentive contract for both division managers.

stage 2: Division managers decide on their effort levels.

stage 3: The headquarter chooses the transfer price and nature reveals  $\varepsilon_i$ .

The sequence of decision implies that the headquarter has more flexibility in setting the transfer price compared to the choice of the incentive contract and to the managerial choices of effort. The latter might be related to investments in product or process innovations whose success depends on the long-term effort choices of the managers.

Solving backward, at stage 3 the MNE chooses the transfer price. Any deviation from the true price level, which is normalized at zero for analytical convenience, is subject to a concealment cost  $\gamma(p)$  that satisfies  $\gamma(0) = 0$ ,  $\gamma'(0) = 0$ ,  $\text{sign}(\gamma') = \text{sign}(p)$  and  $\gamma''(p) > 0$ .

Setting  $p = p_M = p_T$  in (1) and (2) and inserting the modified equations into (4), the headquarter maximizes MNE profits (subject to the concealment cost) by selecting a transfer price  $p$  that satisfies

$$t_N - t_S = \gamma'(p). \quad (5)$$

The deviation from the true transfer price depends on the tax differential across the two jurisdictions. For instance, a positive tax differential  $t_N - t_S$  incentivizes the manager to shift less income to the division in the North. The headquarter chooses to over-invoice the intermediate input and leaves more revenues in the division in the South compared to a situation with equal tax rates.

At stage 2 the division managers choose their effort levels by maximizing utility (3) where division profits are given by (1) and (2) and the transfer price follows from (5). Hence,

$$e_i, s_i = \arg \max \alpha_i + \beta_i E(\pi_i) - r\beta_i^2 \sigma^2 - c_i(s_i, e_i) \quad \text{s.t.} \quad (1), (2) \text{ and } (5). \quad (6)$$

For the manager in division  $S$ , optimal effort levels follow from:

$$s_S : \quad \beta_S (-\partial C_S / \partial s_S) - \partial c_S / \partial s_S < 0 \Rightarrow s_S = 0 \quad (7)$$

and

$$e_S : \quad \beta_S (-\partial C_S / \partial e_S) - \partial c_S / \partial e_S = 0. \quad (8)$$

Correspondingly, the optimal effort choices by the manager of division  $N$  follow from:

$$s_N : \quad \beta_N (\phi' - \partial C_N / \partial s_N) - \partial c_N / \partial s_N = 0 \quad (9)$$

and

$$e_N : \quad \beta_N (-\partial C_N / \partial e_N) - \partial c_N / \partial e_N = 0. \quad (10)$$

Incentives by division  $S$  to invest in value-enhancing activities are diluted by the central choice of transfer prices which is independent of  $s_S$ . Hence, the manager in division  $S$  does not participate in the return to its value-creating effort. In contrast, the manager in division  $N$  participates in the return to  $s_N$  at a rate  $\beta_i$  through the incentive contract. The optimal value-creating effort level in division  $N$  is positive. But, given that the non-pecuniary costs are privately borne by the manager, the effort level stays below the efficient level which follows from the first-order condition when  $\beta_i = 1$ . Similarly, the cost-reducing effort level in both divisions is positive but is below the efficient level due to the imperfect appropriation of the return to effort, while the non-pecuniary costs are fully borne by the managers.

At stage 1 the headquarter chooses the incentive contract by selecting  $\{\alpha_i, \beta_i\}_{i=N,S}$ . Setting  $p = p_M = p_T$  in (1) and (2) and using (4), the headquarter solves

$$\begin{aligned} \max_{\{\alpha_i, \beta_i\}_{i=N,S}} & \quad (1 - t_N) (\phi(s_N) + \phi(s_S) - p - C_N(s_N, e_N)) - r\beta_N^2\sigma^2 - c_N(s_N, e_N) \\ & \quad + (1 - t_S) (p - C_S(s_S, e_S)) - r\beta_S^2\sigma^2 - c_S(s_S, e_S) \end{aligned}$$

accounting for managerial effort choices (7) - (10), the transfer price choice (5) and the participation constraint  $E(U_i) = 0$ . The first-order conditions for the choice of  $\{\beta_i\}_{i=N,S}$  are

$$\begin{aligned} \beta_N : & \quad [(1 - t_N) (\phi' - \partial C_N / \partial s_N) - \partial c_N / \partial s_N] \partial s_N / \partial \beta_N \\ & \quad + [(1 - t_N) (-\partial C_N / \partial e_N) - \partial c_N / \partial e_N] \partial e_N / \partial \beta_N = 2r\beta_N\sigma^2 \end{aligned} \quad (11)$$

and

$$\beta_S : \quad [(1 - t_S) (-\partial C_S / \partial e_S) - \partial c_S / \partial e_S] \partial e_S / \partial \beta_S = 2r\beta_S\sigma^2. \quad (12)$$

The optimal choice of the sharing rate  $\beta_i$  weighs the incentives effects of a higher sharing rate (see l.h.s. of the first-order conditions) against the higher risk the risk-averse manager is exposed

to (see r.h.s. of the respective conditions). The effects mirror the well-known incentive-insurance trade-off in optimal incentive provision (Holmstrom, 1979). Note, the first-order condition for  $\beta_S$  does not include changes in the value-creating effort in the South,  $s_S$ . The manager will not exert this type of effort and a higher sharing rate will not change the managerial choice, c.f. (7). The first-order conditions implicitly define the sharing rate  $\beta_i$  as a function of the tax rate in jurisdiction  $i$ ,  $\beta_i(t_i)$ . A higher tax rate  $t_i$  lowers the return of higher effort provision that accrues to the headquarter in terms of profits, which implies  $d\beta_i(t_i)/dt_i < 0$ . The headquarter chooses the fixed wage payment  $\alpha_i$  so as to satisfy the participation constraint of the manager in division  $i$ ,  $E(U_i) = 0$ .

### 3.2 Transfer prices are negotiated between division units

Now, assume that transfer price choices are decentralized and division managers choose the price at which the intermediate input is traded between the two divisions. The associated sequence of decisions is:

- stage 1: The headquarter chooses the incentive contract for both division managers.
- stage 2: Division managers decide on their effort levels.
- stage 3: The two division managers negotiate the transfer price and nature reveals  $\varepsilon_i$ .

Similar to Section 3.1, the sequence of decisions implies that the transfer price can be more flexibly adjusted compared to effort levels and the structure of the incentive contract. Division managers might meet more often to negotiate the transfer and the cost of changes in transfer prices are less severe, while effort levels might be more long-term in nature, possibly being related to investments in product or process innovations whose success depends on the long-term effort choices of the managers.

Solving backward, division managers negotiate the transfer price at stage 3. We assume Nash-bargaining between the two division managers in which case the transfer price splits the gains from trade between the two divisions.<sup>6</sup> For given effort choices and the associated monetary and non-pecuniary costs, trade in the intermediate input yields a gain of  $\phi(s_N) + \phi(s_S)$ . Instead of trading the input internally, the division managers can sell or buy the input in a competitive external market which gives the two managers an outside option of value  $\{m_i \geq 0\}_{i=N,S}$ . Internal

---

<sup>6</sup>We could deviate from the pure Nash-bargaining solution and introduce differences in bargaining power of the two managers. The modification will not qualitatively change our findings.

trade yields a higher surplus, i.e.  $\sum_i \phi(s_i) > \sum_i m_i$ . This reflects the relationship-specificity of the intermediate input which, due to the relationship-specific effort choices, is of higher value once it is used internally. Now, the negotiated transfer price follows from

$$\max_p (\phi(s_N) + \phi(s_S) - p - m_N)(p - m_S),$$

which yields

$$p = \frac{\phi(s_N) + \phi(s_S) - m_N + m_S}{2}. \quad (13)$$

For simplicity, we set  $\{m_i = 0\}_{i=N,S}$  in what follows. With this transfer price, each division's revenue is  $p = \frac{\phi(s_N) + \phi(s_S)}{2}$ . Note, the transfer price is independent of tax rates  $\{t_i \geq 0\}_{i=N,S}$  and the sharing parameters  $\{\beta_i \geq 0\}_{i=N,S}$ . They only scale the maximand of the bargaining problem, but do not change the bargaining outcome.<sup>7</sup> As a consequence, there is no tax-motivated strategic transfer pricing and the incentive contract does not directly influence the bargaining behavior of the two managers.<sup>8</sup> However, it will indirectly influence the negotiated transfer price through the managerial effort choices, as shown below.

At stage 2 the two managers choose their effort levels  $\{e_i, s_i\}_{i=N,S}$ . The splitting of the surplus implies that the revenue of the divisions and thereby the utility of the two managers qualitatively coincide. Thus, using (1), (2), (3) and the transfer price (13):

$$e_i, s_i = \arg \max \alpha_i + \beta_i \left( \frac{\phi(s_N) + \phi(s_S)}{2} - C_i(s_i, e_i) \right) - r\beta_i^2 \sigma^2 - c_i(s_i, e_i).$$

The first-order conditions are

$$s_i : \quad \beta_i (\phi'/2 - \partial C_i/\partial s_i) - \partial c_i/\partial s_i = 0 \quad (14)$$

and

$$e_i : \quad \beta_i (-\partial C_i/\partial e_i) - \partial c_i/\partial e_i = 0. \quad (15)$$

Different to the centralized choice of the transfer price, the transfer price assigns half of the marginal gain of value-creating effort  $s_S$  to the manager in division  $S$ . This incentivizes the

---

<sup>7</sup>Technically spoken, the Nash bargaining solution is immune to the scaling of the gains from trading internally (net of the value of the outside option) due to its axiomatic construction. This involves invariance to equivalent utility representations. See Osborne and Rubinstein (1990).

<sup>8</sup>The result that managers do not account for tax payments does not hinge on the assumption that the manager gets a share of gross profits. If (s)he gets a share of net profits, then the share the managers gets out of gross profits will be  $\beta_i = \tilde{\beta}_i(1 - t_i)$ . Replacing  $\beta_i$  by  $\tilde{\beta}_i(1 - t_i)$  and re-iterating all steps, the managers continue to negotiate the transfer price (13). The modified contract also yields the same sharing parameter  $\beta_i$  and effort choices as derived below.

manager to exert value-creating effort. The surplus sharing dilutes incentives of the manager in division  $N$  to exert value-creating effort. With a centralized choice of the transfer price, the manager is residual claimant of the return to effort (subject to the incentive contract), while the manager receives only half of the marginal return with a negotiated transfer price.

At stage 1 the headquarter chooses the incentive contract  $\{\alpha_i, \beta_i\}_{i=N,S}$ . Setting  $p = p_M = p_T$  in (1) and (2) and using (4), the headquarter solves

$$\begin{aligned} \max_{\{\alpha_i, \beta_i\}_{i=N,S}} \quad & (1 - t_N) (\phi(s_N) + \phi(s_S) - p - C_N(s_N, e_N)) - r\beta_N^2\sigma^2 - c_N(s_N, e_N) \\ & + (1 - t_S) (p - C_S(s_S, e_S)) - r\beta_S^2\sigma^2 - c_S(s_S, e_S) \end{aligned}$$

accounting for the managerial effort choices (14) - (15), the transfer price (13) and the participation constraint  $E(U_i) = 0$ . The first-order conditions for the choice of  $\{\beta_i\}_{i=N,S}$  are

$$\begin{aligned} \beta_i : \quad & [((1 - t_N) + (1 - t_S))\phi'/2 + (1 - t_i) (-\partial C_i/\partial s_i) - \partial c_i/\partial s_i] \partial s_i/\partial \beta_i \\ & + [(1 - t_i) (-\partial C_i/\partial e_i) - \partial c_i/\partial e_i] \partial e_i/\partial \beta_i = 2r\beta_i\sigma^2. \end{aligned} \quad (16)$$

Given that the surplus is equally shared between the two divisions, the optimality condition for  $\beta_i$  qualitatively coincides for the two managers and the sharing parameter  $\beta_i$  depends on both tax rates,  $\beta_i(t_N, t_S)$ . Interestingly, with a decentralized pricing of intra-firm trade the transfer price (13) is not affected by tax rate differential. However, the headquarter now has an incentive to shift income across divisions via adjustments in the incentive contracts. Again, the fixed wage  $\alpha_i$  is residually determined so as to satisfy the manager's participation constraint  $E(U_i) = 0$ .

The choice between decentralized price negotiations and a centralized choice of transfer prices appears to be related to the trade-off between a more direct control of income shifting with centralization and more incentive provision to engage in value-enhancing activities by the division in the South with decentralization. It follows that, when the value-creating effort by the division S's manager is sufficiently important for MNE profits, a decentralized choice of transfer prices tends to be optimal for the MNE. For concreteness consider some asymmetry in the way value-creating effort translates into sales:

$$\phi_i(s_i) = \lambda_i \tilde{\phi}(s_i), \quad \lambda_S \neq \lambda_N.$$

For a sufficiently high asymmetry in the productivity parameters  $\lambda_i$ , i.e.  $\lambda_S \gg \lambda_N$ , the rise in the sales value that is associated with decentralization tends to outweigh the loss in tax savings that follows from the eliminated tax aggressiveness in the choice of the transfer price.

The finding that a decentralized choice of transfer pricing implies less tax aggressiveness is consistent with empirical findings. The more autonomy divisions of MNEs in China have in terms of making pricing decisions for intra-firm sourcing the lower are audit adjustments by tax authorities (Chan et al., 2006). Tax compliance and thereby tax aggressiveness co-move with decentralization of decision authority which implies that tax savings become less of a concern for MNE behavior.

## 4 Two sets of books ( $p_M \neq p_T$ )

Allowing for two transfer prices, one for tax planning and one for management accounting purposes, gives the MNE more flexibility in its choices. We will subsequently analyze the sensitivity of the previous findings to the choice of two transfer prices under (de)centralization.

### 4.1 Transfer prices are determined centrally

Under centralization, the MNE uses the transfer price  $p_T$  to minimize its tax payment subject to the concealment cost. The choice of  $p_T$  straightforwardly follows from

$$t_N - t_S = \gamma'(p),$$

which is the same transfer price that is used by the MNE in a one-book system, c.f. (5).

The internal transfer price  $p_M$  only distributes revenues across the two divisions without generating incentive effects. Thus,  $p_M$  is undetermined and incentive provision is only related to the incentive contract, as with one transfer price. With these choices of  $p_T$  and  $p_M$ , managerial behavior is governed by the optimality conditions (7) - (10) and the contract choice follows from (11) and (12).

### 4.2 Transfer prices are negotiated between division units

When division managers negotiate the transfer price  $p_M$ , manager utility is qualitatively the same as in a one-price system. The maximand of the Nash-bargaining problem is thus given by

$$\max_{p_M} (\phi(s_N) + \phi(s_S) - p_M)p_M,$$

with the consequence that the negotiated internal transfer price is  $p_M = \frac{\phi(s_N) + \phi(s_S)}{2}$ , which coincides with the transfer price (13) in a one-price system.

As to the choice of  $p_T$ , profit taxes do not influence manager utility. Consequently, managers have no incentives to strategically choose the tax-related transfer price  $p_T$ .<sup>9</sup> The two transfer price choices mirror the choice in a one-price system and so does the behavior of managers and the headquarter prior to the determination of the transfer price at stage 3. The behavior follows from (14), (15) and (16).

## 5 Transfer pricing regulation

Tax-induced transfer pricing is at the heart of tax policy discussions and various policy measures have been suggested as a remedy against aggressive tax avoidance behavior of MNEs (OECD, 2010, 2013). Most notably, the OECD transfer pricing regulation stipulates different ways of calculating transfer prices for tax purposes. They are intended to limit the MNE's discretion in shifting taxable profits across jurisdictions by relying on the notion of cost-plus regulation or of some economically justified profit-splitting between the divisions of the MNE. In this section, we analyze the implications of using these two types of transfer pricing regulation for the economic behavior of the MNE.

### 5.1 Cost-plus regulation

The basic idea of cost-plus regulation is to use the cost of producing the intermediate input as a starting point for the calculation of the transfer price which might be adjusted by some mark-up to allow divisions to earn a normal amount of profit on the internal sale of the intermediate input. In our setting, the cost-plus regulation might be interpreted to yield a transfer price for tax purposes of

$$p_T = C_S(s_S, e_S) + \delta, \quad (17)$$

where  $\delta \geq 0$  is the mark up that allows the selling division to earn a normal level of profits.

In a one-price system ( $p = p_M = p_T$ ) the regulation fixes all transfer price choice in the MNE under (de)centralization. The regulation has implications for the effort choices of the manager in division S. The manager solves (6) where (17) is the relevant transfer price. The first-order

---

<sup>9</sup>This finding is sensitive to the type of incentive contract. If the contract is conditioned on net-of-tax profits, i.e.  $\beta_i = \tilde{\beta}_i(1 - t_i)$  where  $\tilde{\beta}_i$  is chosen by the headquarter, then managers also engage in tax avoidance. The negotiated transfer price  $p_T$  satisfies  $(t_N - t_S)/2 = \gamma'(p_T)$ . Different to the centralized choice of  $p_T$  in (5), bargaining implies that managers do respond only to half of the tax differential. Thus, with this modification, the basic qualitative difference in tax aggressiveness under de(centralization) remains intact. Note, for given taxes, the value of the sharing rate  $\beta_i$  and the managerial effort choices coincide under the two formulations of the incentive contract. A formal analysis is available upon request.

conditions are

$$s_S : \quad \beta_S (\partial C_S / \partial s_S - \partial C_S / \partial s_S) - \partial c_S / \partial s_S < 0 \Rightarrow s_S = 0 \quad (18)$$

and

$$e_S : \quad \beta_S (\partial C_S / \partial e_S - \partial C_S / \partial e_S) - \partial c_S / \partial e_S < 0 \Rightarrow e_S = 0. \quad (19)$$

The cost-plus regulation implicitly taxes the return to cost-reducing effort at a rate of 100 percent which nullifies incentives to engage in this type of effort provision. Differently, the regulated pricing scheme implicitly subsidizes the pecuniary cost of value-creating effort. Since changes in the return to value-creating effort  $s_S$  are not reflected by the transfer price and the manager privately bears the non-pecuniary cost, the manager in division  $S$  has no incentive to engage in value-creating effort. In response, the headquarter will set  $\beta_S = 0$  and  $\beta_N$  at the level as in Section 3.1, given that effort choices  $e_N$  and  $s_N$  and thereby the value of incentive contracting in division  $N$  will be the same as under a centralized choice of  $p$ . In the unregulated, (de)centralized one-price system, the manager in division  $S$  always engages in cost-reducing effort (c.f. (8) and (15)) and also in value-creating effort when transfer prices are negotiated (c.f. (14)). The inefficiency associated with this type of transfer pricing regulation will lower the desirability of the regulation and might even render it undesirable provided the inefficiency is sufficiently strong compared to the tax revenue implications for the governments involved.

## 5.2 Profit-split regulation

The profit-split regulation relies on the idea to allocate the total profit of the internal transaction among the two divisions based on some economically-justified criterion. In our setting, the profit-split transfer price  $p_T$  might thus be interpreted as

$$p_T = \omega(\phi(s_N) + \phi(s_S) - C_N(s_N, e_N)) + (1 - \omega)C_S(s_S, e_S), \quad (20)$$

where  $\omega \in (0, 1)$  is the weight that is used to assign the total profit of the internal transaction to the two divisions. The transfer price allocates a share  $1 - \omega$  of total profit to the division N and the residual share  $\omega$  to the division S.

In a one-price system ( $p = p_T = p_M$ ), the transfer price leaves no discretion to the headquarter or divisions in setting a pricing scheme, but induces effort choices of the managers different to those in Section 3.1 and 3.2. Compared to the centralized choice in Section 3.1, it provides incentives to the division manager in the South to exert value-creating effort  $s_S$ . The effort

choice follows from solving (6) where (20) replaces (5). The first-order condition is

$$s_S : \quad \beta_S \omega (\phi' - \partial C_S / \partial s_S) - \partial c_S / \partial s_S = 0, \quad (21)$$

The transfer pricing regulation allows the manager to participate in the return to this type of effort, yielding  $s_S > 0$  instead of  $s_S = 0$ , as in Section 3.1. The optimality condition for  $e_S$  formally deviates from (8) due to the introduction of the weight  $\omega$  in the corresponding optimality condition, similar to (21). The weight in isolation will not change effort levels. The reason is that the headquarter effectively controls  $\beta_S \omega$  and will adjust  $\beta_S$  so as to neutralize the implications of the splitting factor  $\omega$ . However, given that  $\beta_S$  will now also be useful in eliciting value-creating effort, the incentive contract for division S will become more high powered (vis-a-vis gross profits) compared to Section 3.1. Differently, the profit-split regulation leaves  $s_N$  and  $e_N$  unaffected. The headquarter effectively chooses  $\beta_N(1 - \omega)$  and adjusts  $\beta_N$  to neutralize the weight for effort choices with the consequence that the optimality conditions for  $s_N$  and  $e_N$  quantitatively coincide with those in Section 3.1. Thus, we can conclude that the regulation eliminates tax aggressiveness (as intended) and increases gross profits of the MNE.<sup>10</sup>

With a decentralized pricing of internal trade the regulated price (20) replaces the negotiated price (13). The two prices imply a different sharing of final sales  $\phi(s_N) + \phi(s_S)$  among the two divisions with a weight of 1/2 when divisions negotiate the price and weights  $\omega$  and  $1 - \omega$  when the regulated price applies. With a regulated price, the headquarter effectively controls  $\beta_S \omega$  and  $\beta_N(1 - \omega)$  and offsets the effect of the splitting factor on effort choices. This does not apply with a negotiated price since the sharing rate 1/2 only applies to sales and not to production cost  $C_i(s_i, e_i)$ . Hence, this strengthens incentives to engage in value-creating effort provision in the two divisions when the profit-split regulation applies, an efficiency effect of transfer pricing regulation hitherto unnoticed.

## 6 Summary and concluding remarks

In this paper we evaluate the implications of a (de)centralized choice of transfer prices for tax avoidance behavior of MNEs and managerial behavior. We show that a decentralized choice of transfer prices yields better incentive provision for managers, while a centralized system gives the MNE more direct control over tax avoidance behavior. Interestingly, we show that

<sup>10</sup>The commitment power is related to the policy which stipulates a rule rather than allowing for discretion in the choice of the transfer price, as in Section 3.1.

the importance of effort provision and the benefits of tax avoidance do not always trade-off in the determination of the optimal mode of transfer pricing. Provided the effort choices of the downstream division are sufficiently more important compared to the choices of the upstream division, incentive provision and tax minimization favor a centralized choice of the transfer price. We also find that transfer pricing regulation such as cost-plus transfer pricing might yield efficiency costs that undermine the desirability of such a rule, while a profit-split regulation might enhance efficiency beyond its fiscal implications which are intended by this rule.

Multiple extensions are conceivable. For instance, we may allow for firm-wide performance measures as a basis for incentive contracting. Such an incentive contract would give the upstream division stronger incentives to engage in value-creating effort provision. However, the relative incentive effects of a (de)centralized choice of transfer prices tend to be qualitatively unaffected by this extension. Decentralization yields stronger incentives to engage in cross-divisional effort choices.<sup>11</sup> We might also formally look into the tax-setting behavior of the two governments. From the current analytical results, we can tentatively conclude that a decentralized choice of transfer prices reduces governments' incentives to attract tax bases through low profit tax rates (given that transfer prices are not chosen to save on taxes). However, it makes internal decisions related to the incentive contract and thereby to managerial effort choices more sensitive to taxes. Despite being interesting, we leave a formal treatment of the net effect on taxing incentives and of other possible extensions to future research.

## References

- [1] Acemoglu, D., P. Aghion, C. Lelarge, J. van Reenen and F. Zilibotti (2007), Technology, information, and the decentralization of the firm, *Quarterly Journal of Economics*, 122, 1759 - 1799.
- [2] Anctil, R. and S. Dutta (1999), Negotiated transfer pricing and divisional versus firm-wide performance evaluation, *The Accounting Review*, 74, 87-104.
- [3] Baldenius, T., N. Melumad and S. Reichelstein (2004), Integrating managerial and tax objectives in transfer pricing, *The Accounting Review*, 79, 591-615.

---

<sup>11</sup>With a firm-wide performance measures, the incentive contract of the manager of division  $S$  is  $w_S = \alpha_S + \beta_S^N \pi_N + \beta_S^S \pi_S$ . Under decentralization the negotiated transfer price is  $p = \Omega(\phi(s_N) + \phi(s_S))$ , where  $\Omega = (1 - \beta_S^N)/(1 + \beta_S^S)$ . Now, the transfer price-related effect of a higher  $e_S$  on manager  $S$ 's utility is  $(-\beta_S^N + \beta_S^S)\Omega\phi'$ , while the transfer price under centralization is independent of  $e_S$ , as in the analysis above. The negotiated transfer price strengthens incentives to exert effort  $e_S$  provided  $\beta_S^S$  under centralization is smaller than  $\beta_S^N + \beta_S^S$  under decentralization.

- [4] Baldenius, T., S. Reichelstein and S. Sahay (1999), Negotiated versus cost-based transfer pricing, *Review of Accounting Studies*, 4, 67-91.
- [5] Chan, K.H., A.W.Y. Lo, and P.L.L. Mo (2006), Managerial autonomy and tax compliance: An empirical study on international transfer pricing, *Journal of the American Taxation Association*, 28, 1-22.
- [6] Chen, K.P. and C.Y.C. Chu (2005), Internal control versus external manipulation: a model of corporate income tax evasion, *RAND Journal of Economics*, 36, 151-164.
- [7] Crocker, K.J. and J. Slemrod (2005), Corporate tax evasion with agency costs, *Journal of Public Economics*, 89, 1593-1610.
- [8] Desai, M. and D. Dharmapala (2006), Corporate tax avoidance and high-powered incentives, *Journal of Financial Economics*, 79, 145-179.
- [9] Desai, M. and D. Dharmapala (2009), Corporate tax avoidance and firm value, *Review of Economics and Statistics*, 91, 537-546.
- [10] Desai, M. and D. Dharmapala (2011), An alternative transfer pricing norm, mimeo.
- [11] Dharmapala, D. (2014), What do we know about base erosion and profit shifting? A review of the empirical literature, *Fiscal Studies*, 35, 421-448.
- [12] Elitzur, R. and J. Mintz (1996), Transfer pricing rules and corporate tax competition, *Journal of Public Economics*, 60, 401-422.
- [13] Ernst & Young (2003), Transfer Pricing 2003 Global Survey. International Tax Services.
- [14] Gresik, T. (2001), The taxing task of taxing transnationals, *Journal of Economic Literature*, 39, 800-838.
- [15] Griffith, R., J.R. Hines and P.B. Sørensen (2010), International capital taxation, in: James A. Mirrlees, Stuart Adam, Timothy Besley, Richard Blundell, Steve Bond, Robert Chote, Malcolm Gammie, Paul Johnson, Gareth D. Myles, and James Poterba, eds., *Dimensions of Tax Design: the Mirrlees Review*, Oxford University Press, chapter 10.
- [16] Halperin, R.M. and B. Srinidhi (1991), U.S. income tax transfer-pricing rules and resource allocation: The case of decentralized multinational firms, *The Accounting Review* 66, 141-157.
- [17] Harris, D. and R. Sansing (1998), Distortions caused by the use of arm's length transfer prices, *The Journal of the American Taxation Association* (Spring), 40-50.
- [18] Haufler, A. and G. Schjelderup (2000), Corporate tax systems and cross country profit shifting, *Oxford Economic Papers*, 52, 306-325.
- [19] Hines, J. (1999), Lessons from behavioral responses to international taxation, *National Tax Journal*, 52, 305-322.
- [20] Holmstrom, B. (1979), Observability and moral hazard, *Bell Journal of Economics*, 10, 74-91.

- [21] Holmstrom, B. and J. Tirole (1991), Transfer pricing and organizational form. *Journal of Law, Economics, and Organization* 7, 201-228.
- [22] Hyde, C.E. and C. Choe (2005), Keeping two sets of books: The relationship between tax and incentive transfer prices, *Journal of Economics and Management Strategy*, 14, 165-186.
- [23] Keen, M. and K. Konrad (2013), The theory of international tax competition and coordination, in: *Handbook of Public Economics*, Volume 5, A. Auerbach, R. Chetty, M. Feldstein and E. Saez, eds., North-Holland, chapter 5.
- [24] Mookherjee, D. (2006), Decentralization, hierarchies and incentives: a mechanism design approach, *Journal of Economic Literature*, 64, 367-390.
- [25] Nielsen, S.B., P. Raimondos-Møller and G. Schjelderup (2008), Taxes and decision rights in multinationals, *Journal of Public Economic Theory*, 10, 245-258.
- [26] OECD (2010), *Transfer Pricing Guidelines for Multinational Enterprises and Tax Administrations*, Paris.
- [27] OECD (2013), *Action Plan on Base Erosion and Profit Shifting*, Paris.
- [28] Osborne, M. and A. Rubinstein (1990), *Bargaining and Markets*, Academic Press, London.
- [29] Samuelson, L. (1982), The multinational firm with arm's length transfer price limits, *Journal of International Economics*, 13, 365-374.
- [30] Smith, M. (2002), Tax and incentive trade-offs in multinational transfer pricing, *Journal of Accounting, Auditing and Finance*, 17, 209-236.