Transfer Pricing with Dishonest Subsidiaries

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Abstract: The existing transfer pricing literature generally considers a situation in which the subsidiaries are honest with respect to the parent firm and the parent knows the production process of its subsidiaries perfectly. This paper explores how parent multinationals set transfer prices when subsidiaries are dishonest. Dishonesty is modeled by the managers of the subsidiary absconding with part of the profits. We begin by assuming that parents are knowledgeable about the subsidiaries. Secondly, we consider the case in which subsidiaries are dishonest and parents do not know completely the production process. With dishonest subs and knowledgeable parents, we find that the parent's transfer price (1) is higher than the optimal transfer price with no evasion, (2) is a nonlinear function of evasion, and (3) a higher subsidiary tax rate may increase or decrease the optimal transfer price. On the one hand a higher foreign tax rate leads to a higher transfer price to shift income home; on the other hand, it leads to more evasion which if strong enough might overwhelm the ability to bring income back home. We also extend these results to the case in which the parent does not perfectly know the production process of its subsidiaries. In this case it is found that transfer prices can deviate from the arm's length standard as a deterrent for corruption. This suggests that when corruption is an important factor, a case can be made that the arm's length standard be modified.

I. Introduction and Summary

Transfer pricing rules of tax authorities (such as Section 482 for the US) arise from a concern that such (internal to a multinational company) prices can be used to shift income from high to low tax jurisdictions, thus avoiding proper tax payments. This important topic of income shifting via transfer pricing is most recently highlighted in the OECD/G20 Base Erosion and Profit Shifting Project, OECD (2015). Current rules, usually based on an "arm's length" standard (as if the transaction occurred between two unrelated parties), are meant to provide a guide to internal prices acceptable to tax authorities, although different methods may be used, both across countries and even within a country. The US, for instance, allows a variety of possible methods to conform to transfer pricing rules.

A correlation of high taxes and low profits within multinationals has been documented in a number of studies using different datasets and identification techniques, briefly reviewed in the next section. While the basic intuition of the reasons multinationals might shift income for tax purposes is clear, the theoretical basis on which this intuition is based is a model in which the parent multinational knows and controls the decisions and profits of honest subsidiaries. Yet the subsidiaries may not be honest, the parent multinational may not understand the entire production process of its subsidiaries, and it may suffer from corporate governance problems.

The contribution of this paper is to move away from a model in which the parent knows and controls perfectly its honest subsidiaries. We consider first what happens when subsidiaries are dishonest and parent firms are aware of this. Dishonesty is modeled by the managers of the subsidiary absconding with part of the profits. We then

consider dishonest subsidiaries when parents do not know completely the production process. How should a multinational set transfer prices in these cases?

The model considers a situation where a parent firm garners revenue by selling an input to a subsidiary at a certain price called the transfer price. The subsidiary uses the input to produce a product which generates profit for the subsidiary. The parent can manipulate the transfer price to shift profit between the parent and subsidiary. If the parent knows the production process and managers are honest they maximize profits by using the input so that the marginal product of the input is equal to the transfer price. If tax rates are equal, the transfer price is set by the parent at the "arm's length" price; otherwise profits are shifted towards the low-tax location.

With dishonest subsidiaries and knowledgeable parents, we find that the parent's transfer price (1) is higher than the optimal transfer price with no evasion, (2) is a nonlinear function of evasion, and (3) a higher subsidiary tax rate may increase or decrease the optimal transfer price. On the one hand a higher foreign tax rate leads to a higher transfer price to shift income home; on the other hand, it leads to more evasion which if strong enough might overwhelm the ability to bring income back home.

We also extend these results in a simplified way to the case in which the parent does not perfectly know the production process of its subsidiaries. In this case it is found that transfer prices can deviate from the arm's length standard as a deterrent for corruption. This suggests that when corruption is an important factor, a case can be made that the arm's length standard be modified.

II. Some Previous Literature

As noted above, the correlation of high taxes and low profits within multinationals has been documented in a number of studies using different datasets and identification techniques. Early studies include Grubert and Mutti (1991), Grubert, Goodspeed, and Swenson (1993), and Hines and Rice (1994). More recent ones include Clausing (2003), Huizinga and Laeven (2008), Weichenrieder (2009), Dharmapala and Riedel (2013), and Dowd, Landefeld, and Moore (2017). Accounting researchers have also investigated such relationships including Mills and Newberry (2000) and Klassen, Lang and Wolfson (1993). Recent surveys of this literature include Hines (2014), Dharmapala (2014), and Blouin, Krull, and Robinson (2019).

There are surprisingly few theoretical papers on transfer pricing in the public finance literature. This is likely because if the multinational knows everything and has perfect control of the subsidiary, it is evident that profit shifting is optimal. Nevertheless, problems of ownership and control abound in the real world and it is worth exploring the implications of this for multinational firms. The one paper that I have found that examines a multinational's transfer pricing incentives when the parent does not have complete knowledge is Elitzur and Mintz (1996), and that paper is the most similar to our model here. They view the multinational as not knowing the effort exerted by the manager of a subsidiary, and find the optimal payment which is based partly on a transfer price as well as a share of profits and lump-sum transfer. They go on to model a tax competition game and find that tax rates are set too high in the absence of coordination.

Agency models of the type examined in this paper have been used in other contexts in the economics literature. For instance, Besley and Smart (2007) examine political agency models and their applications in public finance. The literature on transfer pricing we think could benefit from an analysis in this framework as well and this paper provides a beginning step in that process.

III. A Model of Transfer Pricing with Dishonest Subsidiaries

I first lay out the basic assumptions of the model. A multinational parent firm supplies a subsidiary with intermediate inputs (x) used in production and prices that at the transfer price p^T. The subsidiary generates output through production technology $\theta_i f(x)$, $f_x > 0$, $f_{xx} < 0$, where θ_i is a productivity parameter where i = (L, H) which is either high (H) with probability q or low (L) with probability (1 – q). θ_i is independently and identically distributed and known by the manager. We begin by assuming that subsidiaries are honest but later relax this assumption to allow the subsidiary to abscond with part of the profits. The parent observes profits but may not observe the production technology; we begin by assuming that the parent is knowledgeable about everything.

Honest subsidiaries and knowledgeable parent firms

If subsidiaries are honest and the parent firm knows all parameters, the parent will set a transfer price to transfer profits towards the low tax location. Let t^s be the tax rate in the foreign country and t^h be the tax rate in the home country. The manager chooses x to maximize profits:

$$(1-t^s)[\theta f(x) - p^T x]$$

The first order condition is

$$\theta \frac{\partial f}{\partial x} = p^T$$

Given the optimal choice for x, the multinational chooses p^T to maximize joint profits

$$(1-t^h)[p^T - p]x + (1-t^S)[\theta f(x) - p^T x] - \phi^h (p^T - p)^2 x$$

where p is the "arm's length" price of x and the last term represents the expected costs of deviating from the arm's length price (resulting from a home country tax ruling against such a price). The first order condition with respect to p^T is

$$(1-t^h)x - (1-t^s)x - 2\phi^h (p^T - p)x = 0$$

which can be rewritten as

$$p^T = p + \frac{(t^s - t^h)}{2\phi^h}$$

If the home and subsidiary tax rates are equal or if deviating from the arm's length price has a very high marginal cost, the transfer price is set equal to the arm's length price. The higher is the home tax rate the lower is the transfer price ($\partial p^T/\partial t^h < 0$ and profits are shifted abroad) while the higher is the foreign tax rate, the higher is the transfer price ($\partial p^T/\partial t^s > 0$ and profits are shifted home).

Dishonest subsidiaries and knowledgeable parent firms

We next introduce dishonesty into the model by allowing the diversion of subsidiary profits by the manager for his or her personal use. The manager can divert s of before-tax subsidiary profits but doing so entails an expected cost of $\Phi^s s^2$. The manager chooses x and s to maximize profits:

$$(1-s)(1-t^s)[\theta_i f(x) - p^T x] + s(1-\phi^s s^2)[\theta_i f(x) - p^T x]$$

The first order condition for x is

$$\left(\theta_i \frac{\partial f}{\partial x} - p^T\right)\left[(1-s)(1-t^s) + s(1-\phi^s)s^2\right] = 0 \Rightarrow \theta_i \frac{\partial f}{\partial x} = p^T$$

Thus, the manager again sets marginal product equal to the transfer price to maximize profit. What proportion of profits will be diverted? The first order condition for s yields:

$$-(1-t^s)\pi^s + (1-\phi^s s^2)\pi^s + s\pi^s(-2s\phi^s) = 0$$

which can be rewritten to solve for s:

$$s = \sqrt{\frac{t^s}{3\phi^s}}$$

The dishonest subsidiary's will divert more profit the higher is its tax rate and the lower is marginal cost of diversion.

Now consider again the transfer price chosen by the multinational given the optimal choices of x and s by the subsidiary. The parent firm chooses p^T to maximize joint profits which now adds only (1 – s) of after tax profits and subtracts s of before tax profits (net of expected costs of diversion):

$$(1-t^h)[p^T - p]x + (1-s)(1-t^S)[\theta f(x) - p^T x] - \phi^h(p^T - p)^2 x - s(1-\phi^s s^2)[\theta f(x) - p^T x]$$

The first order condition for p^T is:

$$(1-t^h)x - (1-t^s)(1-s)x - 2\phi^h(p^T - p)x + s(1-\phi^s s^2)x = 0$$

which can be rewritten as:

$$p^T = p + \frac{(t^s - t^h) + 2s - t^s s - \phi^s s^3}{2\phi^h}$$

There are several interesting features of this equation for the optimal transfer price. First, p^T is higher than the optimal transfer price with no evasion if $2 > t^s + \Phi^s s^2$, where the right hand side is the cost of taxes plus the expected cost of evasion. As long as t^s, Φ^s,s are each less than one this will be satisfied. Second, the function for the optimal transfer price is a nonlinear function of s:

$$\frac{\partial p^T}{\partial s} = \frac{2 - t^s - 3\phi^s s^2}{2\phi^h}$$

which is positive for low values of s and ϕ^s but potentially negative for high values of s and ϕ^s and a maximum p^T at some s. And third, a higher subsidiary tax rate may increase or decrease the optimal transfer price:

$$\frac{\partial p^T}{\partial t^s} = \frac{1 + \frac{\partial s}{\partial t^s}\left(2 - t^s - 3\phi^s s^2\right)}{2\phi^h}$$

For high values of s and ϕ^s a negative relationship is possible since $\partial s/\partial t^s > 0$. On the one hand a higher foreign tax rate leads to a higher transfer price to shift income home; on the other hand, it leads to more evasion which if strong enough might overwhelm the ability to bring income home.

Dishonest subsidiaries and unobserved subsidiary productivity

We next allow for the productivity parameter of the subsidiary to be unobservable by the parent. The manager of the subsidiary knows this parameter perfectly however. This opens up a new route for dishonest behavior. If the parent observes low profits in this case it does not know whether this is because of truly low productivity, or whether the subsidiary is actually a high productivity type pretending to be a low productivity type with corrupt managers taking the excess profits.

To simplify we eliminate the previous possible diversion of revenues. We instead assume here that the subsidiary may decide to pretend to have low revenues because of low productivity vis-à-vis the parent but yet declare such income (or not hide it) from home tax authorities. In this case the excess revenues are siphoned off from the parent firm while still being declared to home tax authorities. This would always be beneficial to the subsidiary manager so all high productivity firms are assumed to do this and the manager faces the following problem to choose x and s to maximize profits:

$$(1-t^s)[Lf(x)+(\theta-L)f(x)-p_\theta^T x]$$

The first order condition for x is

$$(1-t^s)\left(L\frac{\partial f}{\partial x}+(\theta-L)\frac{\partial f}{\partial x}-p_\theta^T\right)=0$$
$$\Rightarrow p_\theta^T=\theta\frac{\partial f}{\partial x},\theta=L,H$$

Low and high productivity subsidiaries once again set marginal product equal to the transfer price to maximize profit.

Consider next the problem of the parent firm. Since the parent firm does not know the true productivity level of the subsidiary, an additional constraint is that the parent firm would like to insure that a high productivity subsidiary prefers to truthfully implement the high profit level rather than use the given transfer price to implement a low-productivity profit level and pocket the difference. This defines an incentive compatibility constraint for a high-productivity subsidiary:

$$(IC_H)\quad \pi_H\geq\pi_L+(1-t^s)(H-L)f(x):$$
$$(1-t^s)[Hf(x)-p_H^T x]\geq(1-t^s)[Lf(x)+(H-L)f(x)-p_L^T x]$$

Consider the optimal transfer price. The input x now generates production and profits in the subsidiary, some of which can be transferred home through the transfer price, but some of the profits of a high productivity subsidiary can be hidden and taken by the subsidiary. The parent firm's objective is to choose transfer prices to maximize expected joint profits subject to the incentive compatibility constraint:

$$\begin{aligned}
&\underset{p_{i1\theta}^T}{Max}\, q[\pi_{1H}^P] + (1-q)[\pi_{1L}^P] \\
&= q[(1-t^h)[p_H^T - p]x + (1-t^s)[Hf(x) - p_H^T x] - \phi(p_H^T - p)^2 x] \\
&+(1-q)[(1-t^h)[p_L^T - p]x + (1-t^s)[Lf(x) - p_L^T x] - \phi(p_L^T - p)^2 x] \\
&s.t. \\
(IC_H)\quad \pi_H &= (1-t^s)(Hf(x) - p_H^T x) \geq (1-t^s)(Lf(x) + (H-L)f(x) - p_L^T x) \\
&= \pi_L + (1-t^s)(H-L)f(x)
\end{aligned}$$

The first order conditions for p^T_H and p^T_L are:

$$\begin{aligned}
&q[(1-t^h)x + (1-t^s)(-x) + 2\phi(p_H^T - p)x] = 0 \\
&(1-q)[(1-t^h)x + (1-t^s)(-x) + 2\phi(p_L^T - p)x] + q[-x] = 0
\end{aligned}$$

These can be rewritten as:

$$p_H^T = p + \frac{t^s - t^h}{2\phi}$$

$$p_L^T = p + \frac{t^s - t^h}{2\phi} + \frac{q}{1-q}$$

It is apparent that the high productivity transfer price is identical to the case of honest subsidiaries and perfect knowledge, and the transfer price will equal the arm's length price if the tax rates are equal, be lower than the arm's length if the home tax rate is the higher and be higher than the arm's length if the subsidiary tax rate is higher.

The low productivity case has an additional term and the transfer price associated with a low productivity subsidiary will be higher than that for a high productivity subsidiary. This is to help deter a high productivity subsidiary from pretending to be a

low productivity subsidiary. Even if home and foreign tax rates are equal, the transfer price for the low productivity subsidiary is higher than the arm's length price. The purpose of the higher transfer price from the parent's perspective is not to transfer profits to a low tax location. Rather, the high transfer price is needed to deter high productivity subsidiaries from pretending to be low productivity subsidiaries and is helpful to home tax authorities in this regard. The mark-up applied to the transfer price of low productivity subsidiaries is higher the greater the ratio of high to low productivity subsidiaries. Transfer prices in this case can deviate from arm's length prices as a deterrent to corrupt activity.

IV. Summary

This paper explores how parent multinationals set transfer prices when subsidiaries are dishonest. Dishonesty is modeled by the managers of the subsidiary absconding with part of the profits. We begin by assuming that parents are knowledgeable about the subsidiaries. Secondly, we consider the case in which subsidiaries are dishonest and parents do not know completely the production process. With dishonest subsidiaries and knowledgeable parents, we find that the parent's transfer price (1) is higher than the optimal transfer price with no evasion, (2) is a nonlinear function of evasion, and (3) a higher subsidiary tax rate may increase or decrease the optimal transfer price. On the one hand a higher foreign tax rate leads to a higher transfer price to shift income home; on the other hand, it leads to more evasion which if strong enough might overwhelm the ability to bring income back home. We also extend these

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