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## **Perverse Intra-Firm Trade\***

**Chander Kant<sup>a</sup>**

### I. Introduction

It is recognised that intra-firm trade constitutes a large proportion of total international trade.<sup>1</sup> Further, trade between the units of multinational firms (MNFs) located in industrial countries is often in final goods. Thus, 63% and 89% of related-party imports from E.E.C. and Japan, respectively, in the U.S. in 1977 by non-US MNFs were in finished goods [8, 300].

Intra-firm trade in final goods has been explained both by real and by tax factors in partial equilibrium models of the MNF.<sup>2</sup> Horst, Katrak, Eden, Batra and Hadar, Itagaki, and Kant [11; 16; 17; 4; 1; 13; 14; 15] assume or conclude that when a final good producing MNF faces increasing costs, it establishes production plants in both the countries and also exports intra-firm from the country with lower marginal cost. On the other hand, Lall [19] and Eden [4] point out that the MNF can also change the volume (as distinct from the transfer price) of its intra-firm trade in order to shift profits from the high tax to the low tax country.

The purpose of this note is to examine the real implications of the tax saving motivation behind intra-firm trade. It shows for the first time (to this writer's knowledge) in the MNF

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literature that if the transfer price is not constrained to lie within too narrow a range, then intra-firm export of final goods is always perverse, i.e., such exports always originate from the country with higher marginal cost. A formal derivation of this result follows.

## II. The Model and Analysis

Consider an increasing cost MNF producing and selling a final good in two countries. It also exports a part of its output from, say, Country 1 (home country) to Country 2 (foreign country). We wish to examine the implications of exporting from Country 1 for the MNF's relative production costs in the two countries. Let  $\pi_i$ ,  $t_i$ ,  $s_i$ ,  $x_i$ ,  $R_i(s_i)$ ,  $C_i(x_i)$ ,  $r_i$ , and  $c_i$  represent gross profits, effective profit tax rate, sales, production, total revenue and total cost functions, marginal revenue and marginal cost in Country  $i$  ( $i = 1, 2$ ), and let  $T_i = (1 - t_i)$ .<sup>3</sup> Further, let  $m$  represent the MNF's imports from Country 1 into Country 2,  $p$  the transfer price, and  $\pi$  the MNF's global net profit function. Then,

$$\pi = T_1[R_1(s_1) - C_1(s_1 + m) + pm] + T_2[R_2(s_2) - C_2(s_2 - m) - pm].^4 \quad (1)$$

The derivative of  $\pi$  with respect to  $m$  can be stated as:

$$\pi_m = T_2[(c_2 - c_1) + T(p - c_1)], \quad (2)$$

where  $T$  represents the relative tax differential,  $(t_2 - t_1)/(1 - t_2)$ .<sup>5</sup> Intra-firm trade then depends on the relative production costs, the tax differential, and the difference between the transfer price and marginal cost in Country 1. Clearly, in equilibrium

$$\text{sign}(c_2 - c_1) = - \text{sign}(T(p - c_1)). \quad (3)$$

When  $t_2$  is greater (smaller) than  $t_1$ , the MNF charges the highest (lowest) possible transfer price permitted by the arm's length transfer pricing rules it faces. These rules, arbitrarily defined by governments and discussed in the MNF literature, invariably imply that the upper limit on the transfer price (UTP) is greater than  $c_1$ . But, the lower limit (LTP) could be greater than, equal to, or smaller than  $c_1$ .<sup>6</sup> We consider these cases in turn.

Analyse the UTP case first. In that case, both  $T$  and  $(p - c_1)$  are positive, and from (3),  $(c_2 - c_1)$  is negative. That is, the exporting country has higher marginal cost. Exporting from Country 1 wastes real resources. But the MNF clearly saves sufficiently in profit taxes to make such exports profitable. In the LTP ( $T < 0$ ) case, the limiting transfer price can be  $>$ ,  $=$ , or  $< c_1$ . Examine first the situation when  $p < c_1$ . In that case, same conclusion as for the UTP case above follows. On the other hand, when the exogenously given lower limit on the transfer price is equal to (greater than)  $c_1$ , marginal cost in the exporting country equals (is less than) that in the importing country.<sup>7</sup>

### III. Concluding Remarks

The above analysis shows that linkages between domestic costs and direction of intra-firm trade break down when the MNFs face tax differentials. Thus, in the context of MNFs, conclusions drawn on the assumption of equal or nonexistent tax rates cannot be *assumed* to extend to the general case of unequal tax rates.<sup>8</sup> Ethier [7], among others, suggests that internalization should be the focal point in the study of MNFs. However, he does not consider profit tax differential as a cause of internalization. This note demonstrates that saving on profit taxes can be a powerful motive for internalisation.

Helleiner and Lavergne [8], and Helpman and Krugman [10] ask whether intra-firm transactions differ significantly from those between unrelated buyers and sellers. Since a seller from a higher cost country cannot engage in any tax-arbitrage by selling to an unrelated buyer in the other country, intra-firm trade in final goods differs significantly from trade between unrelated parties; and contraction of such trade unambiguously improves the global allocation of resources. Governments can alternatively remedy the situation by setting tighter limits on the

transfer price. Such a policy also increases global tax revenues and, therefore, may be considered superior to placing quantitative restrictions on intra-firm trade.<sup>9</sup>

### **End Notes**

1. For example, Helleiner and Lavergne [8] report that 48.4% of total U.S. imports in 1977 came from related parties.
2. For example, the general equilibrium MNF models developed recently [see 2; 20; 9; 7] either model intra-firm export of a specific factor, or explain intra-firm trade in intermediate goods only.
3. By effective tax rate we mean the statutory tax rate in the country concerned plus any home taxation of the MNF's foreign profits.
4. It is assumed that the exchange rate between the two currencies is unity, and price discrimination between the two countries is possible.
5. A non-zero  $T$  and similar demand conditions in the two countries are also assumed.
6. Horst [11] and Samuelson (21); Katrak (18) and Eden [5]; and Eden [6] and Kant [14] assume that the lower limit on  $p$  is respectively equal to, greater than, and smaller than  $c_1$ .
7. In the above analysis Country 1 was assumed to be the exporting country. Similar conclusions follow if, instead, exports originate from Country 2.
8. Horst (12) had derived such linkage on the assumption of equal tax rates. His diagram has been subsequently used by the following authors for analysis or illustration: Katrak [17], Caves [3], Eden [6] and Kant [14].
9. Unambiguous statements about the effect on global economic welfare are not possible because the consumer surpluses in the two countries are impacted in opposite directions.

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