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Coordinating Tariff Reduction and Domestic Tax Reform under Imperfect Competition*

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RRH: COORDINATED TARIFF-TAX REFORM

LRH: Michael Keen and Jenny E. Ligthart

Abstract

A major constraint on trade liberalization in many countries is the prospective loss of government revenue. Recent results, however, have established a simple and appealing strategy for overcoming this difficulty, whilst still realizing the efficiency gains from liberalization, in small, competitive economies: combining tariff cuts with point-for-point increases in destination-based consumption taxes unambiguously increases both national welfare and total government revenue. This note explores the implications of imperfect competition for this strategy. Examples are easily found in which this strategy unambiguously *reduces* domestic welfare.

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1. Introduction

Many emerging market and developing countries have embarked on a strategy of cutting tariffs in order to improve the allocation of their productive resources, with the current Doha round of trade negotiations adding further impetus to the process. But the potential revenue losses from this have often been a major concern to governments contemplating such trade liberalization, especially those facing major fiscal imbalances.¹ This naturally leads to a search for alternative domestic sources of revenue, often in the form of indirect taxes. For example, tariff reduction in Morocco and the Philippines during the mid-1980s was accompanied by the introduction of a value-added tax (VAT); and in 1995 Senegal successfully lowered tariffs whilst simultaneously refining its VAT.

Despite the many practical examples pointing to its importance, the theoretical literature has paid little attention to the interaction between trade reform and domestic tax reform. A number of authors (e.g., Michael et al. (1993); Falvey (1994); Hatzipanayotou et al. (1994); and Tsuneki (1995)) have examined the welfare and revenue effects of integrated tax-tariff reforms for small, competitive economies. In that same context, Keen and Ligthart (2002) show that a simple strategy of coordinated tax-tariff reform in which reductions in tariffs are exactly offset by increases in consumption taxes—so leaving consumer prices unchanged—has extremely attractive properties: it unambiguously improves domestic welfare and raises government revenue.² They also show, however, that increasingly stringent conditions are required to secure such “win-win” outcomes from this reform strategy when allowance is made for important features of reality such as non-tradable goods and intermediate inputs. None of these papers, however, considers the implications for this strategy of imperfect competition in the product market, an issue likely to be important in a range of contexts, not

least in emerging market and developing countries.³ These implications are the concern of this note.

It is well known that policy reforms which are welfare improving under perfect competition may be undesirable in a setting of imperfect competition. This note shows very starkly that this is indeed the case for the strategy of coordinated tariff and domestic tax reform just described. To establish this cautionary result, it suffices to prove the point for one particular model of imperfect competition. We do so here for a simple and popular model of international Cournot duopoly, a slight variant of that familiar from Dixit (1984) and Brander and Spencer (1984). Two tax-tariff reform strategies are considered, both mimicking that found by Ligthart and Keen (2002) to be unambiguously beneficial under perfect competition: (i) tariff cuts combined with one-for-one increases in consumption taxes; and (ii) tariff cuts combined with increases in consumption taxes so as to keep the consumer price constant. Both are shown to strictly *reduce* overall (domestic) welfare.

2. The Basic Model

The framework is a simple general equilibrium model of two tradable goods and two countries. In the background, there is a numeraire bearing (by normalization) no tax or tariff, traded competitively, and produced using a single factor under constant returns to scale. The home market for this good is served by two firms, one domestic and the other foreign, sharing the same downward-sloping demand curve for their (homogeneous) product. The two firms are identical, having constant marginal cost (reflecting also the assumptions on the numeraire sector), c , and fixed cost F . They face the same destination-based consumption tax, t , but the foreign firm also pays a tariff, τ , imposed by the home country.⁴ There are no

transport costs. Profits of the home and foreign firms,⁵ Π and Π^* respectively, are thus given by:

$$\begin{aligned}\Pi &= [q(X + X^*) - t - c]X - F, \\ \Pi^* &= [q(X + X^*) - t - \tau - c]X^* - F,\end{aligned}\tag{1}$$

where X denotes output of the domestic firm, $q(\cdot)$ is the inverse demand curve relating the consumer price to world output (with $q' < 0$, where a prime denotes a derivative) and foreign variables are indicated by an asterisk. The home consumer's preferences are described by an indirect utility function $v(q) + m$, with $v'(q) < 0$, where m denotes lump-sum income and v is quadratic: thus inverse demand is linear, and all income effects are concentrated in the untaxed numeraire. It is also assumed that t and τ are both strictly positive in the pre-reform equilibrium.

Cournot-Nash behavior implies the first-order conditions:

$$\begin{aligned}\frac{d\Pi}{dX} &= q'X + q - (t + c) = 0, \\ \frac{d\Pi^*}{dX^*} &= q'X^* + q - (t + \tau + c) = 0.\end{aligned}\tag{2}$$

It is assumed that both firms are active in the initial equilibrium, for which it is evidently necessary that $q - t - \tau - c > 0$.

Perturbing the system (2) for an arbitrary change in taxes and tariffs gives:

$$\begin{bmatrix} dX \\ dX^* \end{bmatrix} = \frac{1}{3q'} \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix} \begin{bmatrix} dt \\ dt + d\tau \end{bmatrix}.\tag{3}$$

An increase in the consumption tax thus increases both firms' marginal costs and so reduces both their outputs. Raising the tariff depresses production in the foreign country whilst increasing that at home.

Total revenue of the home government (from both the consumption tax and tariff),

$$G = t(X + X^*) + \tau X^*, \quad (4)$$

is assumed to be returned to the consumer as a lump-sum transfer, as is the profit income of the home firm. Thus, home welfare is given by:

$$W = v(q) + \Pi + t(X + X^*) + \tau X^*. \quad (5)$$

3. Welfare and Revenue Effects of Tax-Tariff Reforms

The strategy for coordinated tax-tariff reforms that Keen and Ligthart (2002) show to be unambiguously beneficial for the small, competitive economy can be characterized in either of two ways: as involving equal but opposite changes in consumption taxes and tariffs (that is, $dt = -d\tau > 0$), or as leaving consumer prices unchanged in the face of a tariff cut (that is, $dq = 0$). For the small, competitive economy of previous studies, these two characterizations are precisely equivalent. For the imperfectly competitive economy here, however, they are not: from (3) it is evident that setting $dt = -d\tau > 0$ will change the consumer price (because it will change world output, $X + X^*$).

The two results which follow show that neither kind of reform is necessarily desirable in the presence of imperfect competition; indeed, in the model considered here both reforms actually *reduce* national welfare.

Proposition 1 establishes this for the first characterization of the reform:

PROPOSITION 1. *A small tariff cut combined with an increase in the consumption tax of the same absolute magnitude strictly reduces national welfare.*

Proof: Perturbing (5) yields

$$dW = v'dq + d\Pi + dG, \quad (6)$$

with $dq = q'(dX + dX^*)$ and, by Roy's identity (normalizing the marginal utility of income to unity), $v' = -(X + X^*)$. Setting $dt + d\tau = 0$, note too, from (3), that then

$$dX = -2dX^* = \frac{2}{3q'} dt < 0, \quad (7)$$

so that the world price increases ($dq = (1/3)dt > 0$),⁶ but by less than does the consumption tax. The first component of welfare, v , falls:

$$dv = -(X + X^*)dq < 0, \quad (8)$$

where use is made of v' . The change in profits of the home firm can be derived by perturbing (1) and using (7):

$$d\Pi = \frac{1}{q'} [q - t - c] dt < 0. \quad (9)$$

Differentiating (4), using (7) and $dt + d\tau = 0$, yields:

$$\begin{aligned} dG &= Xdt + (dt + d\tau)X^* + t dX + (\tau + t)dX^* \\ &= -\frac{1}{3q'} [3(q - c - t) + \tau - t] dt. \end{aligned} \quad (10)$$

Substituting the expressions for dq , dG , and $d\Pi$ into (6), and noting from (2) that

$q - c - 2q'X^* = 3(q - c - t - \tau) + t + \tau > 0$, one finds

$$dW = \frac{1}{3q'} [q - c - 2q'X^*] dt < 0, \quad (11)$$

and thus home welfare falls. QED

This result runs directly counter to that for the competitive, small economy in Keen and Ligthart (2002). Under the conditions there, the same reform as in Proposition 1: leaves the consumer price unchanged; moves domestic production closer to the level that maximizes the value of output at world prices; and, since the base of the domestic consumption tax is broader than that of the tariff, increases government revenue. Here, it can be seen from (1) that while the reform has no direct impact on the output of the foreign firm it reduces that of the domestic firm; thus the consumer price rises, reducing consumer welfare. Because outputs of the two firms are strategic substitutes, the contraction of the home firm's output induces an indirect expansion of foreign output; and this, together with the higher consumption tax rate, means that domestic profits also fall. From (10), government revenue will increase only if the tariff rate is high enough relative to the rate of consumption taxation for the increased tariff revenue (from a greater volume of imports) to offset the consumption tax revenue lost from the decline in consumption. In any event, however, the fall in domestic profits outweighs any gain in revenue if initial tariffs are not too high, that is if $\tau < t$. With a higher consumer price and lower lump-sum income, domestic welfare unambiguously falls.

The second strategy of tax-tariff reform is to leave the consumer price unchanged, requiring that world output remains constant. But this too is certain to reduce welfare:

PROPOSITION 2. *An increase in the consumption tax combined with such a reduction in the tariff as to leave the consumer price of the taxed good unchanged strictly reduces national welfare.*

Proof: Since $dq = 0$ requires that $dX = -dX^*$, equation (5) in this case becomes

$$dW = (q - c - t - \tau)dX + X^*(dt + d\tau). \quad (12)$$

From equation (3), $dX = -dX^*$ requires that $-d\tau = 2dt$. Then, $dX = (1/q')dt < 0$ and $dt + d\tau = -dt < 0$; thus both terms in (12) are strictly negative. QED

The underlying reasoning is of course closely related to that given for Proposition 1 above. In order to hold the consumer price constant, as Proposition 2 requires, it is necessary to increase imports by more than does the point-for-point reform of Proposition 1. This amplifies the adverse impact on domestic profits; it also means that government revenue is sure to rise in this case,⁷ but again not by enough to offset the effect on welfare of the adverse rent-shifting.

4. Conclusion

Recent work has established an appealingly simple strategy for realizing the efficiency gains from trade liberalization whilst at the same time increasing government revenue: simply offset tariff cuts point-for-point with increased destination-based consumption taxes. Few propositions from the theory of piecemeal reform in the presence of a binding revenue constraint are so readily applicable. The examples presented in this note have shown very

starkly, however, that caution is warranted in applying this strategy if firms are price setters in the international market. In such circumstances this reform can quite plausibly lower welfare rather than increase it. This is not to say, of course, that there are no circumstances in which such a coordinated tax-tariff reform will increase welfare even in the presence of imperfect competition. We leave to future work, however, the characterization of preference and market structures that are conducive to such an outcome.

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Notes

¹ See Tanzi (1989) and Ebrill et al. (1999) for an overview of the revenue implications of trade liberalization.

² A radial contraction of tariffs accompanied by an exactly offsetting increase in consumption taxes—as studied by Hatzipanayotou et al. (1994)—is a special case of Keen and Ligthart's more general proposition.

³ Both Tharakan (1984) and Havrylyshyn and Civan (1985), for instance, show that intra-industry trade between developing and industrial countries is far from negligible.

⁴ The assumption that taxes and tariffs are levied in specific rather than—as is the usual practice—in ad valorem form is inessential to the point at issue.

⁵ Both assumed to be untaxed.

⁶ This follows on substituting $dX = (2/3q')dt$ and $dX^* = -(1/3q')dt$ into $dq = q'(dX + dX^*)$.

⁷ It is readily shown that in this case $dG/dt = -2\tau/q' > 0$.