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## NON-PREFENTIAL TRADING CLUBS

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# Non-Preferential Trading Clubs

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**Abstract:** This paper examines the welfare implications of *non-discriminatory* tariff reforms by a subset of countries, which we term a non-preferential trading club. We show that there exist coordinated tariff reforms, accompanied by appropriate income transfers between the member countries, that unambiguously increase the welfare of these countries while leaving the welfare of non-members unaltered. In terms of economic policy implications, our results show that there exist regional, MFN-consistent arrangements that lead to Pareto improvements in world welfare.

**JEL code:** F15.

**Keywords:** Trading clubs, non-preferential tariff reform, Kemp-Wan-Ohyama proposition.

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## 1 Introduction

The present paper analyses the welfare implications of tariff reform by a non-preferential trading club. We define a non-preferential trading club as a group of countries that agree to coordinate their *non-discriminatory* tariff policies and to undertake internal income transfers. By contrast, a preferential trading club (such as customs unions and free trade areas) provides preferential tariff rates to club members and hence is discriminatory in its tariff policies (see Panagariya, 2000).

While academic research has focused on preferential trading arrangements on the one hand and on multilateral tariff reforms on the other, interest in the study of non-preferential trading arrangements by a subset of countries is sparked by the policy debate concerning "open regionalism" (see Bergsten, 1997). The present paper is the first to provide a theoretical justification for the advantages of open regionalism.

By combining tools from multilateral tariff reform theory[1] and features of the Kemp-Wan-Ohyama (henceforth KWO) mechanism for the creation of welfare improving customs unions,[2] we show that there exist regional, *MFN-consistent* arrangements that lead to Pareto improvements in world welfare.[3] Within a many country, many commodity general equilibrium model of trade we establish the necessary and sufficient conditions for a strict Pareto improvement in club welfare. Careful interpretation of this result leads to a number of propositions that spell out the implications of our non-preferential trading clubs. These propositions show that a trading club can obtain a strict Pareto improvement in club

[1] See, for example, Fukushima and Kim (1989), Diewert, Turunen-Red and Woodland (1989), Turunen-Red and Woodland (1991), and Anderson and Neary (1992).

[2] The main idea was first mentioned by Kemp (1964) and Vanek (1965) and later rigorously employed by Ohyama (1972) and Kemp and Wan (1976).

[3] Neary (1998) also combines the tariff reform literature and the Kemp-Wan-Ohyama mechansim. However, his emphasis is upon the replication of the Kemp-Wan-Ohyama proposition and not, as in this paper, on non-preferential trading clubs.

welfare, while maintaining the welfare levels of all other countries at their pre-club levels. Moreover, a sequence of such welfare improvements exists as long as the prices in the member countries are not all equal. The limit of such a sequence of trading-club equilibria is an equilibrium that is conditionally Pareto optimal for the club members. Finally, this equilibrium is shown to be welfare equivalent (but not completely identical) to the KWO customs union equilibrium.

Aspects of the KWO mechanism have appeared in some studies outside the customs union context. First, Bagwell and Staiger (1999, 2004) have elegantly employed the "keeping-world-prices-fixed" idea in explaining the economics of GATT negotiations. They showed that negotiated tariff changes made under the principles of reciprocity and non-discrimination - the two pillars of the GATT - lead necessarily to fixed world prices, thus eliminating the incentive for aggressive use of tariffs to generate favourable terms-of-trade effects. Second, Ohyama (2002) and Panagariya and Krishna (2002) use the KWO mechanism in designing free trade areas that lead to Pareto improvements in world welfare, thus extending the KWO result for customs unions to free trade areas. In the present paper, the application is in a yet different area – that of trading clubs.

## 2 Pareto Welfare Gains in Trading Clubs

We consider a perfectly competitive general equilibrium model of the world, consisting of $K$ nations trading in $L$ internationally tradeable commodities. Following Turunen-Red and Woodland (1991), the model may be expressed as

$$\sum_{k\in K} S_p^k(p^k, u^k) = 0 \tag{1}$$

$$p^{\intercal} S_p^k(p^k, u^k) = b^k,\ k \in K \tag{2}$$

$$\sum_{k\in K} b^k = 0, \tag{3}$$

in terms of the world price vector $p$ ($p^{\intercal}$ denotes the transpose of a vector), domestic price vectors $p^k = p + t^k$, representative agents' utility levels $u^k$ and transfers abroad $b^k$ for each country $k \in K$. The net revenue function $S^k(p^k, u^k) \equiv G^k(p^k) - E^k(p^k, u^k)$ is the difference between the gross domestic product function $G^k$ and the consumer expenditure function $E^k$. The gradient of the net revenue function with respect to prices, $x^k \equiv S_p^k(p^k, u^k) \equiv \nabla_p S^k(p^k, u^k)$, is the vector of compensated net export functions for nation $k$.

Equations (1)-(3) consist of the market equilibrium conditions, the budget constraints for each country and the world budget constraint. The market equilibrium conditions express the requirement that the net exports of countries sum to the zero vector, meaning that world markets clear. The budget constraints state that each country's balance of trade must be matched by a transfer of income abroad, $b^k$. The world budget constraint require these transfers abroad to sum to zero over all countries.

Countries are divided into two groups – those that wish to form a trading club and those that do not. The set of countries that form the trading club is denoted by $K^M$, while $K^N$ is the set of non-club countries. Let $u = (u^M, u^N)$, $t = (t^M, t^N)$, and $b = (b^M, b^N)$ be obvious partitions of the vectors $u, t$ and $b$ into elements for club members ($M$) and non-member countries ($N$). The initial equilibrium, before the club is formed, is arbitrarily given and characterized by $(p, u) = (p_0, u_0)$ and $(t, b) = (t_0, 0)$. At this initial equilibrium, the vector of aggregate trade between (to be) club members and non-members is given by the net export vector $x_0^M \equiv \sum_{k \in K^M} S_p^k(p_0^k, u_0^k)$. The initial equilibrium might, of course, be a Nash equilibrium in a non-cooperative tariff game but this interpretation is not essential.[4]

Attention is restricted to coordinated *non-discriminatory* tariff reforms and intra-club transfers of income. Attention is further restricted to reforms that ensure that the vector of trade between the trading club and the rest of the world remains unaltered. Assuming passive policy behavior on the part of the rest of the world, whereby the countries in the rest of the world do not alter their tariff policies as a result of the club's activities, these reforms ensure that the world prices of traded goods are also unaltered.[5]

Specifically, the club is to choose domestic price vectors $p^k$, a vector of transfers $b^M$ and a vector of utilities $u^M$ that generate the same external trade vector as before, satisfy the aggregate balance of trade restriction at the same world prices as before and provide greater utility for all union members. Since the club's balance of trade restriction automatically holds ($p_0^\intercal x_0^M = 0$) due to the price homogeneity properties of the foreign net export functions and since transfers are available, only the internal market equilibrium conditions are constraining for the club.

Given the requirement that the aggregate trade vector with the rest of the world is set at its the pre-club value, $x_0^M$, the internal club market equilibrium condition may be

[4] Morevover, it is not necessary to assume that the initial equilibrium involves no income transfers. This assumption is made merely to simplify the exposition.

[5] As Richardson (1995) demonstrates via an example, the Kemp-Wan-Ohyama proposition may break down if the rest of the world alters its tariffs strategically. To counter this observation Kemp and Shimomura (2001) have provided a second "elementary proposition on customs unions" whereby the union chooses, not a common external tariff vector, but a common external *tariff function* that leaves the union's offer surface unchanged and thus ensures a strict Pareto improvement for the union irrespective of the response by the rest of the world. Both Richardson's critique and the Kemp and Shimomura response apply also to our analysis of trading clubs.

expressed as

$$\sum_{k \in K^M} S_p^k(p^k, u^k) = x_0^M. \tag{4}$$

To proceed further, we differentiate the club market equilibrium conditions (4) totally to get

$$\sum_{k \in K^M} S_{pp}^k(p^k, u^k) dp^k + \sum_{k \in K^M} S_{pu}^k(p^k, u^k) du^k = 0, \tag{5}$$

where $S_{pp}^k \equiv \nabla_p^2 S^k(p, u^k) = \nabla_p S_p^k(p, u^k)$ is the substitution matrix for country $k$, measuring the response of compensated net outputs to changes in prices, and $S_{pu}^k \equiv \nabla_{pu} S^k(p, u^k) = \nabla_u S_p^k(p, u^k)$ is a vector of 'income' effects for country $k$, measuring the response of compensated net outputs to changes in utility. We consider whether a solution to this system exists with $du^k > 0,\ k \in K^M$. To obtain our main result, the following assumption on technologies and preferences is made.

**Assumption A:** *(i)The club member countries' substitution matrices $S_{pp}^k$ have maximal rank $L-1$. (ii) The club members' expenditure functions are strictly increasing in utility, that is, $S_u^k \equiv \nabla_u S^k(p, u^k) < 0$.*

Part (i) of this assumption is made to ensure that the net exports of each member country are "controllable" by differential changes in domestic prices induced by changes in world prices and trade taxes. It is well known that the substitution matrices $S_{pp}^k$ are singular and have rank less than or equal to $L-1$. Our assumption that the substitution matrices have maximal rank means that any $(L-1) \times (L-1)$ sub-matrix is of full rank $(L-1)$ and, hence, invertible. Requiring the substitution matrices to have maximal rank at the initial equilibrium implies that any direction of compensated change $dx^k$ in net exports can be achieved by some suitable change $dp^k$ in the domestic price vector for country $k$. This controllability of net exports is important for our proof below and ensures that each member country has curvature to its net export function with well-defined derivatives, whence net exports are differentially responsive to differential changes in domestic prices.[6] Part (ii) of Assumption A states that the consumer needs to spend more on goods to achieve a higher level of utility and is the weakest normality assumption that can be made.[7]

We can now derive the following result.

**Proposition 1** *Let Assumption A hold at the initial pre-club equilibrium. Let the trading club undertake non-discriminatory tariffs reforms and internal transfers to maintain the pre-club vector of trade with the rest of the world. A strict Pareto improvement in club welfare exists if, and only if, domestic price vectors for club members are not all the same (up to a factor of proportionality), i.e.* $p^k \neq \alpha^{kj} p^j$ *for some* $j$ *and* $k$ *and* $\alpha^{kj} \neq 0$.

**Proof.** We are concerned with whether a solution to the linear system (5) exists with $du^k > 0,\ k \in K^M$. By Motzkin's theorem of the alternative, as expressed in Diewert, Turunen-Red and Woodland (1989, p. 212), a solution exists if and only if there does not exist a solution $\lambda$ to the dual system

$$\lambda^\intercal [S^k_{pu}\ (k \in K^M)] < 0,\ \ \lambda^\intercal [S^k_{pp}\ (k \in K^M)] = 0, \tag{6}$$

where the inequality $x < 0$ means that vector $x$ is semi-negative (all elements are non-positive and at least one element is negative).

(i) Let $p^k \neq \alpha^{kj} p^j$ for some $j$ and $k$ and $\alpha^{kj} \neq 0$. Since Assumption A holds, the

[6] That is, we rule out kinks on the net export functions, i.e. functions that are not responsive to differential changes in prices. The assumption that this rank condition applies to every country can be readily relaxed at the expense of a more cumbersome wording of Proposition 1.

[7] Only one good needs to be normal in consumption at each level of utility, possibly a different good at different levels of utility, to ensure that our normality assumption is satisfied.

equation system $\lambda^\intercal S_{pp}^k = 0$ only has the nontrivial solution $\alpha^k p^k$ ($\alpha^k \neq 0$) and the equation system $\lambda^\intercal S_{pp}^j = 0$ only has the nontrivial solution $\alpha^j p^j$ ($\alpha^j \neq 0$). For both equation systems to hold, as in the second part of (6), we need $\alpha^k p^k = \alpha^j p^j$ whence $p^k = (\alpha^j/\alpha^k)p^j$, which contradicts the assumption that $p^k \neq \alpha^{kj} p^j$. Thus, (6) has no solution for $\lambda$ and so, by Motzkin's theorem of the alternative, a strict Pareto improvement in union welfare exists.

(ii) Let all domestic price vectors be equal up to a factor of proportionality, that is $p^k = \alpha^k p^0$ where $p^0$ is the common price vector. Thus, $\lambda = p^0$ solves the equations $\lambda^\intercal S_{pp}^k = 0$ for all $k \in K^M$. Also, $\lambda^\intercal S_{pu}^k = p^{0\intercal} S_{pu}^k = (1/\alpha^k) p^{k\intercal} S_{pu}^k = (1/\alpha^k) S_u^k < 0$ for all $k \in K^M$ since $S_u^k < 0$ due to the assumption that the consumer expenditure functions are increasing in utility (part (ii) of Assumption A). Thus, there is a solution $\lambda$ to (6) and hence, by Motzkin's theorem of the alternative, there does not exist a strict Pareto improvement in union welfare. ■

This proposition implies that any subset of countries may form a non-preferential trading club that results in a strict Pareto improvement for the club and unchanged welfare for each other country. By carefully choosing the tariff reforms and internal transfers, the same external trade vector is ensured and this, in turn, ensures that world prices are unaltered and that other countries have unchanged welfare. By coordinating the tariff reforms, a more efficient allocation of production and consumption within the club generates welfare improvements for the club members.

To properly interpret Proposition 1, it is important to be clear about the context and implications. First, the trading club arranges its policy reform in such a manner that the vector of aggregate trade of the club members with the rest of the world, and hence the vector of world prices of all traded goods are unchanged. In this sense, the trading club adopts a KWO approach to its policy choice. Second, however, the proposition refers to *non-discriminatory* tariff reform by the members of the trading club. The club members each have arbitrarily given initial tariffs and choose to alter national tariffs in a non-discriminatory way. The resulting national domestic price vectors are, in general, different and there are no tariff preferences given to club members. Accordingly, the club is neither a free trade area nor a customs union. Third, an essential part of the coordination of tariff reforms by club members is a set of accompanying lump sum income transfers. It is these transfers that allow the club members to enjoy a strict Pareto improvement in welfare as a result of the tariff changes; every club member gains. Collectively, the club creates a more efficient allocation of resources within the club through its reform of tariffs and the transfers permit these efficiency gains to be distributed so that every country gains in welfare. Finally, because the countries in the rest of the world face the same world prices as before and, by assumption, choose to retain the same tariff policies as before, each country in the rest of the world has unchanged welfare.

To illustrate the content of Proposition 1, a numerical example is presented. This example is drawn from Table A1 of Kennan and Riezman (1990). In this example, there are three internationally traded products and three countries with identical Cobb-Douglas preferences and fixed endowments that ensure a pattern of trade in which country $i$ exports product $i$ and imports both of the other two goods. We arbitrarily assume that the pre-club equilibrium is the Nash equilibrium and that countries 1 and 2 form a trading club, i.e., $K^M = \{1, 2\}$. The initial ad valorem tariff rates for these countries are $\tau_0^1 = (0.0, 0.4203, 0.5044)'$ and $\tau_0^2 = (0.8142, 0.0, 1.0120)'$, while the national utility vector is $u_0 = (0.5934, 0.8574, 1.3203)'$ and the aggregate club trade (net export) vector is $x_0^M = (0.1261, 0.1646, -0.1796)'$, showing that the (to be) club as a whole exports goods 1 and 2 to, and imports good 3 from, the third country. Thus, in this numerical example, each country imposes substantial tariffs on imports and does not tax exports. In the initial equilibrium there are no income transfers.

The club members choose a small discrete, non-discriminatory reform of tariffs given by $\Delta\tau^1 = (0.0, -0.0205, 0.0607)'$ and $\Delta\tau^2 = (0.0, 0.0, -0.0381)'$, while country 3 remains passive. By construction, this reform succeeds in keeping the trade vector with country 3, and hence the world price vector, unchanged. The resulting change in the club utility vector is $\Delta u^M = (0.0006, 0.0009)' \gg 0$, so both club members experience a welfare gain, while the utility of country 3 is unchanged. This outcome for the club is supported by a lump sum transfer of 0.0021 units of income from country 2 to country 1.

The tariff reform involves country 2 reducing its tariff on imports of good 3 (the tariff rate on good 1 was assumed fixed), while country 1 reduces its tariff on imports of good 2. Country 2's reduction in the tariff on good 3 induces that country to import more of that good from country 3. Hence, to help ensure an unchanged club trade vector, country 1 is required to reduce its imports of good 3 and it does this by raising its tariff rate on good 3. As compensation for this club reform requirement, which raises the domestic price paid by consumers and harms them, country 1 is provided with a lump sum transfer of 0.0021 units of income from country 2.

The consequence of this coordinated tariff reform, accompanied by an income transfer, is that both club members are better off while the non-member is unaffected as predicted by Proposition 1. The existence of the welfare gain is based upon the assumption that the initial equilibrium has intra-club price differentials. This welfare gain is achieved through a reduction in distortions within the club leading to a reduction in intra-club price differentials. These convergences are not necessarily applicable to every product as the example shows - one tariff rate increases, for example - but they apply 'on average'. It is noteworthy that the policy reform undertaken by the club members involves a reform in the general direction of tariff reductions but not uniformly so in view of the requirement that aggregate club trade is unchanged. Also noteworthy is the fact that no trade subsidies are involved.

Of course, this is just one of an infinity of possible reforms that the club can take to raise the welfare of its members. The set of all differential reforms can be found by evaluating the matrices $S^k_{pp}$ and $S^k_{pu}$ at the initial equilibrium for this example and computing solutions to the differential system (5) that yield welfare improvements.

Proposition 1 above leads to several related results concerning welfare reform. These results follow from consideration of a *sequence* of small discrete policy reforms by the trading club. The first result concerns the welfare effects along such a policy path and the second result concerns the nature of the equilibrium arising at the limit of the sequence of policy reforms by the trading club.

1. When ever the domestic price vectors of the trading club members are not all equal (up to a factor of proportionality), there exists a sequence of sufficiently small discrete changes in the tariffs and internal transfers of club members that yields strict Pareto improvements in club welfare. Since the proof of Proposition 1 does not require initial inter-club transfers to be zero, it may be used to show that a sequence of reforms that keep the world price vector unchanged is welfare improving. Again, since we require *strict* Pareto improvements sufficiently small discrete policy reforms yield the desired outcome.

2. If all members of the trading club have the same (up to a factor of proportionality) domestic price vectors then the equilibrium is conditionally Pareto optimal for the

club and every member imposes a common, non-discriminatory tariff vector. This equilibrium is *Conditionally Pareto Optimal* for the trading club in the sense that the equilibrium is Pareto optimal for the members of the club, given that the trading club employs a KWO-like policy whereby world prices for traded goods are kept at their initial pre-club values. Accordingly, given the KWO-like policy, the resulting equilibrium is Pareto optimal in that no member can be made better off without making some other member worse off. This situation arises as a continued sequence of trading club reforms eventually eliminates all differences in domestic prices.[8]

The essence of Proposition 1 on the existence of Pareto-improving reforms and of these two consequences or corollaries can explained and illustrated geometrically by using Figure 1. The axes measure the quantities of the two traded goods. The point $y$ is the club's aggregate production vector (assumed fixed for simplicity) while point $c$ is its aggregate consumption vector before and after the formation of the club. The difference is the net import vector for the club, again both before and after the formation of the club. Thus, the figure reflects our adopted KWO approach whereby the club ensures that the aggregate club trade vector with the rest of the world and, hence, the world price vector are the same before and after the formation of the club.

Figure 1: (about here)

The rectangular box formed by the origin and aggregate production point $y$ shows the allocation of production between the club members. Thus, point $Y$ denotes the production

[8] Not only are strict Pareto improvements not possible for club members, but weak Pareto improvements are also not possible. Since the proof in Proposition 1 refers to strict Pareto improvement, it does not apply without alteration here. A proof of Pareto optimality (lack of weak Pareto improvements) is available from the authors upon request.

points for the members (with origin for the production box at $y$ for member 2).

The rectangular box formed by the origin and the point $c$ is the Edgeworth-Bowley box for the analysis of intra-club exchange between the two club members. Thus $O^1$ denotes the origin for member 1, while $c$ (labelled $O^2$) becomes the origin for member 2. Point $C$ is the initial consumption point (showing vector $c_0^1$ from origin $O^1$ and vector $c_0^2$ from origin $O^2$). Clearly, this point is Pareto sub-optimal since the slopes of the indifference curves through this point (hence initial domestic prices) are different. Consumption points that are Pareto superior to $C$ occur in the cigar shaped area labelled $PCO$. Pareto optimal points that are weakly preferred to $C$ occur on the curve labelled $PO$.

Beginning at the initial consumption point $C$, the arrowed path indicates the sequence of small discrete changes to consumption for the two single-household members of the trading club. The initial Pareto-improving tariff reform takes the club from point $C$ to point $R$. The welfare improvement exists because the domestic price ratios in the two countries differ, thus forming an interior to the cigar shaped area $PCO$. In the case illustrated, both countries have the same trade pattern (both export good 1 and import good 2) and the movement from $C$ to $R$ involves an expansion of the trade vector of country 1 and a corresponding contraction of the trade vector of country 2. Accordingly, the reduction in the tariff on imports of good 2 by country 1 is accompanied by an increase in its imports of good 2, while the reduction in the subsidy on imports of good 2 by country 2 is accompanied by a reduction in its imports of good 2 (or, equivalently, reduction in the tax on exports of good 1 by country 2 is accompanied by a reduction in exports of good 1). Thus, the club's reform policy reduces the overall distortion for the club members.

The next reform in the sequence moves the club from point $R$ in a Pareto-improving direction indicated by the second arrow. At each stage in the sequence, the utility level for each member country increases. As shown in Figure 1, this sequence is arranged to converge to point $Q$, which lies on the Pareto optimal curve labelled $PO$. At this point the domestic price vectors of the two club members are identical and so no further Pareto improvements for the club are possible.

There are, of course, an infinity of Pareto-improving paths that the trading club can take, possibly leading to a different points along the (conditionally) Pareto optimal set $PO$. One such path takes the club from point $C$ to point $S$ and then via a sequence of discrete steps to point $T$. Along this path, the coordinated trade tax policy ensures that country 1 expands its trade vector (all trades are increased proportionally) while country 2 proportionately contracts its trade vector, the proportions being chosen to ensure that the aggregate trade vector is unchanged. This policy corresponds to Bagwell and Staiger's (1999, 2004) concept of 'reciprocity'. Of course, such a policy is a very special case of our more general Pareto-improving policy for the club. Moreover, there is no guarantee that a sequence of such policies will work, since, drawn differently, the line through $R$ and $S$ may depart from the Pareto-improving cigar-shaped area with point $T$ not being on the conditional Pareto optimal curve $PO$. Figure 2 illustrates such a case; indeed, the line $CT$ does not enter the Pareto-improving area.

Figure 2 : (about here)

It is important to recognize that convergence to Pareto optimality for club members does not imply that the club members eventually have internal free trade. Hence, the club is not a customs union. Each member country employs a non-discriminatory tariff vector against trade with every other country - club members and countries in the rest of the world are treated exactly the same as far as tariff policy is concerned. Moreover, a particular implication of the common domestic prices ($p^k = p^M$ for all $k \in K^M$) is that each country must have a common tariff vector $\tau^M = p^M - p$. This means that the member countries have 'harmonized' their tariff vectors. However, note that this needs to be interpreted carefully since the member countries may, and generally will, have different trade patterns. Equality of domestic prices means that $1 = p_i^k/p_i^l = (1+\tau_i^k)/(1+\tau_i^l)$, where $\tau_i^k$ is the ad valorem trade tax rate. Thus, for example, one member's import duty on tennis balls ($\tau_i^k > 0$) equals another member's export subsidy on tennis balls ($\tau_i^l > 0$).[9] Of course, subsidies may not be necessary in the limiting equilibrium. In figure 2 , both countries are on the same side of the market, exporting good 1 and importing good 2 at both the initial and limiting equilibria. Their initially different import taxes on good 2 are reduced as the club undetakes tariff reforms and are eventually harmonized to be equal at the limiting equilibrium given by point $Q$. No subsidies are needed in this case.

Our Pareto optimal trading club and the KWO customs union, although quite distinct in formulation, nevertheless are closely related. Both employ the KWO mechanism for fixing world prices and both employ internal transfers. On the other hand, while the KWO customs union has discriminatory trade policy with internal free trade and a common external tariff, the trading club has non-discriminatory trade policy and hence does not have internal free trade. Despite this difference, our Pareto optimal trading club and the KWO customs union equilibria are essentially identical. This is the content of the following proposition.

[9] Lerner symmetry prevails in our model, and thus an export subsidy is equivalent to an import subsidy. The important point here is that we should allow for both trade taxes and subsidies to exist. The possibility that a Pareto optimal equilibrium can be supported by trade taxes and subsidies is noted also by Mayer (1981, p. 142) and by Bagwell and Staiger (1999, 2004).

**Proposition 2** *The equilibria arising from a conditional Pareto optimal trading club and a Kemp-Wan-Ohyama customs union are essentially identical. They have the same equilibrium values for utilities, prices, consumptions, productions, trades and net incomes. They differ only in that member countries have potentially different tariff revenues and transfer payments.*

A heuristic explanation of the formal proof is provided below (the proof is available from the authors upon request).

The KWO customs union (denoted by superscript $U$) maintains the external trade vector at $x_0^U$ (and, hence, the world price vector at $p_0$) by setting a common external tariff vector $t^U$ and by imposing internal free trade. The conditionally Pareto optimal trading club maintains the external trade vector at $x_0^M$ and the world price vector at $p_0$ by setting a common non-discriminatory tariff $t^M$.

We take this conditionally optimal, non-preferential trading club and the associated equilibrium and show that the club can be re-formed as a KWO customs union and that the resulting equilibrium is essentially the same. Let this customs union set a common external tariff $t^U = t^M$ and fix the external trade vector $x_0^U = x_0^M$. Since both the union and the club impose the same tariff vector, they will have the same domestic price vectors. However, the fact that the customs union has free internal trade while the trading club has not, suggests that incomes in the two regimes would be different. For example, in the case of a trading club, internal trade in tennis balls might involve a duty on imports into country A from country B, but the common tariff vector for the club members therefore involves an export subsidy of exactly the same amount in country B. In aggregate, these trade taxes cancel for the club, but at the country level the government of A gets revenue while that of B loses revenue. This clearly is not the case in a customs union where there is no revenue accruing from internal trade. However, both the union and the trading club are assumed to have a full set of income transfers at their disposal. Transfers can thus be adjusted to neutralize the country tariff revenue effects and thereby to ensure that household incomes will be the same in the two regimes. Thus, with domestic prices and incomes being the same, the two regimes are indeed equivalent in a welfare sense.

The proposition and the above heuristic proof clearly highlight that the main element of a KWO customs union, apart from the KWO mechanism for common external tariff choice, is the existence of intra-club transfers and not the choice of free internal trade. We showed that a sequence of small discrete strict Pareto improving reforms by a trading club that employs a KWO-like mechanism for tariff reforms converges to an equilibrium that is essentially equivalent to a KWO customs union. While that latter involves internal free trade, our trading club does not. Thus, the common, and hence crucial, feature that ensures welfare improvements for a KWO customs union and for a trading club is the assumed existence of internal income transfers.

## 3 Conclusions

This paper has emphasized the value of coordinated non-discriminatory (and thus WTO consistent) tariff reforms, even if these reforms are taken only by a subset of countries and not the whole world. We have shown that open regionalism, in the form of our non-preferential trading clubs, can be Pareto improving for the world. Pareto optimality is achieved by choosing trade policy reforms that maintain the initial world prices, thus ensuring that non-member countries are unaffected, and that reduce the effects of trade distortions for club members, thus improving the efficiency of resource allocation within the club and raising welfare of club members.

An important policy issue that arises is whether our non-discriminatory tariff reform, by keeping world prices fixed, violates other WTO rules. Throughout the paper we have been very careful in referring to 'tariff reform' rather than 'tariff liberalization'. By constraining the club members' tariff reforms to ensure that world prices are unchanged, the required reforms may require some tariffs to rise and some to fall. Indeed, some trade tax rates may have to be negative (export/import subsidies) as the conditionally Pareto optimal state is approached. In this sense, the trading club members' tariff reforms may be in conflict with the written rules of the WTO. While this may be true, the tariff reforms undertaken by our trading club are, arguably, not in conflict with the spirit of the WTO rules, which is that non-participants of a new trading arrangement should not be harmed. As long as our trading club tariff reform produces weak Pareto gains to the world community, it is therefore difficult to criticize it for being against the spirit of the WTO.

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# Non-Preferential Trading Clubs:
# Appendix

(available upon request from readers)

by

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This appendix provides the formal proofs of two results in the paper "Non-Preferential Trading Clubs". These results are that (1) the limiting case of a sequence of trading club tariff reforms yields a conditionally Pareto optimal trading club equilibrium and (2) there is an equivalence between the conditionally Pareto optimal trading club and the Kemp-Wan-Ohyama (KWO) customs union.

**Proposition 3** *Let Assumption A hold. If all members of the trading club have the same (up to a factor of proportionality) domestic price vectors then the equilibrium is conditionally Pareto optimal for the club and every member imposes a common, non-discriminatory tariff vector.*

**Proof.** We are concerned with whether a solution to the linear system

$$\sum_{k \in K^M} S^k_{pp}(p^k, u^k) dp^k + \sum_{k \in K^M} S^k_{pu}(p^k, u^k) du^k = 0 \tag{7}$$

exists with $du^M > 0$, i.e. a *weak* Pareto improvement whereby at least one member gains and no member loses. By Motzkin's theorem of the alternative, as expressed in

Mangasarian (1969, p. 34), a solution exists if and only if there does not exist a solution $\lambda$ to the dual system

$$\lambda \left[ S^k_{pu}(k \in K^M) \right] \ll 0, \qquad \lambda^\intercal \left[ S^k_{pp}(k \in K^M) \right] = 0,$$

where the inequality $x \ll 0$ means that vector $x$ is strictly negative (all elements are negative). By assumption, all domestic prices are equal up to a factor of proportionality, that is $p^k = \alpha p^0$ where $p^0$ is the common price vector. Thus, $\lambda = p^0$ solves the equations $\lambda^\intercal S^k_{pp} = 0$ for all $k \in K^M$. Also, $\lambda^\intercal S^k_{pu} = p^{0\intercal} S^k_{pu} = (1/\alpha^k) p^{k\intercal} S^k_{pu} = (1/\alpha^k) S^k_u < 0$ for all $k \in K^M$ since $S^k_u < 0$ due to the assumption that the consumer expenditure functions are increasing in utility (part (ii) of Assumption A in the paper). Thus, there is a solution $\lambda$ to (A1) and hence, by Motzkin's theorem of the alternative, there does not exist a weak Pareto improvement in union welfare. ■

**Proposition 4** *The equilibria arising from a conditional Pareto optimal trading club and a Kemp-Wan-Ohyama customs union are essentially identical. They have the same equilibrium values for utilities, prices, consumptions, productions, trades and net incomes. They differ only in that member countries have potentially different tariff revenues and transfer payments.*

**Proof.** (i) Let the conditionally Pareto optimal trading club equilibrium for domestic prices, club utilities and transfers be $(p^M, u^M, b^M)$, where $u^M = (u^{kM}, k \in K^M)$ and $b^M = (b^{kM}, k \in K^M)$, when $(p_0, x_0)$ are the given world price and external trade vectors.

This equilibrium satisfies equation system

$$\begin{aligned}
\sum_{k\in K^M} S_p^k(p^M, u^{kM}) &= x_0 \\
p_0^\intercal S_p^k(p^M, u^{kM}) &= b^{kM},\ k \in K^M \\
\sum_{k\in K^M} b^{kM} &= 0,
\end{aligned} \tag{8}$$

comprising the club market equilibrium conditions, budget and transfer constraints. The budget constraints may be expanded and expressed alternatively as

$$E^k(p^M, u^{kM}) = G^k(p^M) - (p^M - p_0)^\intercal S_p^k(p^M, u^{kM}) - b^{kM}, \qquad k \in K^M. \tag{9}$$

This shows that consumer expenditure equals income from production plus tariff revenue ($T^{kM} = -(p^M - p_0)^\intercal S_p^{kM}$) minus transfers abroad.

A KWO customs union comprising the same members $K^M$ faces the same initial world prices $p_0$ and chooses a common external tariff vector $t^U = p^U - p_0$ and transfers to maintain the same initial trade vector $x_0$. Let the KWO customs union equilibrium for domestic prices, club utilities and transfers be $(p^U, u^U, b^U)$, where $u^U = (u^{kU}, k \in K^M)$ and $b^U = (b^{kU}, k \in K^M)$, when $(p_0, x_0)$ are the given world price and external trade vectors. This equilibrium satisfies equation system

$$\begin{aligned}
\sum_{k\in K^M} S_p^k(p^U, u^{kU}) &= x_0 \\
E^k(p^U, u^{kU}) &= G^k(p^U) - \alpha^k(p^U - p_0)^\intercal x_0 - b^{kU}, \qquad k \in K^M \\
\sum_{k\in K^M} b^{kU} &= 0,
\end{aligned} \tag{10}$$

comprising the union market equilibrium conditions, budget and transfer constraints.[10] The budget constraint for country $k$ states that consumer expenditure equals income from production plus the common external tariff revenue allocated to country $k$ by the union $a^k = -\alpha^k(p^U - p_0)^\intercal x_0$ (the proportion so allocated being $\alpha^k$ and the common external tariff revenue being $-\alpha^k(p^U - p_0)^\intercal x_0$) minus transfers abroad. The latter sum to zero over member countries. In this specification, we can alternatively think of member country $k$ getting a 'total transfer' of $\beta^{kU} \equiv -\alpha^k(p^U - p_0)^\intercal x_0 - b^{kU}$, comprising the tariff revenue allocated to it and the income transfer, $-b^{kU}$. These 'total transfers' sum, not to zero, but to the customs union tariff revenue over the member countries.

We now construct a KWO customs union equilibrium from the trading club equilibrium. In particular, consider the solution $(p^U, u^U) = (p^M, u^M)$. Clearly, under this equality of variables, the market equilibrium conditions for the customs union given by the first equation set in (10) are satisfied, being the same as for the trading club. It therefore remains to choose policy instruments $(\alpha^k, b^{kU}),\ k \in K^M$, and then to demonstrate that, given this policy choice, the remaining equations in (10) are also satisfied for the solution $(p^U, u^U) = (p^M, u^M)$.

Choose the customs union transfers by

$$b^{kU} = b^{kM}, \qquad k \in K^M, \tag{11}$$

and the union's customs allocation proportion by

$$\alpha^k = \frac{-(p^M - p_0)^\intercal S_p^{kM}}{-(p^M - p_0)^\intercal x_0}, \qquad k \in K^M, \tag{12}$$

[10] For further details on this formulation of the customs union equilibrium conditions see Melatos and Woodland (2003).

where the denominator is aggregate tariff revenue earned by club members, $TR^M = \sum_{k \in K^M} -(p^M - p_0)^\intercal S_p^{kM} = -(p^M - p_0)^\intercal x_0$. Thus, the (outward) transfer from nation $k$ in the customs union is set equal to its transfer under the trading club equilibrium. In addition, the proportion of customs revenue the union allocates to member $k$ is set equal to the tariff revenue earned by country $k$ as a club member as a proportion of total trading club tariff revenues.

With these choices in hand, it is straightforward to demonstrate that the constructed customs union has an equilibrium identical to that of the trading club. Since it has already been noted that the market equilibrium conditions are satisfied and it is obvious that the chosen union transfers sum to zero, this is achieved by showing that the union's budget constraint for each country $k$ is the same as under the club equilibrium. The budget constraint for country $k$ in the constructed customs union is

$$\begin{aligned} E^k(p^U, u^{kU}) &= G^k(p^U) - \alpha^k (p^U - p_0)^\intercal x_0 - b^{kU} && (13) \\ &= G^k(p^U) - (p^M - p_0)^\intercal S_p^{kM} - b^{kM}, \qquad k \in K^M. && (14) \end{aligned}$$

Also, under the assumption that $(p^U, u^U) = (p^M, u^M)$, the levels of consumer expenditure and GNP will be the same for the customs union as for the trading club, that is, $E^k(p^U, u^{kU}) = E^k(p^M, u^{kM})$ and $G^k(p^U) = G^k(p^M)$. Thus, in view of the assumed equality $(p^U, u^U) = (p^M, u^M)$, the budget constraints under the customs union may be written equivalently as

$$E^k(p^M, u^{kM}) = G^k(p^M) - (p^M - p_0)^\intercal S_p^{kM} - b^{kM}, \qquad k \in K^M, \tag{15}$$

which is exactly the budget constraint applying under the trading club equilibrium.

Thus, it has been demonstrated that, if the union chooses a common external tariff $t^U = p^M - p_0$, transfers $b^{kU} = b^{kM}$ and customs allocation proportions $\alpha^k$ given by (12), then $(p^U, u^U) = (p^M, u^M)$ is an equilibrium solution for world prices and member utilities. As a consequence, all other variables (such as production, consumption and exports) take the same values in the customs union equilibrium as they did in the trading club equilibrium. The customs union equilibrium is identical to the trading club equilibrium.[11]

It should be noted that the choice of transfers and customs revenue allocation proportions is somewhat arbitrary. Both are 'transfers' from the union to the member countries and what is important is that the 'total transfer' in the customs union is exactly the same as the total amount the member country obtains from tariffs and transfers in the trading club equilibrium. Whatever the split between these two sources of transfer from the union, provided each country gets the same income under the customs union regime as obtained under the trading club regime (and this is always possible through the choice of 'transfers') the equilibrium prices, utilities and all real variables will be the same under the two regimes. Our particular choices above meant that the transfers under the two regimes are equal and that the customs union revenue allocated to each country exactly coincides with the actual tariff revenue obtained under the trading club regime.

(ii) By a similar argument, a Kemp-Wan-Ohyama customs union equilibrium may be re-interpreted as a conditional Pareto optimal trading club equilibrium. The members of the constructed club each choose tariff vector $t^M \equiv p^U - p_0 = t^U$ equal to the union's common external tariff vector and transfers are chosen to ensure that member incomes

[11] Note also that the aggregate tariff revenue for the trading club equals the common external tariff revenue for the customs union, since $TR^M = \sum_{k \in K^M} -(p^M - p_0)^\intercal S_p^{kM} = -(p^M - p_0)^\intercal x_0 = -(p^U - p_0)^\intercal x_0 = TR^U$.

are the same in the club as they were in the union. This is achieved by choosing

$$b^{kM} = b^{kU} - (p^U - p_0)^\intercal S_p^k(p^U, u^{kU}) + \alpha^k (p^U - p_0)^\intercal x_0, \qquad k \in K^M, \tag{16}$$

which comprises the union transfer plus the imputed common external tariff revenue on member $k$'s trade minus the actual tariff revenue allocated to member $k$. Since the argument is analogous to that given in part (i) of the proof, details are not provided.

Together (i) and (ii) establish the essential (in all respects except possibly for the values of the tariff revenues and transfers) equivalence between a conditional Pareto optimal trading club and a Kemp-Wan-Ohyama customs union. ■

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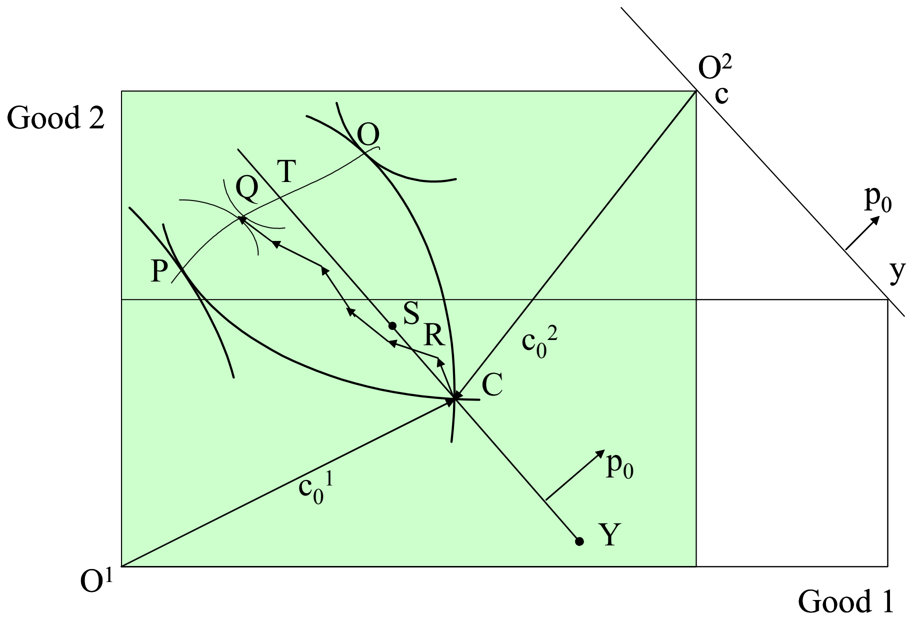


Figure 1: SPI Transition of Club to Conditional Pareto Optimality

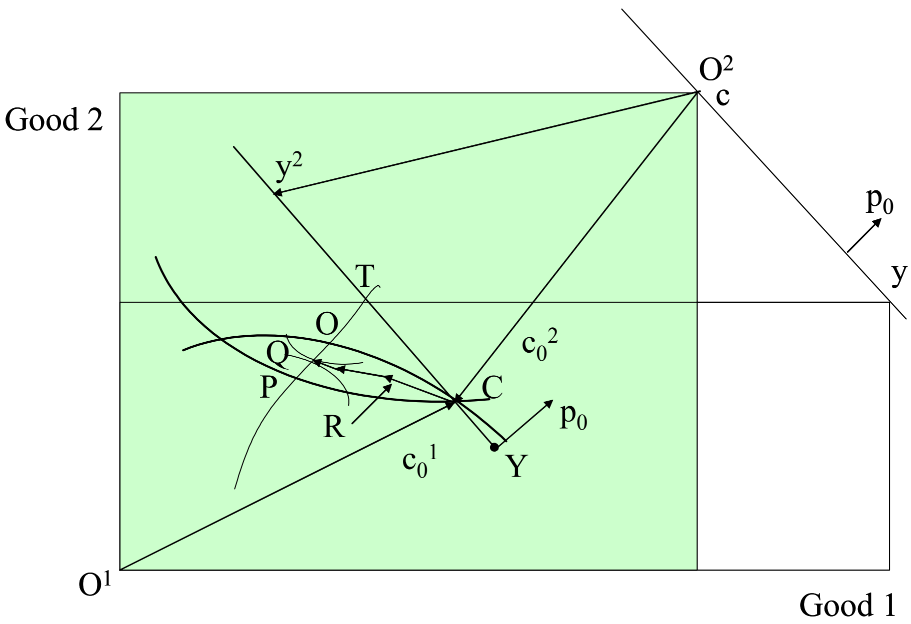


Figure 2: SPI Transition of Club to Conditional Pareto Optimality with Members on One Side of the Market