OPEN REGIONALISM AND WORLD WELFARE

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INTRODUCTION

In recent years, there has been a resurgence of the formation of preferential trading blocs, such as the European Union (EU), the North American Free Trade Agreement (NAFTA) zone, and an emerging Asian bloc. This development has raised concerns that the formation of regional trading blocs may undermine the spirit of global free trade.

How does the formation of preferential trading blocs affect world welfare — in particular, the welfare of nonmember countries? Is the fear of protectionism against outsiders, symbolized, for example, by "Fortress Europe," well-founded? Or will the removal of trade barriers among member nations lead to an increase in the volume of trade with nonmember nations, and thereby improve the welfare of nonmembers as well? When countries are able to form trading blocs freely, what trading bloc structures are stable? What are the properties of a stable trading bloc structure? Are regional trading blocs stepping stones or stumbling blocks to global free trade? Can one design a rule for bloc formation which will sustain global free trade as a stable outcome?

By drawing from the recent developments in noncooperative theory of coalition formation among symmetric players [Yi, 1996a; 1996b], this paper reports some answers to the above questions. This paper examines the case of customs unions, a set of countries which agree to abolish tariffs among member countries and to set common external tariffs in order to maximize the joint welfare of the member countries. (Yi [1996a] examines the case of free-trade areas. If a set of countries form a free trade area, they eliminate tariffs among member countries, but each country is allowed to set its own external tariffs on nonmember countries.)

The vast literature on trading blocs, dating back to Vinson [1950], has examined the welfare effects of the formation of trading blocs on member countries and nonmember countries. In recent years, some authors have started the analysis of the stable structures of trading blocs [Baldwin, 1995; Krishna, 1996; Levy 1995; Yi, 1996a;]. In Baldwin [1995], Krishna [1996] and Levy [1995], only one trading bloc can form. Baldwin [1995] demonstrates that the formation or enlargement of a trading bloc enhances the incentives of nonmember countries to form a global trading bloc (i.e., global free trade). Krishna [1996] and Levy [1995] point out that the formation of a regional trading bloc reduces the incentives of the member countries to form a grand trading club.

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transfers involving only members of the customs union exists, such that all member countries are made better off while making no nonmember country worse off. Yi [1996a] differs from Kemp and Wan [1976] in two critical aspects. First, Kemp and Wan [1976] do not examine how the external tariffs are determined. Yi [1996a] shows that, if the external tariffs are chosen to maximize the joint welfare of the member countries, nonmember countries are made worse off. Second, and more importantly, even in the absence of any kind of side payments, customs unions can be stepping stones toward global free trade under the Open Regionalism rule.

In this paper, I illustrate these results on equilibrium structures of customs unions (as well as the related results by Baldwin [1995], Krishna [1996], and Levy [1995]) by constructing a simple example. To that purpose, the next section introduces the rules of customs-union formation, which are discussed in detail in Yi [1996a] in an abstract model of coalition formation.

**RULES OF CUSTOMS-UNION FORMATION**

N ex-ante symmetric countries are denoted by $P_1, P_2, \ldots, P_n$. A customs-union structure $C = \{B_1, B_2, \ldots, B_n\}$ is a partition of the set of countries $P = \{P_1, P_2, \ldots, P_n\}$, $B_i \cap B_j = \emptyset$ for $i \neq j$ and $\cup B_i = P$. Given the symmetry of players, the composition of a customs union does not matter. Hence, with a slight abuse of notation, one can denote a customs union by its size so that $C = \{B_1, B_2, \ldots, B_n\}$ can be written as $C = \{n_1, n_2, \ldots, n_n\}$, where $n_i$ is the size of the $i$-th coalition $B_i$. For example, suppose that there are four countries, $C(3,1)$ is a customs-union structure with two asymmetrically sized customs unions, a size-3 customs union and a size-1 customs union. With four countries, five different coalition structures are possible: $(4), (3,1), (2,2), (2,1,1)$ and $(1,1,1,1)$. Assume that the second-stage tariff-setting game has a unique Nash equilibrium outcome for any customs-union structure. Then the welfare of each country in any customs-union structure is well defined. Let $W(C)$ be the welfare of a member of the size-$s$ customs union in the customs-union structure $C = \{n_1, n_2, \ldots, n_n\}$ in the second-stage tariff game. For example, $W(3,1)$ is the equilibrium welfare of the size-3 customs union in the customs-union structure $(3,1)$.

**Simultaneous-Move Open Regionalism Game: Yi and Shin [1995]**

In this game, each country announces an "address" simultaneously. The countries that announce the same address belong to the same customs union. Formally, each country's strategy space is $A = \{a_1, a_2, \ldots, a_n\}$. For each $N$-tuple of announcements $a = (a_1, a_2, \ldots, a_N)$, let $A = A_1 \times A_2 \times \cdots \times A_N$, the resulting customs-union structure is $C = \{B_1, B_2, \ldots, B_n\}$, where $P_i$ and $P_j$ are $B_i$ and $B_j$ if and only if $a_i = a_j$ they choose the same address. Notice that a nonmember country does not need the consent of the existing members of a customs union in order to join the union. All it has to do is change its address to the one announced by members of the customs union.
Infinite-horizon Unanimous Regionalism game: Bloch [1996]

In this game, $P_i$ first proposes a customs union, say, with $P_j$, $P_k$, and $P_l$. The potential members of $P_i$'s customs union sequentially decide whether to accept or reject $P_i$'s proposal. If any potential member rejects $P_i$'s proposal, then this customs union does not form and the first country which rejects $P_i$'s proposal makes a counter-proposal. If all potential members of the proposed customs union accept $P_i$'s proposal, then this customs union forms, and the country with the smallest index among the remaining countries (here, it is $P_j$) proposes a customs union to the rest of the countries, and so on. Bloch [1996] shows that this game yields the same stationary subgame perfect equilibrium coalition structure as the following "Size Announcement" game: $P_i$ first announces the size of its customs union $s_i$, and the first $s_i$ countries form a size-$s_i$ customs union, and then propose $s_i$ and the next $s_i$ players form a size-$s_i$ customs union, and so on until $P_i$ is reached. Intuitively, this equivalence theorem is a result of the symmetry assumption. In an equilibrium with no delay, $P_i$ makes a proposal which is going to be accepted immediately. Since the identities of the members do not matter, $P_i$ (and all other subsequent proposers) may as well pick the size of its customs union $s_i$ under the assumption that the next $s_i - 1$ countries will be its union partners. It is easy to see that this "Size Announcement" game has a (generically) unique subgame perfect equilibrium coalition structure. In this game, once a customs union forms, an outsider cannot join it. Hence, the Unanimous Regionalism rule allows for exclusivity in membership.

EQUILIBRIUM CUSTOMS-UNION STRUCTURES: A FOUR-COUNTRY EXAMPLE

Consider the following example with four countries. If four countries form the grand customs union, each country's welfare is 20: $W_1(4) = 20$. If three countries form a size-3 customs union and the remaining country forms a size-1 customs union, the per-member welfare of the size-3 customs union is 23 and the welfare of the size-1 customs union is 3: $W_2(3,1) = 23$ and $W_1(3,1) = 3$. If two countries form a size-2 customs union and the other two countries also form a size-2 customs union, the per-member welfare of the size-2 customs union is 13: $W_2(2,2) = 13$. If two countries form a size-2 customs union and the other two countries each form a size-1 customs union, the per-member welfare of the size-2 customs union is 14 and the welfare of a size-1 customs union is 7: $W_2(2,1,1) = 14$ and $W_1(2,1,1) = 7$. Finally, if all four countries each form a size-1 customs union, each country's welfare is 10: $W_1(1,1,1,1) = 10$. Notice that this example satisfies the five results (mentioned earlier) regarding the effects of changes in the customs-union structures (such as the formation, expansion or merger of customs unions) on the welfare of member countries and nonmember countries. Figure 1 summarizes the per-member welfare of customs unions under different customs-union structures.

Equilibrium Customs-Union Structure in the Open Regionalism Game

It is straightforward to see that (4), the grand customs union, is the unique pure-strategy equilibrium outcome of the simultaneous-move Open Regionalism game. Consider a strategy profile in which all four countries choose the same address, say $a_c$. No country can increase its welfare by announcing a different address, because the resulting customs-union structure would be (3,1), and the deviator would belong to the size-1 customs union. The deviator's welfare would be 3, which is lower than 20. (Notice that there are multiple equilibrium strategy profiles. The grand customs union can be supported by all four countries choosing $a_c$, $a_c$, or $a_c$. However, this multiplicity of equilibrium strategy profiles is outcome-irrelevant: all such strategy profiles lead to the grand customs union.) No other customs-union structure can be supported as a pure-strategy Nash equilibrium outcome, since the country which belongs to the smallest customs union can increase its welfare by changing its address to the one announced by the members of the largest customs union. (For example, (3,1) is supported by three countries choosing $a_c$ and the remaining country choosing a different address, say $a_1$. However, this strategy profile does not constitute a Nash equilibrium of the Open Regionalism game, since the player which belongs to the size-1 customs union can increase its welfare from 3 to 20 by changing its address from $a_c$ to $a_1$.)

More generally, consider a model of welfare-maximizing customs union formation among $N$ symmetric countries. In addition, suppose that a member of a customs union can increase its welfare by leaving its customs union to join a larger or equal
sized customs union. (Yi [1996a] shows that this result holds true in a simple model of intra-industry trade.) Then, the grand customs union is the unique pure-strategy equilibrium outcome of the simultaneous-move Open Regionalism game in any model of trade, whether it is a Heckscher-Ohlin model of comparative advantage or a Dixit- Stiglitz-Krugman model of intra-industry trade with increasing returns. Moreover, the grand customs union is a subgame-perfect equilibrium outcome of the sequential-move Open Regionalism game, in which country 1 first announces its address, and then country 2 announces its address, and so on until country $n$ announces its address. For details, see the Appendix.

**Equilibrium Customs-Union Structure in the Unanimous Regionalism Game**

$P_i$ has four options. First, if $P_i$ chooses 4, then the grand customs union forms and $P_i$'s welfare is 20. Second, if $P_i$ chooses 3, $P_i$ has no option but to declare 1. Hence, the resulting customs-union structure is $(3,1)$ and $P_i$ belongs to the size-3 customs union. $P_i$'s welfare is 20. Third, suppose that $P_i$ chooses 2. The next announcer in the following subgame is $P_{i+1}$ which has two options. If $P_{i+1}$ chooses 2, the resulting customs-union structure is $(2,2)$ and $P_i$'s welfare is 13. If $P_{i+1}$ instead chooses 1, the resulting customs-union structure is $(2,1,1)$ and $P_i$'s welfare is 7. Hence, $P_i$'s optimal strategy in the subgame following $P_i$'s announcement of 2 is to form a size-2 customs union. As a result, if $P_i$ chooses 2, the resulting customs-union structure is $(2,2)$ and $P_i$'s welfare is 13. Finally, suppose that $P_i$ chooses 1. $P_i$'s optimal strategy in the subgame is to announce 3. (Simply notice that in this example 23 is the highest welfare, and $P_i$ can obtain it by announcing 3 in this subgame.) As a result, if $P_i$ chooses 1, the resulting customs-union structure is $(3,1)$ and $P_i$'s welfare is 3. A comparison of the welfare levels resulting from four different announcements shows that $P_i$'s equilibrium strategy is to announce 3 and the equilibrium customs-union structure of the Unanimous Regionalism game is $(3,1)$.

**Discussion**

The above example illustrates that a fundamental conflict of interest exists between the existing member countries of a large customs union and nonmember countries regarding the expansion of the customs union. While a nonmember country becomes better off by joining a larger (or equal-sized) customs union, it may not be in the interest of the existing members of the large customs union to admit a new member (which currently belongs to a smaller customs union). In the above example, it is in the interest of the existing members of the size-2 customs union to admit a new member (either from the other size-2 customs union or from the size-1 customs union), but it is not in the interest of the existing members of the size-3 customs union to admit a new member (from the size-1 customs union) to form grand customs union. As a result, in the Unanimous Regionalism game, the grand customs union is not the equilibrium outcome, because the existing members of the size-3 customs union are allowed to deny membership to the nonmember country.

In contrast, the Open Regionalism rule does not allow the existing members of the large customs union to deny membership to a nonmember country. As a result, the unique stable outcome is the grand customs union. Recall that world welfare is higher under the grand customs union than under any other customs-union structure. Hence, customs unions are stepping stones toward global free trade under the Open Regionalism rule. However, customs unions can be, and typically are, stumbling blocks toward global free trade under rules of customs-union formation, which allows for exclusivity in membership, such as the Unanimous Regionalism rule.

This example also illustrates the basic points of related work by Baldwin [1999], Krishna [1996], and Levy [1995]. Baldwin [1999] considers the formation and expansion of one trading bloc. Thus, by assumption, the formation of multiple trading blocs is ruled out. Baldwin shows that the expansion of the single trading bloc increases the incentives of nonmember countries to form the grand trading bloc. This finding holds true in this paper. Consider the formation of a size-2 customs union and then the expansion of this customs union to a size-3 customs union. The excluded country becomes worse off by the formation and the expansion of this customs union, enhancing its incentives to form the grand customs union. This example demonstrates why the expansion of a customs union makes global free trade more appealing to the nonmembers: the expansion of a welfare-maximizing customs union makes nonmember countries worse off.

In three-country models, Krishna [1996] and Levy [1995] demonstrate that the formation of a preferential trade agreement reduces the member countries' incentives for global trade agreement. In a three-country model, this finding can be understood by revealed-preference arguments. Start from no trade agreements. Two countries will sign a bilateral trade agreement if and only if signing the bilateral agreement raises both their payoffs from the status-quo (no agreement) levels. Since the payoffs of the three countries under a multilateral trade agreement are not affected by the signing of a bilateral trade agreement, the two countries which voluntarily sign a bilateral trade agreement will find the multilateral trade liberalization less attractive ex post.

In an $N$-country model, such as this paper, the findings of Krishna [1996] and Levy [1995] carry over only partially, because the formation of a preferential trading bloc can in principle have a quite complex effect on the stable structures of trading blocs in a dynamic model of trading bloc formation. For example, suppose that there are five countries. Furthermore, suppose that $W_1(3,1,1) > W_1(5,5) > W_1(4,4,1) > W_1(3,2,2) > W_1(3,3,2) > W_1(3,3,1)$. Starting from no trading bloc formation (i.e., $(1,1,1,1,1)$), suppose that three countries form a size-3 trading bloc. At first, it may seem that the formation of this trading bloc will not lead to the formation of the grand trading bloc, since $W_2(3,3,1) > W_2(5,5)$. However, if the size-3 trading bloc refuses to form the grand trading bloc with the other two countries, these two countries will form a size-2 trading bloc of their own, because $W_2(3,2,2) > W_1(3,3,1)$. But the members of the size-3 trading bloc will now find it beneficial to form the grand trad-
ing bloc, since \( W(6,5) > W(3,5,2) \). Hence, the formation of a trading bloc which seemingly makes the grand trading bloc unattractive to the members (since \( W(3,5,1,1) > W(5,5) \)) actually results in the formation of the grand trading bloc through the effect on outsiders' incentives to form their own trading bloc (since \( W(5,5,2) > W(3,5,1,1) \) and \( W(5,5) > W(3,5,2) \)).

Nonetheless, Krishna's (1996) and Levy's (1995) fundamental insight holds true in this paper. Their insight emerges as the finding that the grand customs union is typically not the equilibrium outcome under the Unionsional Regionalism rule because of the refusal of the existing members of the large customs union to admit outsiders as new members.

**CONCLUDING REMARKS**

I have attempted to provide a brief overview of the recent developments in the analysis of stable structures of trading blocs, focusing on the case of welfare-maximizing customs unions. I have illustrated the similarities and differences between the results from welfare maximization models of trading blocs (Yi, 1996a) and the findings from the political-economy analysis of preferential trading blocs (Baldwin, 1995; Krishna, 1996; Levy, 1995).

Through a simple four-country example, the major part of this paper has illustrated the main findings of Yi (1996a). Yi (1996a) goes a step further than other papers on trading blocs by examining equilibrium structures of customs unions under different rules of customs-union formation and by demonstrating that the Open Regionalism rule achieves the globally efficient customs union structure (i.e., global free trade) as the unique equilibrium outcome.

**APPENDIX**

**Claim:** Suppose that a member of a customs union can increase its welfare by leaving its customs union to join a larger or equal-sized customs union. Then the grand customs union is a subgame-perfect equilibrium outcome of the sequential-move Open Regionalism game.

**Proof:** Consider the following strategy profile:

- \( P_1 \): Announce any address.
- \( P_{2,...,N} \): Choose the most frequently announced address. If there is a tie, then pick an address different from the one chosen by the country who created the tie most recently.

In order to check that the above strategy profile constitutes a subgame perfect equilibrium, I use backwards induction. It is obvious that for \( P_1 \), the above strategy is optimal for any given history. Now suppose that the claim is true for \( P_2, P_{3,...,N} \). Suppose that \( N-k \) countries before \( P_{N-k} \) have announced \( t \) addresses. With-out loss of generality, suppose that \( a_t \) has been announced \( t \) times. Since \( f_i > f_i \), \( i = 1, 2, ..., t \), if \( f_i = f_i \), then label the addresses so that \( a_t \) is not the address chosen by the player who created the tie most recently. We need to show that assigning \( a_t \) is an optimal strategy for \( P_{N-k} \). If \( P_{N-k} \) announces \( a_t \), then it becomes the unique most frequently announced address for \( P_{N-k} \). By inductive hypothesis, \( P_{N-k} \) (and all subsequent countries) announce \( a_t \) along the unique subgame perfect equilibrium path of the continuation game. \( P_{N-k} \)'s welfare is then \( W(f_t+k+f_{N-k}f_t+f_{N-k}f_t-f_t) \). Suppose that \( P_{N-k} \) announces another equally popular address \( a_t, i \neq t \), then \( f_{N-k} \) and all subsequent countries will also announce \( a_t \) and \( P_{N-k} \)'s welfare is the same as before. Hence, \( P_{N-k} \) is indifferent between \( a_t \) and any other equally popular address \( a_t, i \neq t \). Now suppose that \( P_{N-k} \) announces a less popular address \( a_t, f_t < f_t \). (\( a_t \) can be a new address.) Suppose that \( f_t < f_t \), then it is not one of the most popular addresses for \( P_{N-k} \). By hypothesis, \( P_{N-k} \), chooses \( a_t \) (or any other equally popular address which is not chosen by the country who created the tie most recently). \( P_{N-k} \)'s welfare is \( W(f_t+k+f_{N-k}f_t+f_{N-k}f_t-f_t) \), which is smaller than \( W(f_t+k+f_{N-k}f_t+f_{N-k}f_t-f_t) \) by the condition in the claim. Finally, suppose that \( f_t < f_t \). Then it is one of the most popular addresses for \( P_{N-k} \). Hence, \( P_{N-k} \) is indifferent between \( a_t \) and \( a_t \). By hypothesis, however, \( P_{N-k} \) breaks the tie against \( a_t \), since \( P_{N-k} \), created the tie most recently. Once again, \( P_{N-k} \)'s welfare is \( W(f_t+k+f_{N-k}f_t+f_{N-k}f_t-f_t) \), which is smaller than \( W(f_t+k+f_{N-k}f_t+f_{N-k}f_t-f_t) \) if it chooses \( a_t \), as prescribed by the above strategy profile.

**REFERENCES**


