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SMALL COUNTRIES AND PREFERENTIAL TRADE AGREEMENTS "HOW SEVERE IS THE INNOCENT BYSTANDER PROBLEM?"

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Abstract

This paper examines the welfare implications of preferential trade agreements (PTAs) from the perspective of small countries in the context of a multi-country, general equilibrium model. We calibrate our model to represent one relatively small country and two symmetric big countries. We consider two cases. In one case, the small country is an "innocent bystander," that is, it is left out of a PTA between the two large countries. In the second case, the small country signs a PTA with one of the large countries. We simulate the model and calculate consumption allocations, prices, trade volume, and tariffs in these two cases considering three different equilibria: Free Trade (FT), Free Trade Area (FTA), and Customs Union (CU). We find that free trade is the best outcome for the small country. If the large country PTA takes the form of a CU then the cost of being an "innocent bystander" is very large. If it is a FTA then the cost of being an "innocent bystander" is relatively modest. In fact, the small country prefers to be an "innocent bystander" to being a member of a FTA with one of the large countries.

Keywords: Preferential trade agreements, general equilibrium, tariffs, welfare, small countries

JEL Classification: F02, F13, F15

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1. Introduction

The 1990s have witnessed a significant increase in the number of preferential trade agreements (PTAs). One notable feature of these agreements is that a number of relatively small countries have signed PTAs with larger countries while granting a lot of major concessions to become members.[1] For example, U.S. and Canada have protected their agriculture sector, while Mexico substantially liberalized it as a result of NAFTA. Several smaller countries, such as Hungary, Poland, Turkey have to accept a variety of protection measures for sensitive sectors, i.e. agriculture and textiles, of the existing members to sign PTAs with the European Community.

There has been a rapidly growing literature examining the different aspects of PTAs in recent years.[2] Nevertheless, there have been only a few studies analyzing the recent surge of PTAs from the perspective of small countries: Krugman (1991a) provides a simple example to illustrate the importance of "the innocent bystander problem", i.e. the problem faced by a small country that is excluded from a PTA, and concludes that the bystander can suffer from significant welfare losses.[3] Perroni and Whalley (1996) study the role of small countries in the recent PTAs employing a computable general equilibrium model. They claim that the main motive of small countries is to provide themselves with "safe havens" by securing access to larger country markets. Kowalczyk (1999) examines the welfare effects of these agreements on small countries and finds that a small country can enjoy welfare gains through its access to a large market but a large trading partner might demand some transfer payments from the small country to establish the PTA.[4]

The purpose of this paper is to examine the impact of PTAs on small countries' welfare considering the strategic aspects of PTAs in a general equilibrium setting. In particular, we study the following questions: first, what are the effects of different types of PTAs on welfare, tariffs, prices, and the trade volume of small countries, i.e. innocent bystanders, that are excluded from these trade agreements? Second, what are the strategic implications of PTAs from the perspective of small countries

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[1] See Winters (1993), Ethier (1996), and Perroni and Whalley (1996) for several common features of PTAs and the role of small countries in these agreements. While reviewing recent PTAs between the European Community and several small countries, Winters calls these agreements *"managed liberalization"* since *"accedants have to accept existing policy unconditionally, even though existing members may be exempt from parts of it… the EC decides what it wants and the EFTA countries take it or leave it."* Ethier also observes that recent regional agreements are *"one-sided"* in the sense that they contain asymmetric concessions.

[2] See De Melo and Panagariya (1993), Riezman (1999), and Kose and Riezman (1999) for reviews of this literature.

[3] In particular, he notes that *".. inward turning free trade areas, while doing little damage to themselves or each other, can easily inflict much more harm on economically smaller players that for one reason or another are not part of any of the big blocks."*

[4] Kennan and Riezman (1988) study the implications of a possible trade war between a small country and a big one. Their results suggest that by having trade agreements with the big countries, small countries could avoid losing a possible trade war. Whalley (1998) documents several objectives of small countries for becoming members of PTAs.

that are able to establish a PTA with a large country while ruling out a trade agreement with another large country?

We construct a simple multi-country, general equilibrium model based on comparative advantage considerations. In our model, there are three countries, two of which are relatively large and the third one is small. Throughout the paper we use the term "small country" to mean relatively small in size, but not infinitesimal as in the more common meaning of "small country." All three countries set tariffs optimally and consider all possible trade agreements when they decide what to do[5]. Countries can form a PTA, either a Free Trade Association (FTA) or a Customs Union (CU), or they can establish free trade (FT). In the FTA, member countries agree to free trade within the Association, but are allowed to set their external tariffs independently. A CU is a FTA with the additional provision that the external tariff is set jointly by the members. We examine the effects of the changes in the relative size of these countries on several endogenous variables. For each trading regime, we calculate equilibrium prices, consumption allocations, tariffs, and trade volume. We, then, study the welfare implications of these agreements for each country.

Our study extends the scope of the ongoing research program in three main directions: first, we focus on the strategic interactions between small and large countries and examine competing cases in which large and small countries play different roles as members or nonmembers of PTAs. To understand the importance of these issues, we study two different cases: we first consider an experiment similar to the one in Krugman (1991a). In particular, in Case 1 the small country is left out of the PTA formed by the big countries. However, this experiment is just one side of the story since it ignores potential strategic interactions between small and large countries. We then turn to Case 2 in which the small country signs a PTA with one of the large countries and the other large country is now the bystander. In other words, the small country has some strategic power in Case 2 as it is part of a relatively large PTA. Considering that small countries are not just idle players in the multilateral trading system and they are in fact actively seeking small and large partners, this case is particularly relevant for understanding the impact of PTAs on small countries.

Second, while some of the recent agreements take the form of FTAs, some are CU arrangements. Existing studies do not investigate different types of agreements, such as FTAs and CUs, and, hence, are unable to document various implications of these agreements on small economies. However, this issue is an important one for small countries because different types of PTAs affect the attitude of large countries towards small ones differently when small and large countries decide to establish PTAs.[6] We explicitly

[5] In our model small countries optimal tariffs will generally be non-zero.

[6] In a recent paper, Kose and Riezman (1999) show that different types of PTAs can have significantly different effects on the welfare of the member and nonmember countries.

examine different types of PTAs, such as CUs and FTAs, and compare the implications of these arrangements with those of free trade.

Third, the impact of change in the size of member and nonmember countries on model variables, such as terms of trade, domestic prices, tariffs, and most importantly welfare have not been examined in the context of a general equilibrium model. For example, none of the existing studies analyzes the link between the relative size of the bystander and the welfare implications of different types of PTAs. We systemically examine the relation between the relative size of small countries and the impact of different types of PTAs on small countries.

We start with providing detailed information about the behavior of endogenous variables of the model in different types of trading arrangements by documenting several regularities associated with tariffs, prices, and the trade volume. These regularities lay the groundwork for understanding the basic intuitive mechanisms driving our welfare results. Here is a brief summary of the main findings. First, when the small country is the nonmember in Case 1, the tariff rate charged by the large members of the CU is much higher than that of the small country. In contrast, the large nonmember country charges a higher tariff rate than the member countries in a CU equilibrium in Case 2. Second, the small country chooses a higher tariff rate when it is a member (Case 2) than that when it is not a member of a CU (Case 1). Unlike in a CU, in a FTA equilibrium, the small country charges a lower tariff rate when it is a member (Case 2) than that when it is a nonmember (Case 1). Third, the deterioration in the terms of trade of the big member of a PTA is larger than that of the nonmember economy as countries move from a PTA equilibrium to FT in both cases. However, the small country's terms of trade is highest when there is FT in both cases. Fourth, the big members trade more with the other countries when there is a CU in Case 1. Both small and large members export a larger fraction of their GDP in a FTA equilibrium than that in a CU equilibrium in Case 2.

We then examine the welfare implications of PTAs on small countries in the two cases. This investigation also reveals several interesting regularities consistent with those documented above: first, if a small country is left out of a PTA, in other words, if it is an innocent bystander, it has to pay very high costs in our model. While the innocent bystander problem can be very severe for small economies that are not able to participate in a PTA, the severity of the problem gets worse as the relative size of the bystander gets smaller. For example, when the two big countries, each of which has an export good endowment of 20 (100) units, establish a CU arrangement, the small country can face up to a loss of roughly 50 (75) percent of consumption. If the trading bloc is a FTA, then the small country again has to pay a high cost but the welfare cost associated with this is much smaller than that of the CU. Second, establishing free trade by accepting the small country into a trading bloc of the two large countries results in lower consumption in the large countries. This result suggests that small countries have to compensate

the large countries in some way to get them to agree to move from a PTA to free trade. There are suggestions in the literature (see Kowalczyk and Sjostrom (1994), and Whalley (1998)) that this is exactly what has happened with NAFTA and the EU in the recent past.

Third, the small nonmember economy gains and the large member economies lose when there is a move from a PTA to free trade in Case 1. In Case 2, both small and large members of a PTA gain in the move to free trade. Fourth, moving from Case 2 to free trade, the small country gets some significant welfare gains if the Case 2 PTA is a CU, but its consumption goes down (for most endowments) if the Case 2 PTA is a FTA. Fifth, as the relative size of the large countries increases, the gain (loss) associated with a CU (FTA) agreement gets larger for the small country. For example, signing a FTA agreement with one of the large countries, decreases the consumption of the small country by 20 percent when the export good endowment of the large country is equal to 40. Sixth, the type of the PTA significantly affects the magnitude of welfare gains of the small country in our model. If the agreement is a FTA (CU) in Case 1, establishing free trade with the large countries in Case 2 increases the welfare of the small country by roughly 10 (190) percent when the export good endowment is equal to 50.

Seventh, it is beneficial for the small country to become a member of the FTA in Case 2 instead of being an innocent bystander in a CU equilibrium in Case 1. If a small nonmember country in a FTA equilibrium in Case 1 becomes a member of a CU agreement in Case 2, this induces welfare losses in the small country.

The organization of the paper is as follows: In section 2, we present the model, describe its calibration, and explain the numerical solution method used to solve the model. We provide information about our measure of welfare change in section 3. Next, we present the results of our simulations and answer the questions posed above. We conclude with a brief summary of our findings in section 5.

2. The Model

We construct a general equilibrium model that is sufficiently comprehensive to incorporate an arbitrary number of countries.[7] Countries set tariffs optimally and consider all possible trade agreements when they decide what to do. They could be part of a FTA, a CU, or an n country coalition—free trade. In the FTA, member countries agree to free trade between themselves, but are allowed to set their external

[7] This model was developed in Riezman (1985) and Kennan and Riezman (1990). A number of researchers have recently used this setup to analyze different issues: see Kose and Riezman (1999), Syropoulos (1999), Haveman (1996) among others. The problem we address here is substantially different than those examined in the earlier papers as we examine the impact of PTAs on small countries' welfare. Our model can be considered as a model of a natural trading region in which countries are in close proximity to each other and natural trading costs are equal to zero.

tariffs independently. A customs union is a FTA with the additional provision that the external tariff is set jointly by the members. A customs union (or FTA) of all countries is, of course, Free Trade.[8]

2.1 The Environment

Consider n countries. The agents derive utility by consuming m different goods in each country. Each country is endowed with a fixed amount of each commodity. Let y_j^i be country i's endowment of good j. Each country consists of individuals with identical Cobb-Douglas preferences implying that the utility function of a representative agent is the same as the aggregate and given by

$$U^i = \sum_{j=1}^{m} b_j^i \ln x_j^i \tag{1}$$

where U^i is the utility of country i, and b_j^i is the weight country i puts on commodity j $(\sum_{j=1}^{m} b_j^i = 1,\ i = 1,\ldots,n)$. x_j^i denotes the aggregate consumption of good j in country i. This preference formulation results in a linear expenditure system allowing us to employ numerical methods to solve the model. Further, with this structure we do not have to specify elasticities and can state our results in terms of fundamental endowment parameters.

The net imports of each good, z_j^i, is defined to be $z_j^i = x_j^i - y_j^i$. Denote the ad-valorem tariff charged by country i on imports of good j by t_j^i. If the equilibrium price for good j is p_j, then the domestic price of good j in country i is $q_j^i = (1+t_j^i)\, p_j$.

Given that each country consists of identical individuals, aggregate demand is obtained from maximizing the utility subject to the budget constraint

$$\sum_{j=1}^{m} p_j(1+t_j^i)x_j^i = I^i = \sum_{j=1}^{m} p_j(1+t_j^i)y_j^i + p_j t_j^i z_j^i \quad i = 1,2,\ldots,n,\ j = 1,2,\ldots,m. \tag{2}$$

where I^i is income of country i and consists of income from the endowment plus tariff revenue which is rebated to consumers lump-sum.

[8] We do not consider the equilibria which are consistent with Article XXIV and Kemp-Wan adjustment. See Syropoulos (1999) for an extensive discussion of those equilibria. While the assumption that the ex-post tariff rates should be consistent with Article XXIV is a seemingly plausible one, the World Trade Organization (1995) reports that only six out of sixty-nine trade agreements are found to be in "full" conformity with Article.

2.2. The Equilibrium

The aggregate expenditure in each country must equal the value of its endowment at the equilibrium. Since we do not allow trade deficits or surpluses, the balance of payments constraint of each country i is given by

(3) $$W^i = \sum_{j=1}^{m} p_j x_j^i = \sum_{j=1}^{m} p_j y_j^i \qquad i = 1,2,\ldots,n.$$

W^i is the aggregate expenditure of country i. In addition to this constraint, the total demand for each good, should be equal to total supply, Y^i:

(4) $$\sum_{i=1}^{n} x_j^i = \sum_{i=1}^{n} y_j^i = Y^i \qquad j = 1,2,\ldots,m.$$

2.3. The Numerical Solution Method

The logarithmic utility results in a linear expenditure system, in which agent allocates a fixed fraction of their income on each good. The first order conditions of the maximization problem lead to the following demand functions,

(5) $$x_j^i = \frac{b_j^i I^i}{(1+t_j^i)p_j}, \qquad i = 1,2,\ldots,n, \qquad j = 1,2,\ldots,m.$$

Denote expenditure of country i on good j with W_j^i. It is easy to show that expenditure is allocated across goods in proportion to b_j^i and t_j^i. Hence, $W_j^i = a_j^i W^i$ where a_j^i is a function of b_j^i and t_j^i. The equilibrium price of each good is equal to total aggregate expenditure on that good

(6) $$\sum_{i=1}^{n} W_i^j = p_j, \qquad j = 1,2,\ldots,m.$$

Using equations (1), (5), and (6), we derive an analytical expression for utility of each country as a function of tariffs, for any given preference and endowment distribution. We employ a recursive numerical solution method to find an approximate solution for equilibrium allocations, prices, and tariffs since we cannot obtain a closed form solution for each equilibrium. The intuition of our solution method is straightforward: for a given endowment matrix, we can compute the equilibrium with optimal tariffs. Thus, when a country considers changing its tariff, it has to make this calculation for any proposed tariff change. Once a country changes its tariff we have to re-compute optimal tariffs for the other countries. This continues until no country wants to alter its tariff rates.

Operationally, FTAs and CUs put constraints on the feasible tariff matrix. For a FTA, tariffs between the member countries are set to zero, and external tariffs are set independently. This means to compute the equilibrium, the appropriate tariffs are constrained to be zero. One can think of a CU as a FTA with the added feature that the external tariff is set jointly.[9]

2.4. Calibration

In order to utilize the solution algorithm, we should specify the number of countries, the number of goods and endowment of each country. We assume that m=n=3 and b_j^i=1/3 for all i,j=1,2,3. We calibrate our model to represent one relatively small country and two symmetric big countries. The endowment matrix can be written as:

$$E = \begin{bmatrix} 0.2 & 0.2 & 0.2 \\ 0.4 & e & 0.4 \\ 0.4 & 0.4 & e \end{bmatrix}$$

In other words, the first country is the small one with y_j^1=0.2 for j=1,2,3. The second and third countries are the large countries with y_j^i=0.4 for $i \neq j$ and $y_j^i = e$ for $i = j$. e denotes export good endowment of a big country. We let e vary from 0.6 to 100. In other words, we systematically change the export good endowment of the big countries while keeping the endowment of the small one unchanged. This changes the size distribution of endowments across countries.

Our treatment of a small country is quite different than the existing literature: first, the small country is able to determine its tariff levels in our model. Second, it has a more even endowment distribution than the large ones implying that its reliance on international trade is less than the large other countries. We calibrate our model this way to give the small country a better chance of benefiting from a potential trade war. Presumably, if the small country's endowment were uneven, it would suffer more from such a trade war.

We consider two cases: in the first case, the two big countries get together and sign a PTA. This case, describing "the innocent bystander problem," has been widely discussed in academics as well as in policy circles recently. For each e, we compute equilibrium allocations in CU, FTA, and FT. In CU and

[9] There are two important issues about the tariff determination problem. First, if the two FTA members exercise different tariff rates, then this results in trade deflection and different tariff rates cannot be sustained. Richardson (1993) discusses the first issue, and shows that even if rules of origin are strictly enforced it still may not be possible

FTA equilibria, the two big countries are the members of the PTA, and the small country is the nonmember. Since we limit our analysis with PTAs between the large countries in this case, we do not have to model the choice of coalition partners.[10] Since big countries have symmetric endowments, the determination of tariff rates in the CU equilibrium does not lead to conflict of interest between the union members, i.e. the members agree on what the optimal tariff should be.

The second case involves with a PTA agreement between the small country and one of the large countries. This case constitutes a major departure from the early literature since it considers a small country actively participating in a PTA. We again compute equilibrium allocations in CU, FTA, and FT for each e. In CU and FTA equilibria, one of the big countries and the small country are the members of the PTA, and the other large country is nonmember. When there is a CU, we assume that the big country determines the optimal tariff rate of the union considering the size difference between the big and small members. This is a plausible simplification, which also eliminates the difficult problem of joint tariff determination in a CU equilibrium.

We study the relationship between the endowment of countries and their size distribution in Table 1. This table presents the changes in e, that is the export good endowment of a big country, and its impact on the relative size of countries in the model. Since the prices are endogenously determined in our model, we should decide which price vector is going to be used to compute the size of the countries at an equilibrium. We use the price vector associated with free trade equilibrium to examine the relationship between the export good endowment of countries, and their relative size. As table 1 indicates, when a big country is endowed with 0.8 units of export good, the value of its total endowment is 2.59 times larger than that of the small country. It is important to stress that the relationship between the export good endowment and the relative size is not linear. When a big country has export good endowment of 1 (100) units, it is 2.83 (6.85) times larger than the small country. An increase in the export good endowment of big countries does not linearly reflect itself in their relative size, since this increase results in a decrease in the equilibrium price of the export good of the big country. The fourth column of the table presents the size ratio of the total wealth of the member countries to that of the small nonmember country in case 1. If the export good endowment of one of the large countries is equal to 1 (100), the total endowment of the member countries of the agreement is 4.63 (13.71) times larger than the small nonmember country. The fifth column of the table presents the size ratio for the case 2. In this case, when the export good endowment of one of the large countries is equal to 1 (100), the total endowment of the member countries is 3.31 (7.85) times larger than the nonmember country.

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to sustain different tariff rates. Second, in general, there is a conflict of interest between the member countries as to what the external tariff should be in a CU.

[10] Riezman (1985) studies partner choice problem during customs union formation.

3. Welfare Change Calculations

We use the measure of Compensating Variation in Consumption to evaluate the welfare changes associated with trade agreements.[11] In particular, the measure of the welfare change we use is the fraction δ by which the consumption allocations should be decreased in the free trade equilibrium to keep the representative agent with the same utility as the one in an equilibrium with tariffs. The welfare gain δ is calculated as

$$U^N(x_1, x_2, x_3) = U^F((1-\delta)x_1, (1-\delta)x_2, (1-\delta)x_3)$$

U^N: utility under an equilibrium with positive tariffs
U^F: utility under a free trade agreement

Unlike some other welfare measures, such as utility level of the representative consumer, our welfare change measure provides a transparent interpretation of welfare effects of trade agreements, since welfare changes are measured in consumption units. For example, it is possible to assess the percentage change in consumption with the establishment of a PTA.

4. How do the PTAs affect small countries?

We first present the results of our simulations concerning the effects of PTAs on tariffs, prices, and the trade volume of large and small countries in this section. These sections, while providing detailed information about the behavior of endogenous variables of the model in different types of trading arrangements, also supply an extensive account of the basic intuitive mechanisms driving our welfare results. Next, we examine the welfare implications of FTAs and CUs for these countries. In each subsection, we first consider Case 1 where the two large countries form a PTA leaving the small country out, and, then, we study Case 2 where the small country and one of the large countries sign a PTA.

4.1. Changes in Tariff Rates

We analyze the effects of changes in the endowment distribution of large countries on tariff rates in this section. We first examine Case 1 where the small country is not a member of any PTA. We

[11] This measure is slightly different than the Equivalent Income Variation measure which looks at the change in income at constant prices. The measure of Compensating Variation in Consumption is widely used in macroeconomics and finance literature to evaluate the costs of business cycles and of the lack of international consumption risk sharing. See Lucas (1987), Cole and Obstfeld (1991) for the use of this measure in different contexts. See Perroni and Whalley (1994) for the use of Equivalent Income Variation. Riezman (1999) and Kose and Riezman (1999) use this measure to analyze the welfare implications of PTAs.

present our results in figure 1. As shown in figures 1a and 1c, the external tariff of the PTA increases as the member countries become larger in their export good in both FTA and CU equilibria. The key to this result is that the rise in the size of the trading bloc results in increased market power, which in turn induces higher tariff rates. In a recent paper, Bond and Syropoulos (1996) derive a similar result: as a trading bloc expands by increasing the number of its members, its' external tariff rate also rises.

When the trading arrangement between big countries takes the form of a CU, the joint tariff rate of the union is higher than the nonmember country's tariff (see figure 1b). Interestingly, this regularity is reversed when the big countries form a FTA: the small nonmember country charges higher tariff rates then the big members (see Figure 1a). This surprising result occurs because the formation of the FTA has improved the nonmember's strategic position since it now has two strategies (tariff rates) to use compared to the members that have only one. This leads to the small nonmember country being more aggressive and charging higher tariffs in a FTA equilibrium. In contrast, nonmember's tariffs fall in a CU equilibrium because the tariff coordination of the member countries results in them being more aggressive. In other words, when the big countries form a CU, they internalize the tariff externality. This leads to the higher CU tariff and lower small country tariff. Members of a FTA cannot internalize this externality, since they do not jointly determine tariff rates.[12]

As the member countries of a PTA gets larger, the tariff rate charged by the members increases more rapidly in a CU equilibrium than it does in a FTA equilibrium (see figure 1c). For example, an increase in the endowment of the export good of a big country from 3 to 50 results in an almost six fold increase in the tariff rate of the CU. The same change in the endowment leads to a less than two fold increase in the tariff rates charged by the member countries of the FTA (see figure 1a).

Interestingly, our simulations suggest that the tariff charged by the small nonmember country increases, as the relative size of it becomes smaller. We present this result in figure 1d. Bond and Syropoulos (1996) find the opposite: as the relative size of a trading bloc gets smaller, it initially decreases its tariff rate, and then increases it. The difference between our finding and theirs is due to different endowment structures we employ. In our model, as the trading bloc gets larger, its dependency to trade also increases since the endowment structure of member countries becomes more uneven. The small country does not suffer from this problem since its endowment is evenly distributed among the three goods.

The magnitudes of tariff rates we report are consistent with those of earlier studies employing general equilibrium methods (see Perroni and Whalley (1994)). For example, when the big member

[12] In a recent paper, Kose and Riezman (1999) show that this result is also valid when countries have symmetric endowment distributions. In particular, they find that in an FTA (CU) equilibrium, the nonmember (member) country charges higher tariffs on imports from the member (nonmember) country.

country has an endowment of 10 units of its export good, it charges approximately 16 (135) percent tariffs on the exports of the small country in a FTA (CU) equilibrium. These very high tariff rates signal that being a small bystander can be extremely painful especially if the big countries establish a CU arrangement.

Next, we examine the tariff rates in Case 2 where the small country and one of the large countries form a PTA. Our results are presented in figure 2. Figure 2a demonstrates that the nonmember country charges a higher tariff rate on the exports of the big member of the FTA than on those from the small member. Similarly, the tariff rate charged by the big member of the FTA on the nonmember country is larger than the tariff charged by the small member (see Figure 2b.) Think of the large nonmember country as being involved in two tariff wars with members of the FTA. This result says that we see lower tariffs in the tariff war between a large and small country than between two large countries.

As Figure 2c shows, the nonmember country charges higher tariffs than the member countries in a CU equilibrium. This is somewhat different than Case 1in which the small country is the nonmember. There, the tariff rate charged by the large members of the CU is much higher than that of the small country. The difference between these two results is due to the difference in the size and endowment distribution of the nonmember countries. In the first case, the small nonmember country has an evenly distributed fixed endowment. In the second case, as the trading bloc gets larger, the large nonmember country also gets larger, and its endowment distribution gets more skewed towards its export. This puts the large nonmember country in a much more comfortable position since it is able to utilize its rising market power more effectively as the CU gets larger. To illustrate, consider the example in which the endowment of the export good of a large country is 10, i.e. the trading bloc is almost 7 times larger than the nonmember country. The tariff rate charged by the nonmember country to the big member of the union is 4 times larger than that of the rate charged by the union to the nonmember country (see figure 2c). This implies that when a small and a large country establish a CU, this does not result in significantly increased market power, and does not necessarily induce much higher tariff rates. This occurs because while the member country's endowment is large, it is also skewed towards its export good. Figure 2d suggests that the small country charges a higher tariff rate in a CU than in a FTA.

Figures 2e and 2f compare the two cases from the perspective of small countries: figure 2e indicates that the small country exercises a higher tariff rate when it is a member than that when it is not a member of a CU. However, in a FTA equilibrium, the small country charges a lower rate when it is a member than that when it is a nonmember. Two factors explain this result. First, the small country is at an extreme disadvantage when it is the nonmember playing against a CU of the two large countries. Second, the small country fares well as the nonmember of a FTA because it has an even endowment and the FTA

puts the large countries at a strategic disadvantage. As we discuss later in the paper, these two results have important implications driving some of our findings on welfare changes.

4.2. Changes in Prices

We study the changes in the terms of trade and domestic prices in response to the changes in the endowment distribution in this section. Our results about Case 1 are presented in figure 3. Figures 3a and 3b show the percentage changes in the terms of trade when countries move from a CU or FTA equilibrium to FT. The terms of trade of the member countries are better in a PTA equilibrium than that in FT. In other words, moving from a CU or FTA to FT worsens the terms of trade of the member countries as shown in Figure 3a. This figure also displays that moving from the FTA agreement to FT deteriorates the terms of trade of the big member countries less than that if they are in a CU equilibrium initially. This is because in a CU equilibrium member countries coordinate their tariff rates.

For the small country moving to free trade from any PTA results in a terms of trade improvement. The terms of trade improvement is larger if the initial equilibrium is a CU. Also, as the relative size of a PTA gets larger, the small country observes a higher improvement in its terms of trade. For example, consider the following scenario: the members of the CU and the small country get together and establish free trade. As a result of this, the terms of trade of the small country improves by more than 100 percent, when e is 10 (see Figure 3b). Kowalczyk (1999) also suggests that small countries can improve their terms of trade by signing trade agreements with larger countries.

Moving from a CU or FTA to FT results in lower domestic prices in all three countries. As figures 3c and 3d indicate, the decrease in domestic prices as a result of moving from CU to FT equilibrium is much higher than that of moving from FTA to FT equilibrium. When the big country has an endowment of 10 units of its export good, going from a CU (FTA) to FT leads to approximately 28 (7) percent fall in the prices of import goods coming from the small country in the big countries' domestic markets (see figure 3c). Similarly, consumers in the small country pay about 31 (19) percent less for goods imported from big countries when there is FT instead of CU (FTA) formed by the two large countries (see figure 3d).

Figure 4 presents the results about Case 2 where the small country and one of the large countries establish a PTA. Figure 4a indicates that moving from a PTA to FT improves the terms of trade of the small member country. Unlike the small member, the large member of a PTA observes a decline in its terms of trade as it moves to FT (see Figure 4b). This result is consistent with that for the large member countries in Case 1. However, Case 2 implies that if the member country is small, having FT instead of a PTA results in higher terms of trade for the small member of the PTA. These results expand the intuition that small countries lose tariff wars. Their terms of trade also deteriorate moving from FT to any PTA.

Figures 4c and 4d reveal an interesting regularity: the decrease in the terms of trade of the big member of a PTA is larger than that of the nonmember economy as countries move from a PTA equilibrium to FT. Coupled with the observations above, these results suggest that large countries prefer to be in a PTA to manipulate the terms of trade. Contrary to this, the message of Figures 4e and 4f is that small countries would rather have free trade since their terms of trade is highest when there is FT.

4.3. Changes in the Trade Volume

We present the results of our simulations associated with the changes in the trade volume of member and nonmember countries in Case 1 in figure 5. We measure a country's trade volume with the ratio of exports to GDP. As figures 5a and 5b show, a large member country of a PTA can have a larger or smaller trade volume than the nonmember small country depending on its export good endowment. As the disparity between the endowment distribution of the member and nonmember countries gets larger, the trade volume of the nonmember economy increases much faster than that of the member economy in a FTA equilibrium (see Figure 5a). This result has an intuitively appealing explanation: since our endowment specification makes the large members more dependent on imported goods coming from the small economy as they become larger, the price of the export good of the small economy increases in a FTA equilibrium. This is also generally true for the CU equilibrium. However, the big members of the CU coordinate their tariff rates and push down the relative price of the export good of the small nonmember country. Hence, the trade volume of the nonmember economy exceeds those of the members in a CU equilibrium, only if the endowment distributions of the member and nonmember economies are substantially different. For example, we observe that this is possible if e is larger than 90 in our simulations.

Figures 5c and 5d reveal a couple of interesting regularities: first, member countries of a PTA export a larger fraction of their GDP in a CU equilibrium than that in a FTA equilibrium. In contrast, the small nonmember country has a larger export share in the FTA equilibrium than that in the CU equilibrium. Second, member countries have the smallest export share when there is free trade. The nonmember country, in contrast, attains its largest export share when there is free trade.[13]

Figure 6 reports our results in Case 2. Figures 6a and 6b show that the small member of a PTA agreement has a larger ratio of trade to GDP than the large member, regardless PTA type. Figures 6c and 6d demonstrate that both small and large members export a larger fraction of their GDP in a FTA equilibrium than that in a CU equilibrium while attaining their largest trade volume in free trade. This result is different than what we find with Case 1 where the big members trade more with the other

[13] We also examine the trade between member countries of the trading bloc. A move from a FTA to a CU improves the terms of trade of the member countries and increases the intra-bloc trade.

countries when there is a CU, and they trade less when there is free trade. The difference between the two is that in Case 1 the members of the CU are able to utilize their market power more effectively charging higher prices for their export goods.

Figures 6e and 6f compare Case 1 and Case 2 from the perspective of the small country. In a FTA, when the small country is a member of the agreement, it trades less than that when it is not a member. In contrast, in a CU equilibrium the small member of the agreement trades more than that when it is not a member of the union.

4.4. Welfare Implications

We examine the welfare implications of PTAs for small countries in this section. We first study Case 1 where the small country is not a member of any PTA. Figure 7 presents our findings. As figures 7a and 7b show, attaining free trade leads to very large welfare gains for the small economy. For example, if the large member countries are endowed with 50 units of export good, consumers in the small country are able to increase their consumption by approximately 9 (65) percent compared to the FTA (CU) situation. This result shows one sense in which the cost to the small country of being an "innocent bystander" is very large. Given that the small country is left out of a PTA it has a strong incentive to see that free trade is adopted.

Figure 7d suggests that while the innocent bystander problem can be very severe for small economies that are not able to participate in a PTA, the severity of the problem gets worse as the relative size of the bystander gets smaller. When the two big countries, each of which has an export good endowment of 20 (100) units, establish a CU arrangement, the small country can face up to a loss of roughly 50 (75) percent of consumption. If the PTA is an FTA, then the small country again has to pay a cost, but a much smaller one.

These welfare results, suggesting that welfare losses associated with a CU agreement are much larger than those of a FTA for a small nonmember economy, are in line with the following regularities we document in the previous sections. First, we observe that while the tariff rate charged by the small nonmember economy is higher than the large members of a FTA, the large members implement much higher tariff rates than the small nonmember economy in a CU. Second, moving to a FT equilibrium from a CU results in a much larger improvement in the terms of trade of the small economy than that from a FTA equilibrium. Third, we find that a small nonmember economy trades more in a FTA equilibrium than in a CU equilibrium. These three regularities are consistent with our welfare calculations providing an intuitive interpretation why being an innocent bystander can be very costly.

One of the stylized features of recent PTAs between small and large countries is that small countries often make concessions on other policy matters in order to have PTAs with larger countries.

The results of our simulations provide a simple, yet very powerful explanation to this observation. Establishing free trade (or accepting the small country to the trading bloc) results in lower consumption in the member countries (see figure 7c). For example e is equal to 0.8, having free trade with the small nonmember economy induces roughly 3.5 (0.5) percent decrease in the consumption of the large members of a CU (FTA). Hence, the small nonmember country might have to offer something to become a member of the large trading bloc. The size of these payments depends on the type of the PTA between the big countries. If the agreement takes the form of a CU, the small country might have to make larger concessions to become a member.

How large are these concessions or transfer payments? To answer this question, we provide the following rough calculation. Assume that the payment from the small country to big countries should be at least as large as the lost tariff revenue of the big countries resulting from moving to free trade.[14] In our example when the size of the PTA is roughly 11 times larger than the small country, i.e. when the big countries are endowed with 8 units of export good, the lost tariff revenue of the CU is approximately equal to 7.3 percent of the small country's endowment. This means that the small country has to transfer at least 7.3 percent of its national product to the big countries to participate in the customs union. Surprisingly, the result of this simple calculation is consistent with that of Perroni and Whalley (1996) who also discuss the possibility that small countries might have to make side payments to participate in trading arrangements.[15] Their findings indicate that the PTA between Canada and the U.S. would not be signed if Canada did not make some transfer payments to the U.S. since the agreement resulted in large welfare gains for Canada, but the U.S. gave up its retaliatory power against Canada. Employing a cooperative solution concept they calculate the size of these size payments which support Pareto improvements for both economies. In particular, the outcome of their study suggests that depending on the coefficient of relative risk aversion and subjective probability of a potential trade war, the size of transfer payments, made by Canada to the U.S., ranges from 0.64 percent to 13 percent of Canada's GDP.

Figure 8 displays our results about Case 2 where the small country signs a PTA with one of the large countries and the other large country is a nonmember in the model. Figures 8a and 8b show an interesting difference between the welfare implications of Case 1 and Case 2. The small nonmember economy gains and the large member economies lose when there is free trade in Case 1. In Case 2, both small and large members of a PTA gain when there is free trade. Moreover, for the large nonmember economy, having free trade induces welfare losses for most of the endowment space we consider. To illustrate the magnitude of the welfare changes consider the case where e is equal to 50. If the agreement

[14] See Kowalczyk (1999) for a similar argument about the transfer payments.
[15] Kowalczyk and Sjostrom also find that small countries which get large welfare gains from PTAs highly likely to pay international side payments to big countries which get relatively much smaller gains from these agreements.

is a FTA, moving to free trade increases the consumption by almost 30 (40) percent in the small (large) member country, while reducing the consumption roughly 10 percent in the nonmember economy (see figure 8a.) Why does the large nonmember economy face welfare losses in Case 2? This can be explained with the two regularities we document in the previous sections: first, the large nonmember economy charges higher tariff rates than the member economies in both FTA and CU equilibria. Second, moving to FT deteriorates the terms of trade of the large nonmember economy in both FTA and CU equilibria. In other words, the nonmember does well in both the FTA and CU equilibria. The intuition for this is that the large member country is constrained by its' small country partner in either PTA equilibrium by being forced to have free trade with its' partner country.

Figures 8c and 8d suggest that for the small (large) member country, moving from a CU (FTA) equilibrium to free trade induces larger welfare gains than that of FTA (CU). In this sense, the big member country would prefer a CU to a FTA with the small country. The small country's preference is the opposite. This result is also in line with our finding in Case 1 that the small nonmember country gets larger gains by moving from a CU equilibrium to free trade than that from a FTA equilibrium to free trade.

Figure 8e indicates that when e is relatively small, i.e. the endowment distribution of the large country is more even, then the large nonmember economy gets some welfare gains by having free trade with other countries. In the case of CU, for all values of e less than 15, all countries would benefit from a move to free trade. For higher values the big nonmember country's welfare will fall. Thus, as the endowment distribution becomes more polarized, the welfare losses associated with the nonmember economy's participation in free trade gets larger. These results are also consistent with our findings regarding price changes.

We also consider some experiments involving the changes in the small country's welfare as it moves from an equilibrium in Case 1 to an equilibrium in Case 2. To be more specific, suppose the small economy is initially an innocent bystander (Case 1), then it signs a PTA with one of the large countries (Case 2). Figure 9 reports our findings. Figure 9a (9b) shows the welfare changes when the small country becomes a member of the FTA (CU). These two figures suggest that if the small country signs a PTA with one of the large countries, while it gets some significant welfare gains with a CU agreement, its welfare goes down in a FTA for most of the endowment space. As the relative size of the large countries increases, the gain (loss) associated with a CU (FTA) agreement gets larger for the small country. For example, signing a FTA agreement with one of the large countries, decreases the consumption of the small country by 20 percent when the export good endowment of the large country is equal to 40. Comparing tariff rates charged by the nonmember economies provides the intuitive argument driving this

result: the small nonmember economy imposes a higher tariff rate than the members of the FTA in Case 1. In Case 2, the small member economy charges a lower tariff rate than the large nonmember economy.

These two figures also indicate that having free trade with the two large countries is always beneficial for the small country. The type of the PTA significantly affects the size of welfare gains of the small country in our model. If the agreement is a FTA (CU), establishing free trade with the large countries increases the welfare of the small country by roughly 10 (190) percent when the export good endowment is equal to 50.

Figures 9c and 9d provide the results of our simulations in which we consider the welfare changes when a small nonmember economy in a FTA (CU) equilibrium signs a CU (FTA) agreement with one of the large countries. It is beneficial for the small country to become a member of the FTA instead of being an innocent bystander in a CU equilibrium (see Figure 9c). Figures 9a and 9c together show that for the small country membership in a FTA is attractive when compared with being an innocent bystander in a CU equilibrium, but is quite unattractive if it is initially an innocent bystander in a FTA equilibrium.

Figure 9d shows that if a small nonmember country in a FTA equilibrium becomes a member of a CU agreement, this induces welfare losses in the small country. The basic intuition for this result comes from our previous results on tariff rates in Case 1 and Case 2. As a nonmember in a FTA equilibrium the tariff rate charged by the small country is higher than that charged by the large member countries. In a CU equilibrium in Case 2, the small member economy levies a tariff that is lower than that implemented by the large nonmember country. This shows that for the small country being an "innocent bystander" is bad if the big countries form a CU, but is a good thing if they form and FTA.

5. Conclusion

We have used a pure exchange, general equilibrium model to investigate how small countries are affected by PTAs. While we find that being an "innocent bystander" can potentially be very costly for the small country, there are a number of caveats to this conclusion. The most important caveat is that the type of PTA formed by the larger countries is crucial. If the small country is left out of a CU the welfare losses can be extremely large, up to 70 percent of GDP in our model. However, if the large countries instead, opt for a FTA, the cost of being an innocent bystander are much more modest, less than 10 percent of GDP. In fact, the small country does better when it is an innocent bystander to a FTA of the two large countries than it does joining one of the large countries in a FTA. If the large countries form a CU, then the small country is much better off to form a CU with one of the large countries. In all cases, the small country does best at global free trade. If PTAs take the form of FTAs then the small country would chose to be an "innocent bystander." When PTAs take the form of CUs the small country would be willing to pay to join in a CU with one of the large countries rather than be an "innocent bystander."

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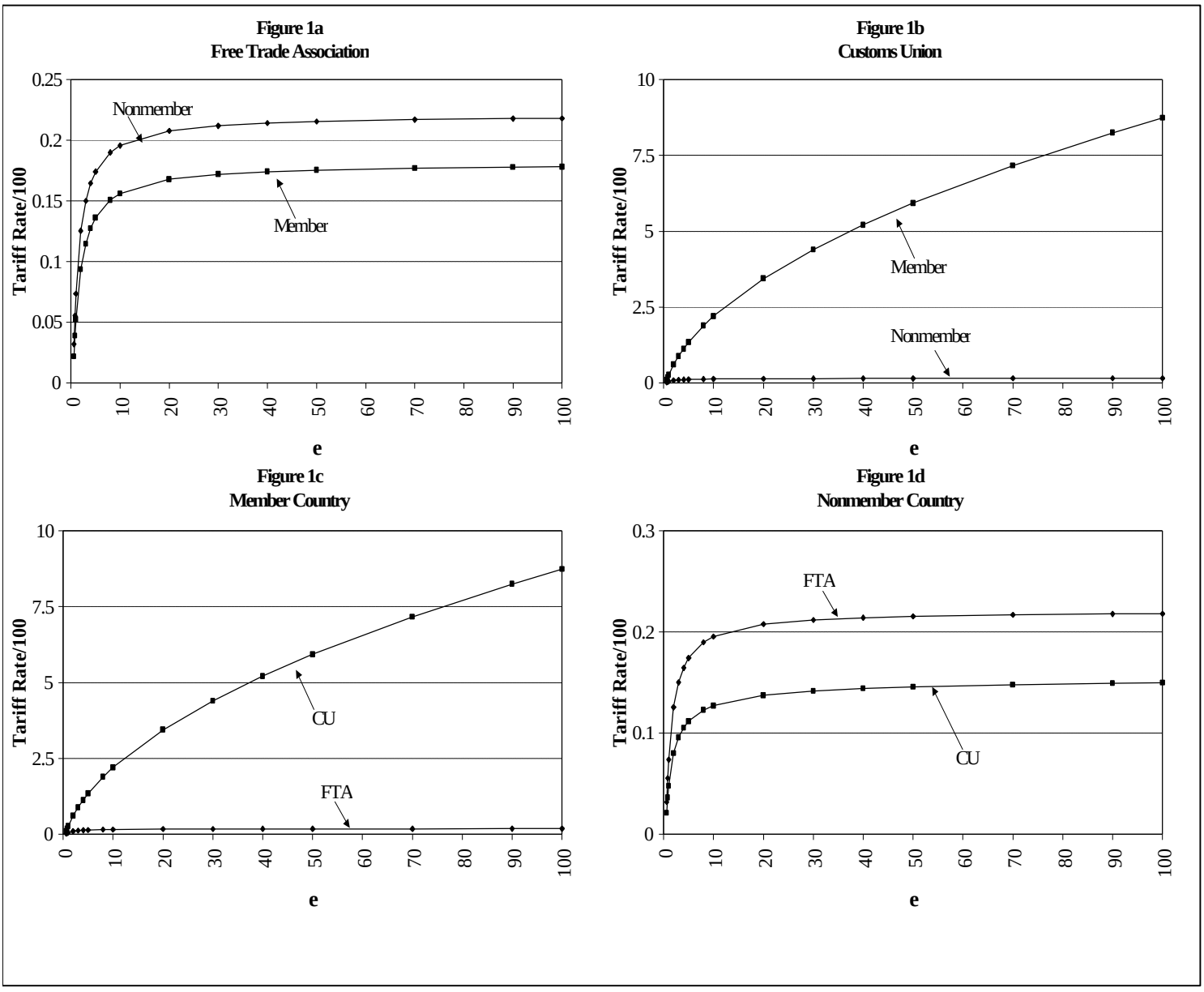
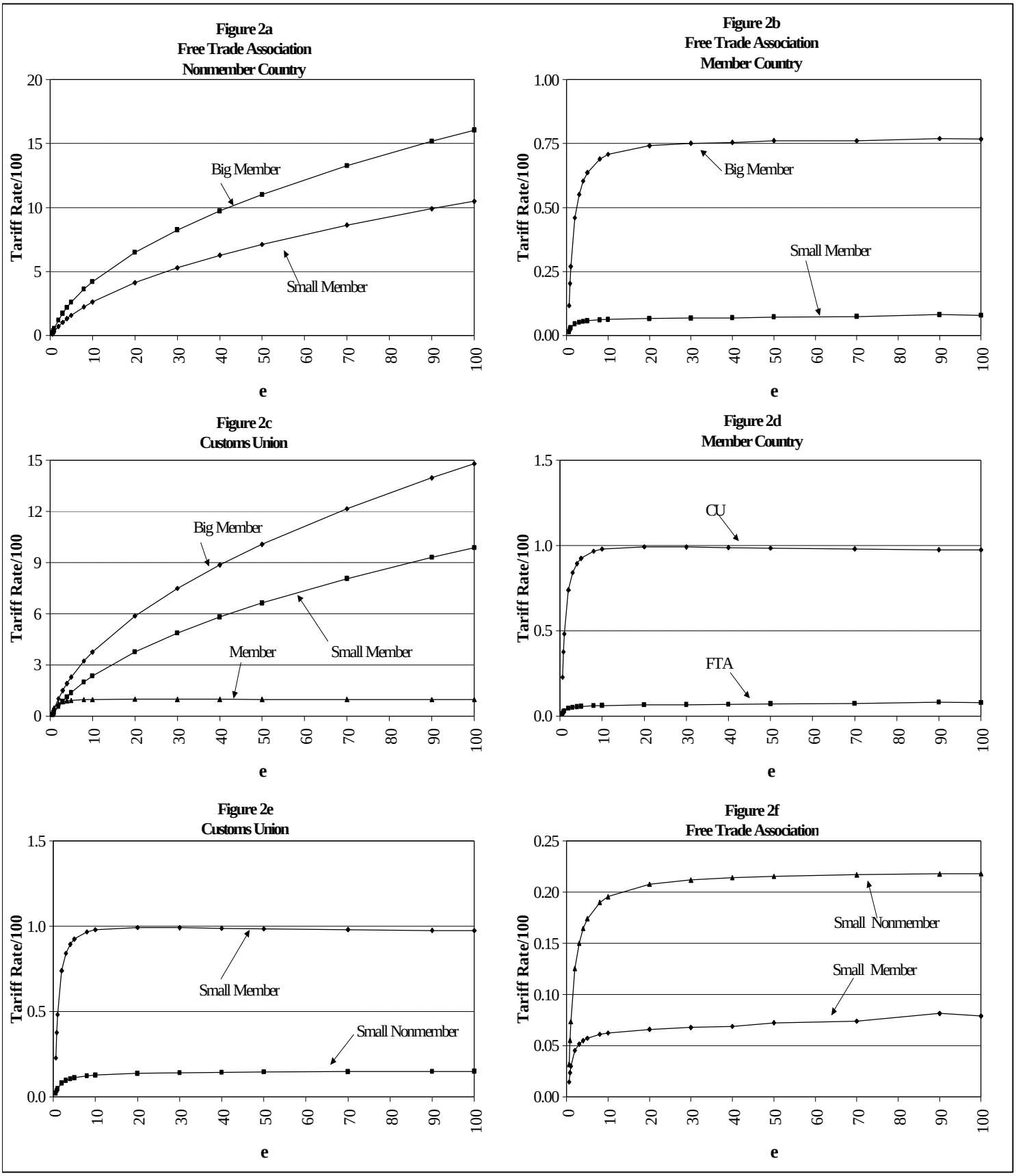
Figure 1. Tariff Rates (Case 1)



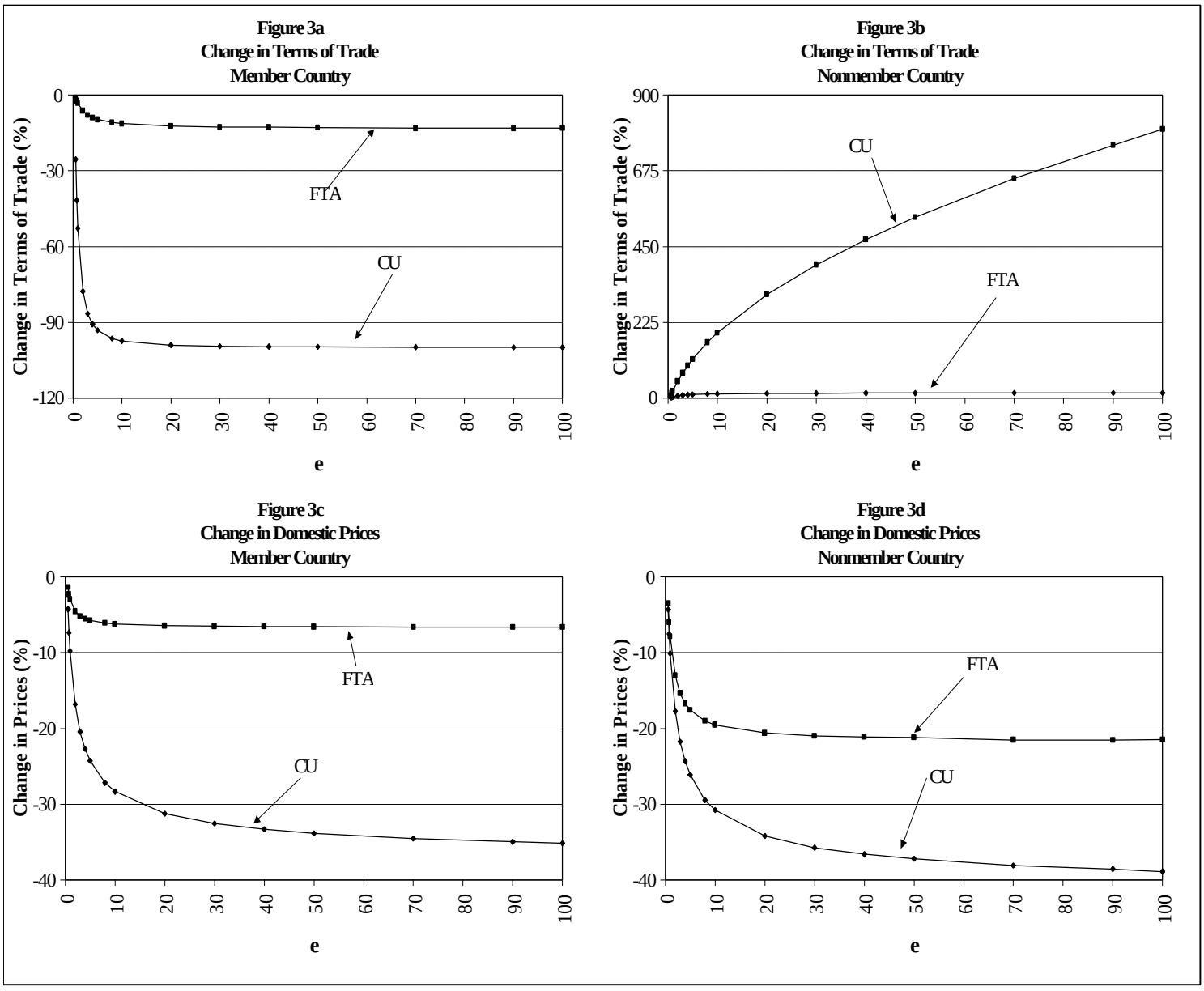
e is the export good endowment of the big country. On the vertical axis, tariff rates, divided by 100, are reported. CU refers to Customs Union and FTA refers to Free Trade Association. See text for details.

Figure 2. Tariff Rates (Case 2)



e is the export good endowment of the big country. On the vertical axis, tariff rates, divided by 100, are reported. CU refers to Customs Union and FTA refers to Free Trade Association. In Figure 2a, Big (Small) refers to the tariff charged by the Nonmember country to the Big (Small) member of the FTA. In Figure 2b, Big (Small) refers to the tariff charged by the Big (Small) Member of the FTA to the Nonmember country. In Figure 2c, Big (Small) refers to the tariff charged by the Nonmember country to the Big (Small) member of the CU. In figure 2c, Member refers to the tariff charged by the CU. In Figure 2d, CU and FTA refers to the tariffs charged by the small country in CU (FTA). In Figure 2e (2f), Small member (Small Nonmember) refers to the tariff rates charged by the small country when it is a member/nonmember of a CU (FTA). See text for details.

Figure 3. Change in Prices (Case 1)



e is the export good endowment of the big country. CU refers to Customs Union and FTA refers to Free Trade Association. On the vertical axis, change in prices or terms of trade are reported. For example, in figure 3a, changes in terms of trade of the member country induced by a change in equilibrium from a CU or FTA to Free Trade are reported. See text for details.

Figure 4. Change in Prices (Case 2)

Figure 4a
Change in Terms of Trade
Member Country (Small)

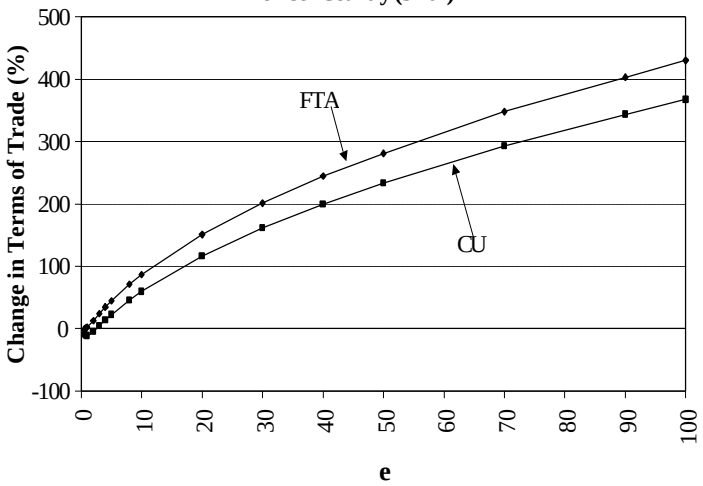


Figure 4b
Change in Terms of Trade
Member Country (Big)

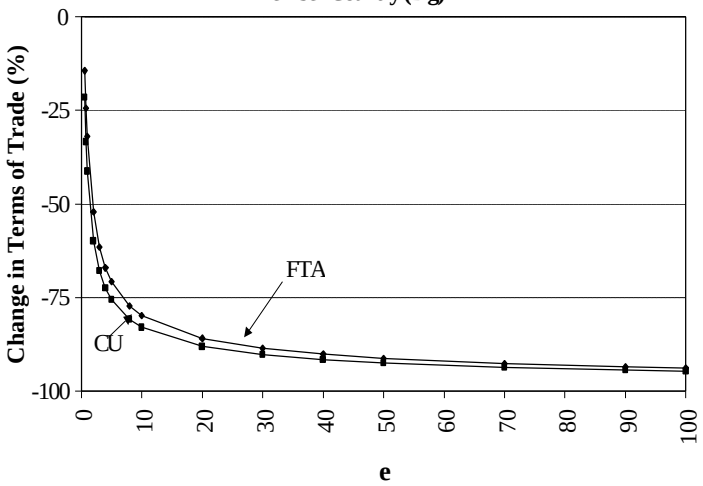


Figure 4c
Change in Terms of Trade
Free Trade Association

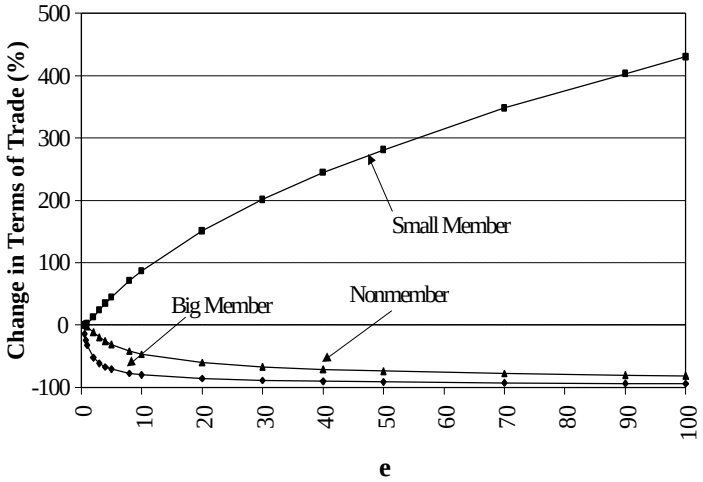


Figure 4d
Change in Terms of Trade
Customs Union

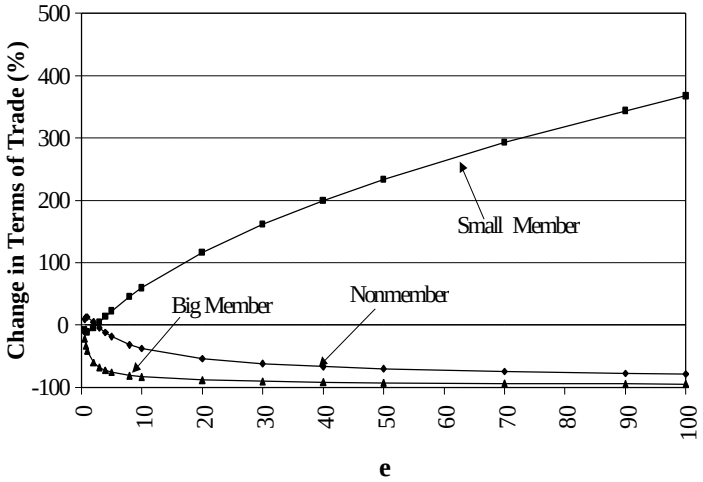


Figure 4e
Change in Terms of Trade
Free Trade Association

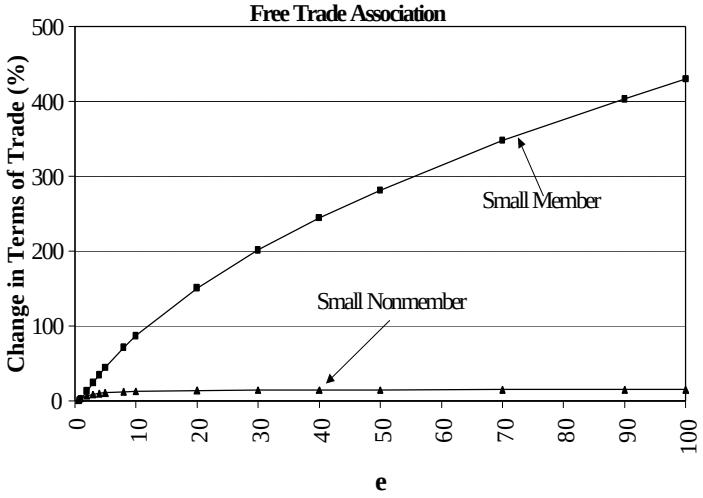
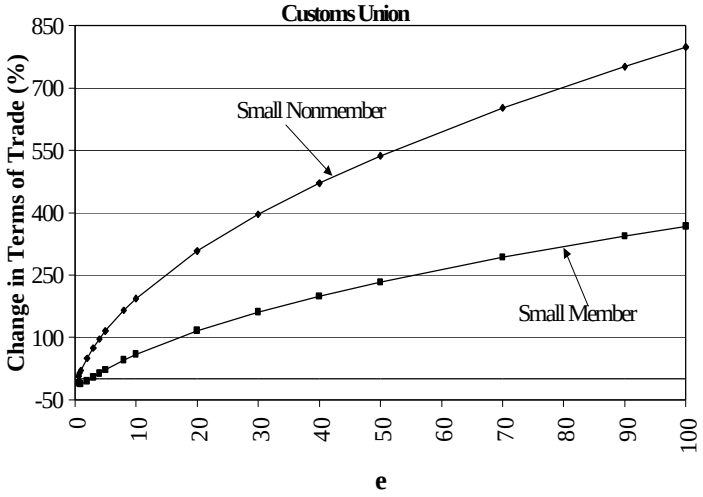
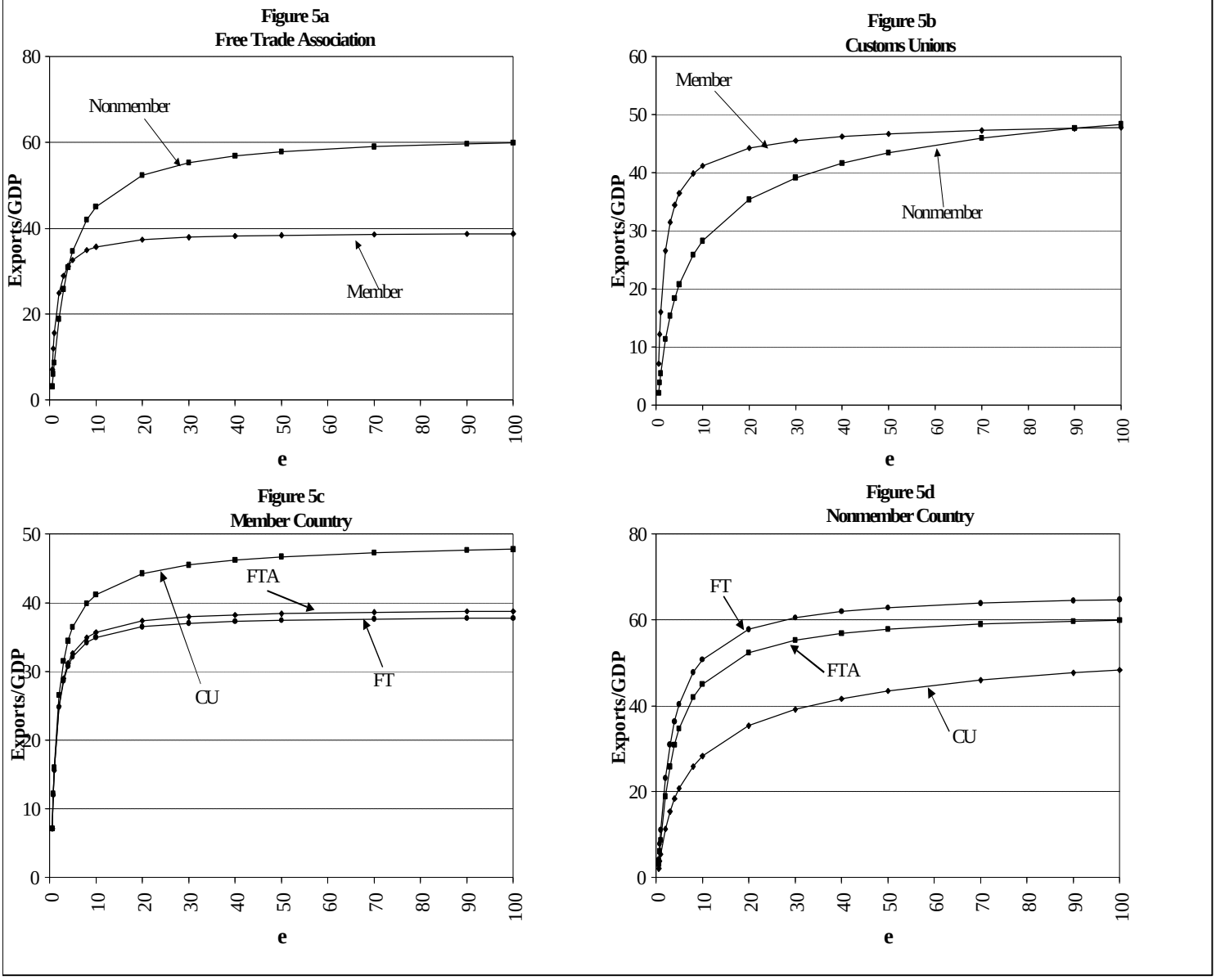


Figure 4f
Change in Terms of Trade
Customs Union



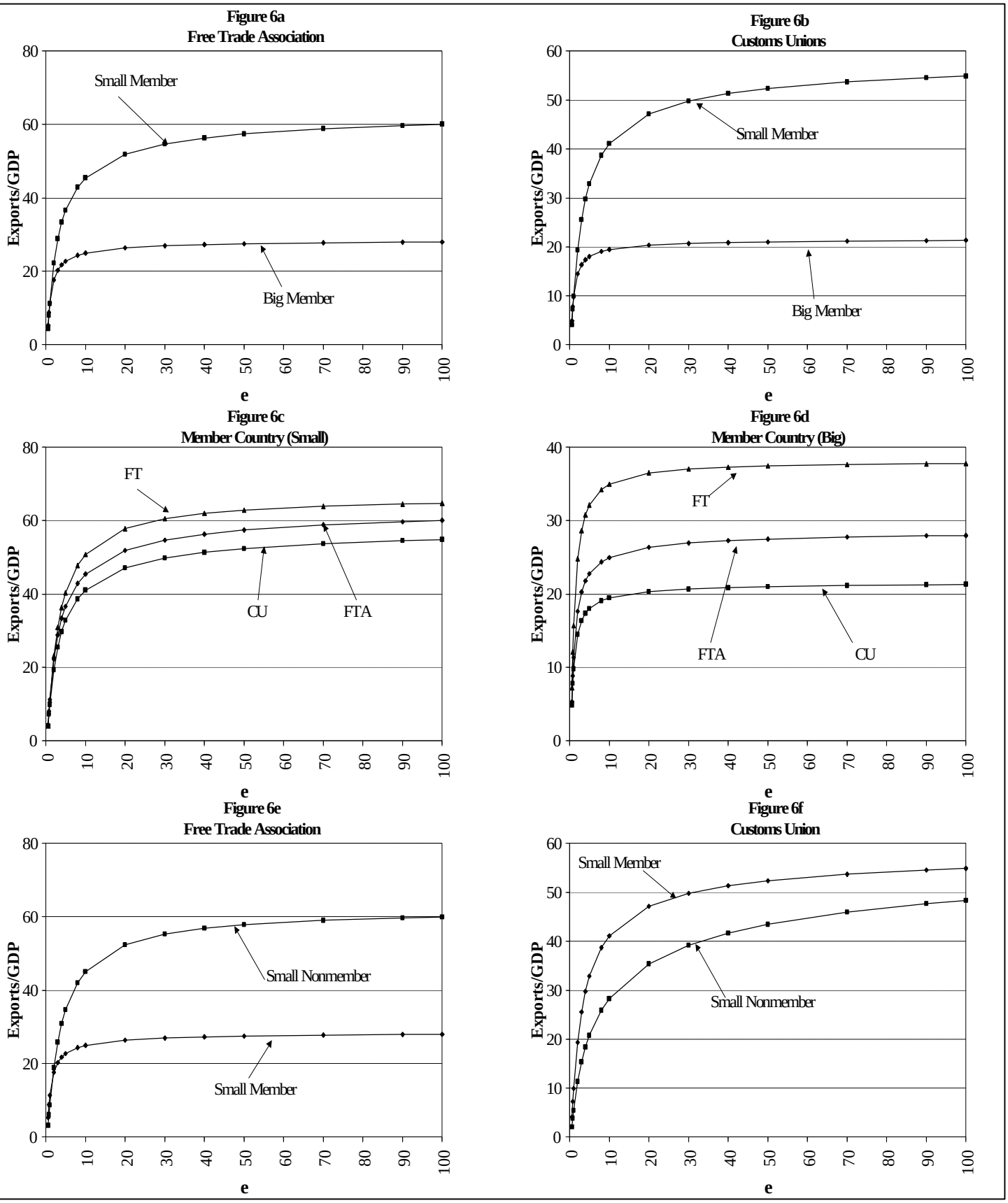
On the vertical axis, change in terms of trade is reported. For example, in figure 4a, changes in terms of trade of the member country induced by a change in equilibrium from a CU or FTA to Free Trade are reported. In Figure 4e (4f), Small member (Small Nonmember) refers to the changes in terms of trade of the small country induced by a change in equilibrium from a CU or FTA, in which the small country is a member/nonmember, to Free Trade, reported. See text for details.

Figure 5. Trade Volume (Case 1)



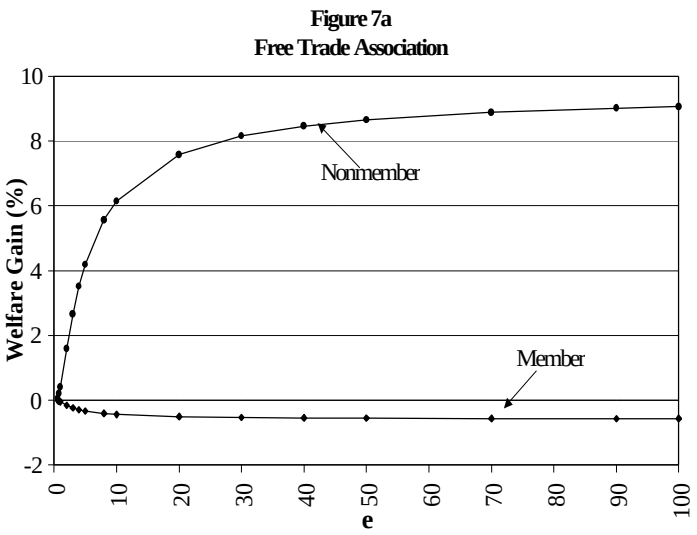
e is the export good endowment of the big country. Export-GDP ratio in percentage terms is reported on the vertical axis. CU (FTA) refers to Customs Union (Free Trade Association), and FT refers to Free Trade. See text for details.

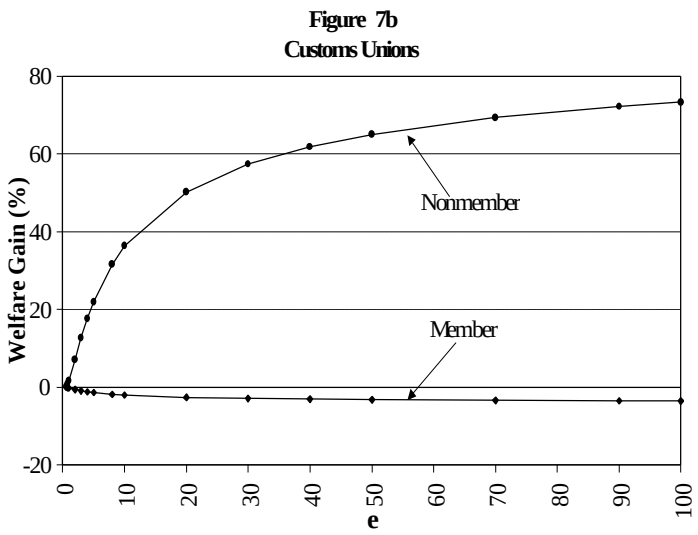
Figure 6. Trade Volume (Case 2)

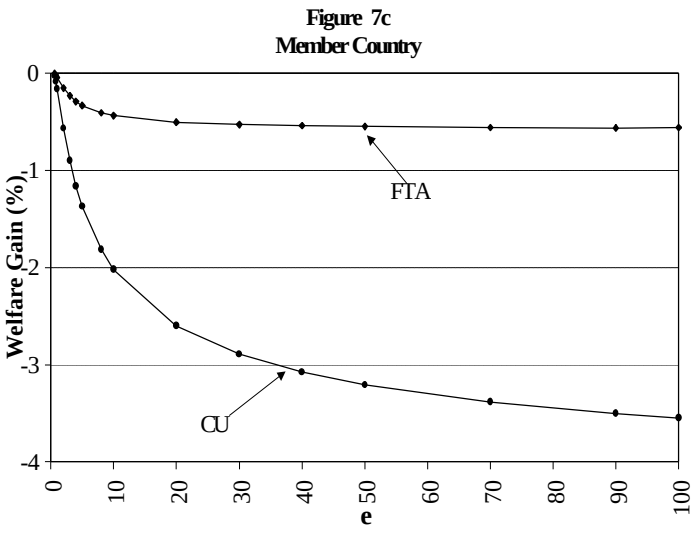


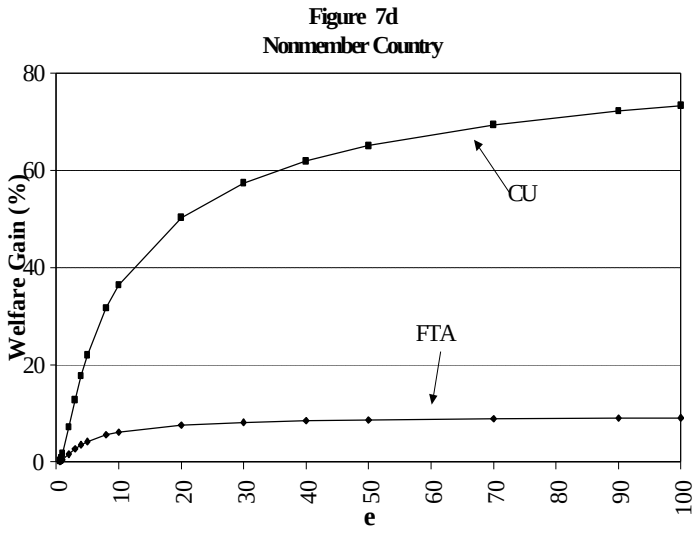
e is the export good endowment of the big country. Export-GDP ratio in percentage terms is reported on the vertical axis. CU (FTA) refers to Customs Union (Free Trade Association), and FT refers to Free Trade. In Figure 6e (6f), Small Member (Small Nonmember) refers to the Export/GDP of the small country when it is a member/nonmember of an FTA (CU). See text for details.

Figure 7. Welfare Gain (Case 1)









e is the export good endowment of the large country. CU (FTA) refers to Customs Union (Free Trade Association). On the vertical axis, welfare cost (in percent) associated with preferential trade agreements are reported. For example, in Figure 7a, welfare cost for a member/nonmember country induced by a change in equilibrium from a CU or FTA to Free Trade is reported. See text for details.

Figure 8. Welfare Gain (Case 2)

Figure 8a
Free Trade Association

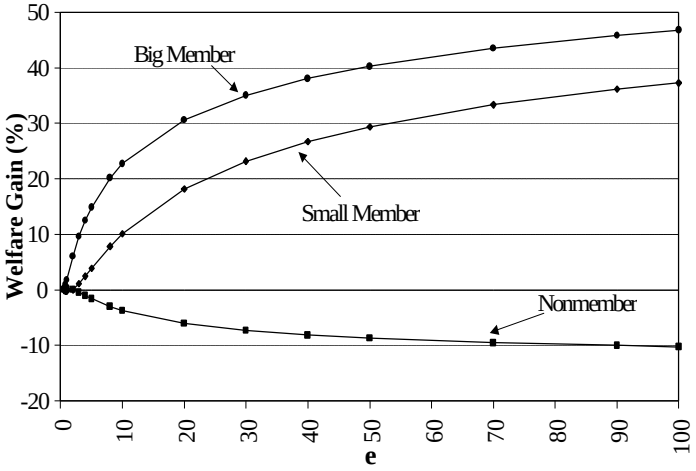


Figure 8b
Customs Unions

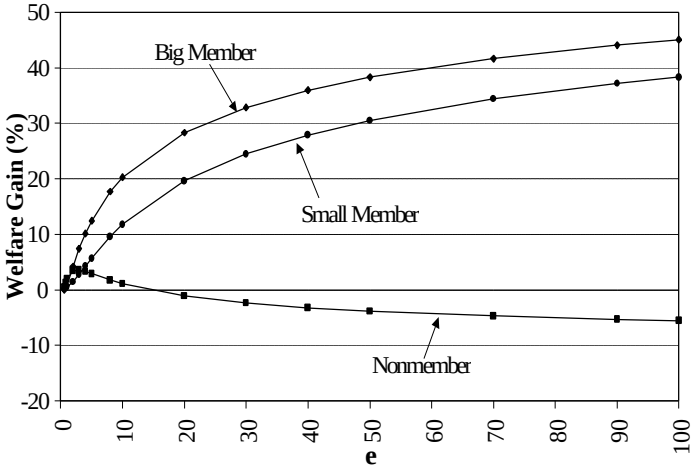


Figure 8c
Member Country
Small

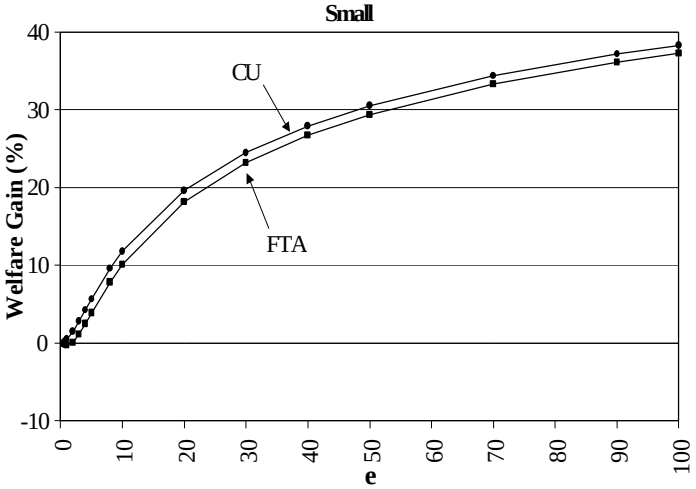


Figure 8d
Member Country
Big

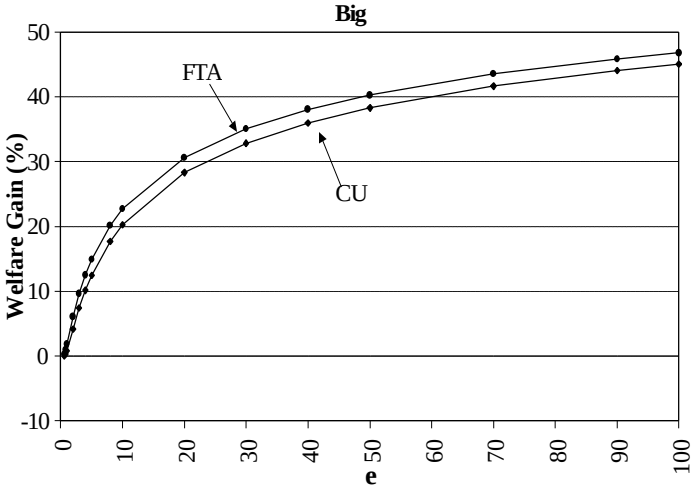
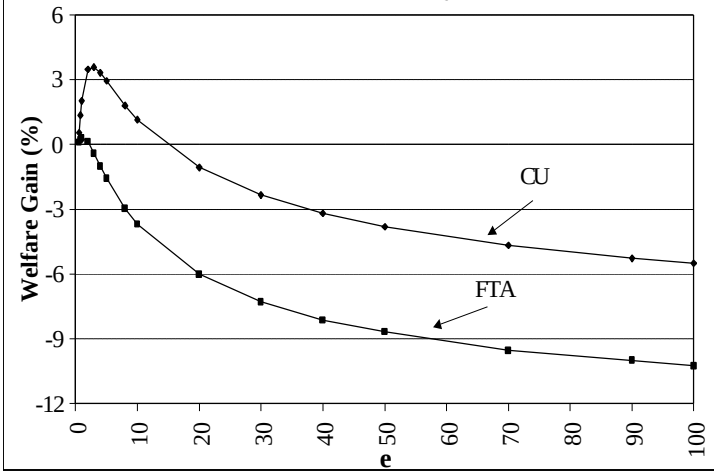
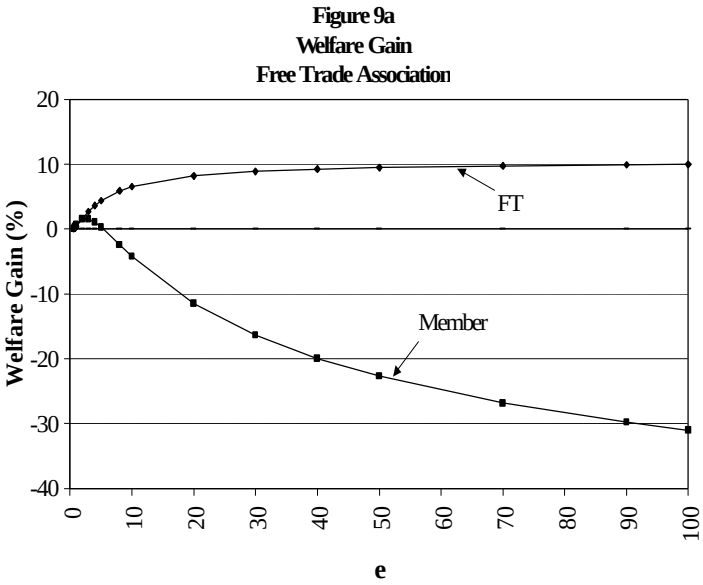


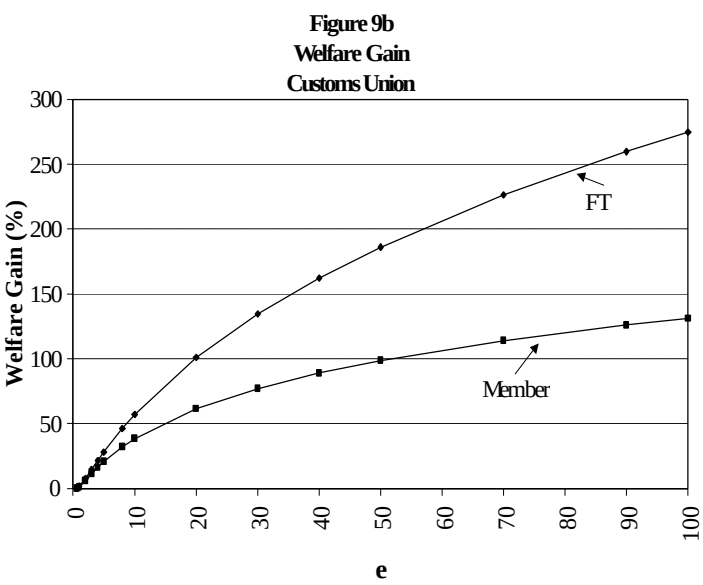
Figure 8e
Nonmember Country

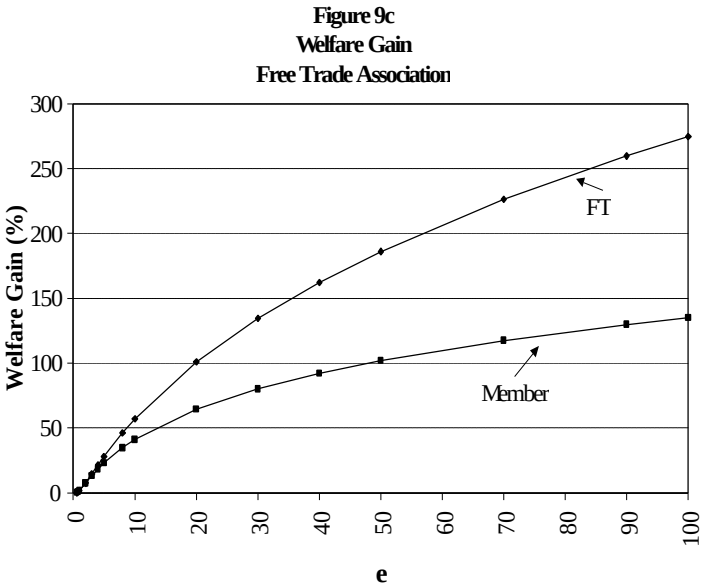


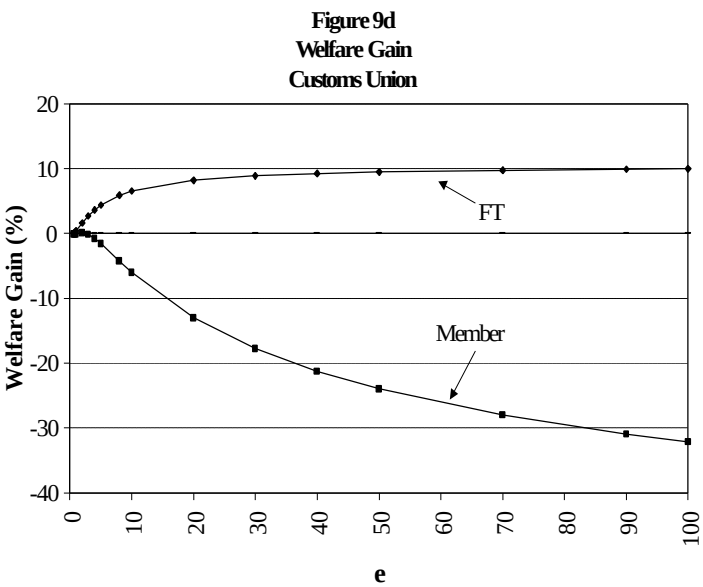
e is the export good endowment of the large country. CU (FTA) refers to Customs Union (Free Trade Association). Big Member (Small Member) refers to the big member (small member) of the preferential trade agreement. On the vertical axis, welfare gain (in percent) associated with preferential trade agreements are reported. For example, in Figure 8a, welfare gain for a member/nonmember country induced by a move from an FTA equilibrium to Free Trade is reported. See text for details.

Figure 9. Welfare Gain (Comparing Case 1 and Case 2 – Small Country)









e is the export good endowment of the large country. FT refers to Free Trade. On the vertical axis, welfare gain (in percent) associated with preferential trade agreements are reported. For example, in Figure 9a (9b), Member refers to the welfare gain the small country gets when it becomes a member of an FTA (CU). In Figure 9c (9d), member refers to the welfare gain the small country gets when the equilibrium changes from a CU (FTA), in which the small country is not a member of the CU (FTA), to an FTA (CU), in which the small country is a member of the FTA (CU). See text for details.