8

Natural and Supernatural Trading Blocs

In the preceding chapter, we presented a model designed to analyze the desirability of different trade arrangements from a world perspective. We now turn to the applications. We start with the question of free trade areas (FTAs) and then consider preferential trade areas (PTAs) with partial preferences.

The Welfare Implications of Free Trade Areas

The first application is a simulation showing that, in the absence of transportation costs, our model replicates Krugman's U-shaped welfare curve as a function of the number of FTAs for plausible values of the parameters. This sets the stage for the rest of the applications, where we introduce transportation costs and study the welfare implications of forming trading blocs.

In the second application, we explore the desirability of forming natural and unnatural trading blocs as a function of transportation costs. In particular, in this experiment we look at free trade areas (FTAs), where the intrabloc tariffs are completely eliminated. We begin by considering the simpler case, a stylized world of three continents with two countries per continent (figure 8.1). We also consider the more realistic case of a world of four continents with 16 countries each.

In the remainder of the chapter, we consider the implications of what could be considered an intermediate degree of regionalization—a partial movement toward the creation of (natural) FTAs—and compare it with the outcome associated with complete regionalization.

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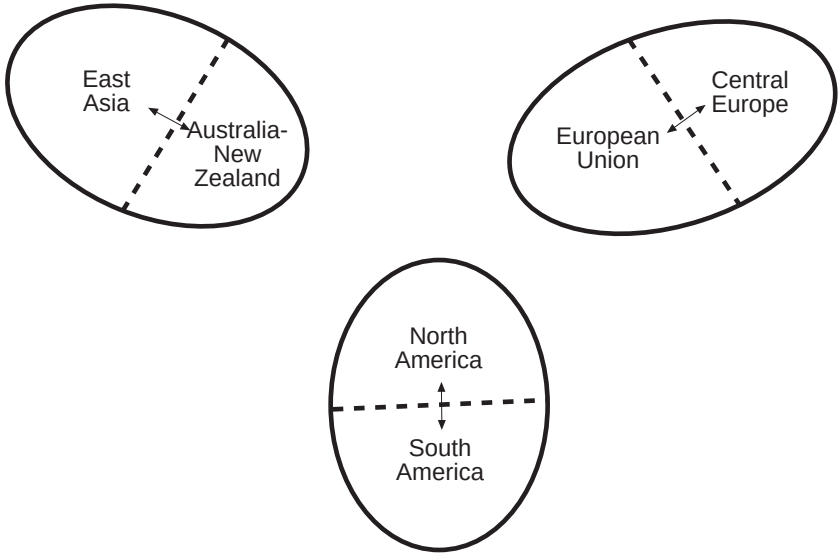
Figure 8.1 Stylized world of three continents with two countries each



Throughout most of this chapter, we consider only exercises involving symmetric formation of equal-sized blocs around the world. Deardorff and Stern (1994) and Srinivasan (1993) have taken exception to the symmetric logic of Krugman's bloc question. In the central analysis, we, like Krugman, do not address the asymmetric, partial equilibrium exercise of examining the effects of forming a single bloc in only one part of the world, particularly the effects on countries unfortunate enough to be left out of any bloc. The chief aim, as we see it, is to determine what the international regime should be with respect to blocs—specifically, what our results tell us about the desirability of current rules such as Article XXIV. It is true, of course, that variation in national incomes, if nothing else, renders the real world an inherently asymmetric place. Later, we shall consider what happens in the model if we allow certain asymmetries, such as disparities in country size and countries that are excluded from a large bloc.

The Number of FTAs and Welfare in the Absence of Transportation Costs

The purpose of this exercise is to see whether, in the absence of transportation costs, our model yields Krugman's U-shaped welfare curve as a

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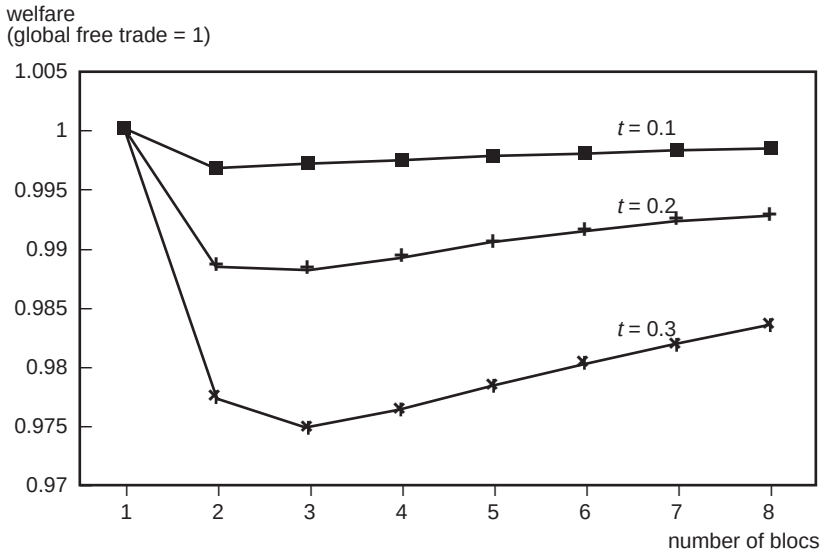
Figure 8.2 Effect of number of blocs on global welfare
(transport costs = 0; $\theta = 0.75$; $N = 60$)



function of the number of blocs. We assume a world of 60 countries and study the welfare implications of dividing the trading system equally into different numbers of blocs. Specifically, we could have 20 small FTAs consisting of 3 countries each, 15 consisting of 4 each, 6 consisting of 10 countries each, 3 consisting of 20 each, or 2 consisting of 30 each.

The effects will depend on what we assume about parameter values. Figure 8.2 shows the results of our simulations for a product substitutability value of $\theta = 0.75$.[1] The other parameter that must be specified is the tariff rate that members of each bloc apply to nonmembers. The graph shows three cases: tariffs of 10, 20, and 30 percent. For comparison, the unweighted average tariff rate among the sample of developing countries examined in Pritchett and Sethi (1994) is .25. The true level of protection may be higher than this since we want to include the effect of nontariff barriers in addition to tariffs and since the composition of trade shifts endogenously away from high-tariff goods. The true level of average worldwide protection may be lower than this, however, since industrial-

1. Krugman (1991a) considers three values for the elasticity of substitution in his simulations: 2, 4, and 10. Since the elasticity of substitution is equal to $1/(1 - \theta)$, the middle value of 4 is equivalent to our value of $\theta = 0.75$. We explore the robustness of our results with respect to this and other parameters in an appendix on sensitivity analysis.

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ized countries have lower barriers than developing countries[2] and since statutory tariff rates are in practice subject to many exceptions.[3]

The figure shows that welfare is maximized when the number of blocs is 1. All countries are included. There are no distortions because this is the case of worldwide free trade. The figure normalizes the measure of welfare at this level. The vertical axis can be read as the percentage loss relative to the free trade norm. Consider the opposite extreme, in which the world is broken into many small blocs. In the limit, consider the case of 60 blocs. Since there are 60 countries, this is the case of nondiscriminatory or most-favored nation (MFN) tariffs; every country is its own bloc. The interesting result is that the level of welfare is almost as high as under free trade. Trade is relatively undistorted: even though foreign goods from the viewpoint of each country are artificially more expensive than domestic goods, the relative prices of (all 59) varieties of foreign goods are undistorted. As the number of blocs falls, however, and as the size of each bloc rises, the level of welfare falls. We can see that welfare is at its lowest point when there are a small number of blocs—three blocs in the cases of 20 and 30 percent tariffs.

In Krugman's model (1991a), there are two reasons for the rise in welfare as the number of blocs increases. One reason is that blocs set tariffs optimally and become less protectionist as the market power of each declines. The other reason is that as the number of blocs increases, a larger portion of demand in each is satisfied from outside the bloc, and tariffs become less distortionary. Tariffs introduce a wedge between the prices of bloc varieties and those of nonbloc varieties, but not between two nonbloc varieties. The greater the number of nonbloc varieties relative to those from within the bloc, the smaller the distortionary effect of a given tariff level. In our model, where tariffs are assumed to be exogenous, the shape of the curve is explained completely by the latter reason.[4]

The intuition behind this result was laid out in chapter 7 and is illustrated in figure 8.1. A move from six to three blocs eliminates some distortions—

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2. The average tariff rates applied to products in the manufacturing and mining sectors before the Uruguay Round agreement of 1994 were 3.8 percent in Japan, 5.4 percent in the United States, 9.0 percent in Canada, and 5.7 percent in the European Community. The agreement was to reduce these rates to 1.5, 3.6, 4.9, and 3.6 percent, respectively. The model of Spilimbergo and Stein (1997) allows for different tariff rates in developing and industrialized countries.

3. Lewis, Robinson, and Wang (1995, table 4), for example, report average 1992 protection rates (including both tariffs and the estimated effects of nontariff barriers) as follows: 9.9 percent for the United States, 10.3 percent for the European Union, 45.1 percent for Japan, 12.2 percent for China, and 20.6 percent for the ASEAN-4 countries (Indonesia, Malaysia, the Philippines, and Thailand).

4. Krugman (1993) argues that the optimal-tariff argument is not crucial and shows that one gets the U-shape result even when tariffs are set exogenously. This is the exercise that is reproduced in figure 8.2.

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those within each of the two-bloc groupings—but it introduces more distortions than it eliminates. The distortions that it introduces, from the viewpoint of one country, are to create an artificial incentive to buy from fellow bloc members as opposed to nonmembers. In terms of the classic theory of customs unions, the beneficial effects of trade creation within each bloc are outweighed by the detrimental effects of trade diversion.

On what does the minimum-welfare number of blocs depend? Three is the magic number for a moderately wide range of parameter values, but not for all. We have found that it depends positively on the tariff rate t, other things being equal. (An example of this can be seen in figure 8.2: if t is only 10 percent, then the optimal number of blocs falls to 2.) Additionally, we have found that the minimum-welfare number of blocs increases as the value for θ rises, other things being equal. The relevant simulations are reported in appendix D, on sensitivity analysis.[5]

Transportation Costs and the Effects of Free Trade Areas on Welfare

In this application, we study how the effect of the formation of free trade agreements on welfare depends on intercontinental transportation costs. We begin by assuming the stylized world that consists of three continents, with two countries in each continent. Thus we are able to fill in a realistic intermediate case between Krugman's polar cases of zero and prohibitive intercontinental transportation costs. Transportation costs within continents are for now assumed to be zero, for simplicity, so that we can focus on the transport costs *between* continents.

Figure 8.3 shows the percentage change in welfare associated with the formation of free trade areas as a function of intercontinental costs, b. Recall that b reflects the costs of shipping across the ocean (and other costs to doing business at so great a distance) as a percentage of the value of the product. The figure illustrates the effects both of natural and unnatural blocs for the parameters $\theta = 0.75$ and $t = 0.3$. We can see that there is a critical level of intercontinental transportation costs (b) that governs the welfare effects. For the case of natural trading blocs, where each country forms an FTA with its neighbor, the critical value of b is approximately 0.186. For values of b above this critical value, the formation of continental trading blocs will improve welfare. Remember Krugman's case where $b = 1$: when intercontinental costs are large, it is likely that FTAs will raise welfare if drawn along natural continental lines.

For values of b lower than the critical value, continental blocs would reduce welfare. Remember the limit case in which $b = 0$: when intercontinental costs are small, the result in which three blocs minimize welfare is more likely (figure 8.2). As has already been noted, we call the welfare-

5. Based on the appendix in Stein (1994) and in Frankel, Stein, and Wei (1994). The difference is that they will be in c.i.f. terms here.

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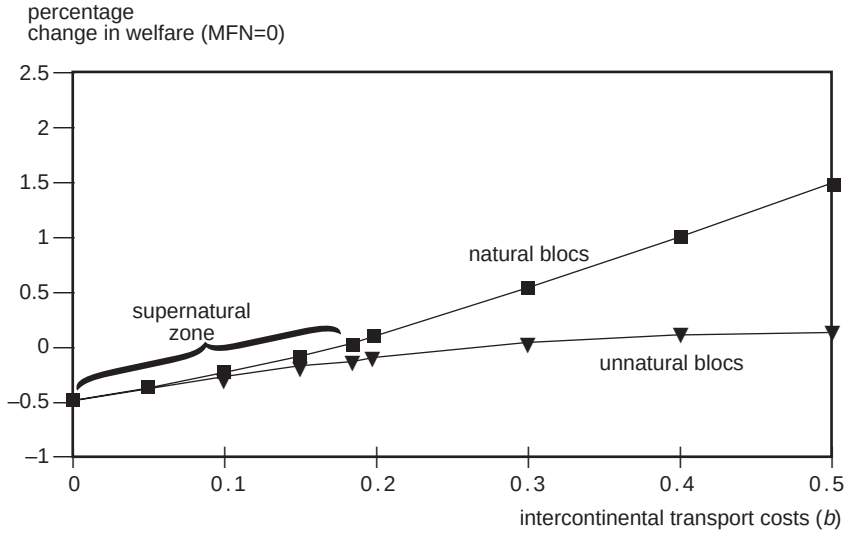
Figure 8.3 Effect of free trade areas on global welfare
($\theta = 0.75$; $t = 0.3$; $a = 0$; $N = 2$; $C = 3$)



Free trade areas, even if drawn along natural continental lines, can reduce welfare relative to MFN if transport costs are low enough.

reducing arrangements ''supernatural blocs'' to indicate that intercontinental transportation costs are not high enough to justify the formation of blocs, even along the lines of geographical proximity.

Unnatural trading blocs, where each country forms a bloc with one other country outside the continent, result in distinctly lower welfare for reasonably small values of b. (When $b = 0$, they reduce welfare in precisely the same way as natural blocs do.) Unnatural blocs then have a steadily smaller effect as b tends toward 1. The reason for this is intuitive: as b gets closer to 1, the bilateral volume of trade between countries in different continents will move toward zero, whether they belong to the same bloc or not. Therefore, the formation of unnatural trading blocs has only negligible effect on welfare when intercontinental transport costs are very high. The limit is the polar case of no intercontinental trade.

Our results confirm Krugman's intuition that the benefits from regional free trade areas depend positively on intercontinental transportation costs. They also confirm his idea that natural trade arrangements have a better chance of improving welfare than arrangements between unnatural partners.

Allowing for Preferential Trade Arrangements on Each Continent

In this section, we will have another look at trading blocs of the natural kind (among neighbors), but we will allow for the formation of PTAs—

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that is, partial liberalization. In this, the third application of the model, we allow for the formation of PTAs that differ from the FTAs in that the tariff level is reduced among partners, although not necessarily eliminated. Even though Article XXIV technically prohibits PTAs, many existing regional arrangements are in fact of this partial kind. We will show that a partial movement toward regional integration, as in the case of PTAs with preference levels below 100 percent, is usually superior to the complete integration associated with natural FTAs. At the same time, this application illustrates the need for a more complete characterization of trading blocs—one that goes beyond the natural/unnatural distinction.

A different way to define a partial trend toward regionalization is to recognize that each continent has many countries and to consider the formation of several blocs within each continent. An obvious example of this is the existence of more than one bloc in the Western Hemisphere (the North American Free Trade Agreement, or NAFTA, the Andean Community, and Mercosur). The welfare implications of forming more than one FTA or PTA in each continent are considered later.

We need to modify our model slightly. The tariff level between partners, instead of being zero, will now be $(1 - k)t$, where $0 \leq k \leq 1$ and k is the margin of preference—that is, the concession granted intrabloc trade. Thus k is the degree of intrabloc liberalization.[6] The price of partner varieties faced by domestic consumers now becomes

$$p_c = \frac{p[1 + (1 - k)t]}{1 - a} \tag{8.1}$$

Until now we have only been considering the special cases of $k = 0$ (MFN or an absence of blocs) and $k = 1$ (free trade areas). Now the blocs are allowed to set any level of intrabloc preference between the two extremes. For the moment, we will continue, as in the previous application, with a world that consists of three continents, each comprising two countries.

The Optimum Margin of Preferences on Each Two-Country Continent

What is the level of intrabloc preference that will maximize welfare? Figure 8.4 shows the welfare level as a function of k for $t = 0.3$, $\theta = 0.75$, $a = 0$, and several values of b.[7] This figure is closely related to figure 8.3.

6. We assume the same degree of tariff preferences on all goods. The problem of different preferences for different goods—a major motivation for Article XXIV's call for liberalization of "substantially all trade"—will be discussed in chapter 10.

7. As before, for each set of parameter values (transport cost and θ), the figure normalizes welfare to be 1 under free trade.

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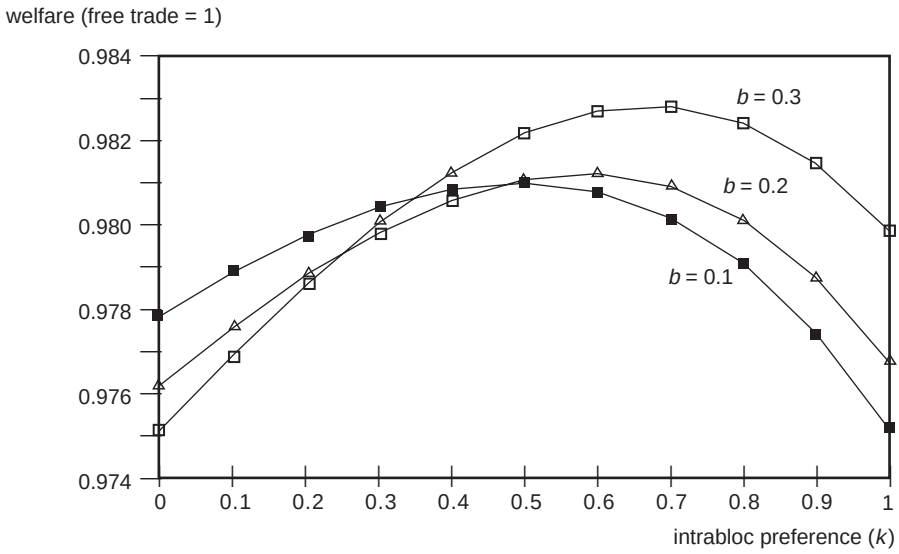
Figure 8.4 Effect of preferential trade arrangements on global welfare in case of three blocs of two countries each ($\theta = 0.75$; $t = 0.3$; $a = 0$)



Partial preferences within continental blocs are better than either full free trade areas or strict MFN rules.

There, we were comparing the welfare levels associated with the two extremes of $k = 0$ and $k = 1$ for every possible level of intercontinental transportation cost, b. Notice that for the case $b = 0.1$ in figure 8.4, the level of welfare, measured on the vertical axis at the right-hand end point is lower than at the left-hand end point. This says that the world is worse off under the extreme of full continental FTAs ($k = 1$) relative to the opposite end point of MFN or no preferences ($k = 0$). This result corresponds in figure 8.3 to a point in the range $b \leq 0.186$, which indicates that the formation of FTAs along natural regional lines is welfare-reducing (supernatural).

The important thing to notice in figure 8.4 is that for every level of intercontinental transportation costs, the level of intrabloc preference associated with maximum welfare lies in between 0 and 1. In other words, in general, PTAs with less than 100 percent preferences are superior to FTAs.[8] This result is not new in the literature. Mead (1955) first suggested it as a conjecture.[9] Here the result has been obtained in the imperfect competition

8. This follows from the fact that the welfare functions are strictly concave to the origin so, in general, the maximization problem will have an interior solution.

9. Also see Lipsey (1957, 1960). Negishi (1972) showed that world welfare maximization requires a positive tariff within the customs union so long as there are positive external

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model. The result is noteworthy if we contrast it with Article XXIV, which technically rules out PTAs with less than 100 percent preferences.

The key to the result is the diminishing marginal utility for the consumption of each variety. The intuition is easier to understand under zero transport costs, where trade policy does not affect total consumption. Under MFN, households will consume the same amount of every foreign variety but a larger amount of the domestic varieties. Imagine that the formation of FTAs entails successive small reductions of intrabloc tariffs. To begin with, consider the question of whether a small reduction raises welfare. With the first reduction, trade diversion has a small welfare effect because there is a shift between varieties that were consumed in similar quantities. But trade-creation effects are large because domestic varieties (with smaller marginal utility, as they are already consumed in large quantities) are replaced by varieties from other bloc members (with larger marginal utility because they are consumed in smaller quantities). Thus, a small reduction in intrabloc tariffs starting from MFN will improve welfare.

But how do we know that a large reduction in intrabloc tariffs would not improve welfare even more? The opposite reasoning applies for the last reduction of intrabloc tariffs, which would bring the country to a full FTA with its bloc partners. Under FTAs, the consumption of member and domestic varieties is the same (in the absence of transport costs), while the consumption of other foreign varieties is lower. In this case, the welfare effects of trade creation are negligible while trade diversion has a larger effect because varieties with larger marginal utility (those from other foreign countries) are replaced by varieties from member countries, which have smaller marginal utility. It follows that it cannot be optimal to remove that last barrier against fellow bloc members. But if the first incremental margin of preference raises welfare and the last one lowers welfare, we must conclude that the optimum is somewhere in between: a level of preferences that is greater than zero but less than 100 percent.

Figure 8.4 shows that, starting from a world without trading blocs, a small or moderate movement toward increased regionalization, by increasing intrabloc preference, is a good thing. We can say that there are positive returns to regionalization up to the point of maximum welfare, at the ''top of the hill,'' and negative returns to regionalization thereafter, on the downward slope. If transport costs, b, are 10 percent of product value, for example, then the optimal margin of preferences appears to be just below 50 percent. If transport costs are higher than this, then the optimum occurs at a somewhat higher level of preferences.

Figure 8.5 provides another way of looking at this issue. For the set of parameters chosen, the figure represents all possible combinations of intercontinental transportation cost (b) and intrabloc preference (k). The

tariffs. Kemp (1969), however, argued that free internal trade maximizes *members'* welfare if the external tariff is raised optimally.

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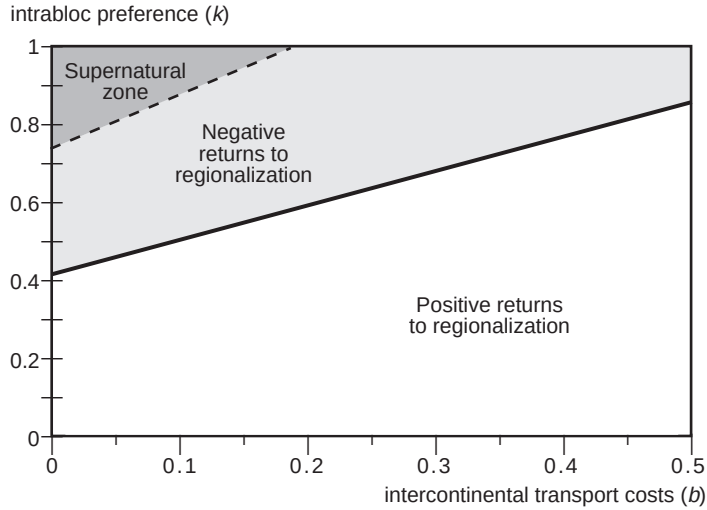
Figure 8.5 Returns to regionalization in six-country case
($\theta = 0.75$; $t = 0.3$; $a = 0$; $N = 2$; $C = 3$)



Supernatural blocs are more likely if transportation costs are low *and* the degree of intrabloc preferences is high.

solid line represents the level of intrabloc preference that maximizes welfare at each level of transportation cost. (If figure 8.4 was a cross-sectional view of a hill, then this figure is the aerial view of the same hill. One could draw contour lines representing particular levels of welfare as on a topographical map. The solid line represents the top of a ridge.) Below this line, there are positive returns to regionalization—that is, increasing the degree of preference will result in higher welfare. Above this line, increases in the preference level are welfare-reducing. We call this the area of negative returns to regionalization (NRR).

Within the NRR area, the dotted line represents the intrabloc preference level that yields, for every level of intercontinental transportation cost, the same welfare as $k = 0$ (i.e., the absence of trading blocs). The term ''natural'' does not seem appropriate to describe trade arrangements that, even when formed along the lines of geographical proximity, represent a movement so deep toward regionalization that welfare is reduced compared with the no-bloc situation. The trade arrangements that lie above this dotted line are the ones we call supernatural trading blocs.

We now look at the welfare effects, this time not only allowing for less than 100 percent preferences but also assuming the world trade system chooses the preference level optimally.[10] For example, imagine we were

10. This ''optimal'' level is not the result of a Nash noncooperative equilibrium, where each bloc chooses the optimal preference level given the preference level chosen by the rest of the blocs (and given the tariff level, *t*). It is just the preference level that maximizes welfare

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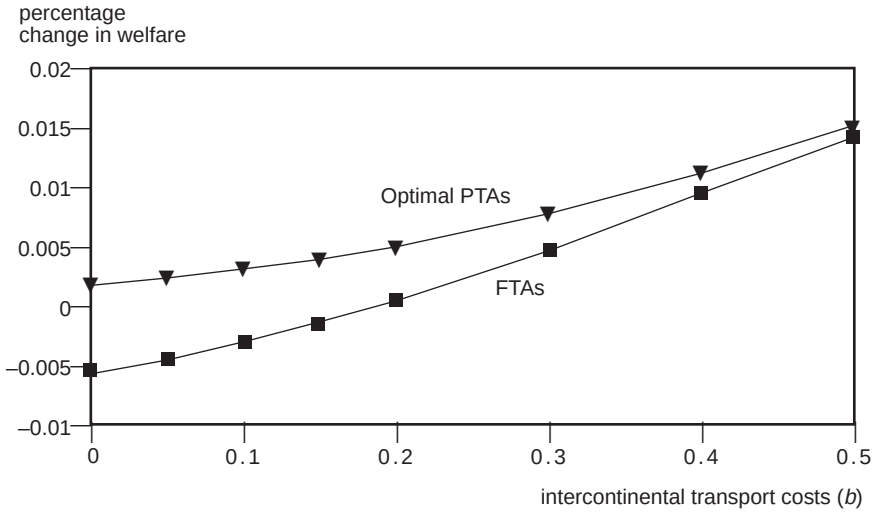
Figure 8.6 Effect of free trade areas and optimal preferential trade areas on global welfare ($\theta = 0.75$; $t = 0.3$; $a = 0$; $N = 2$; $C = 3$)



If the degree of intrabloc preferences is chosen optimally, then the blocs raise welfare even if transport costs are low.

rewriting Article XXIV to say that regional trading arrangements would be allowed if and only if the margin of preferences were set at k^* rather than 100 percent. The present analysis would shed light on the desirable value of k^*. In figure 8.6, we see that these optimal PTAs are welfare-improving no matter what the intercontinental transport costs are.

As b increases, the difference between welfare under optimal PTAs and under FTAs diminishes. The reason for this is that the optimal preference level approaches 1.0 for high values of b, and therefore an FTA comes closer to being optimal. Recall once again the limit argument: as intercontinental transport costs become prohibitive, FTAs become the best arrangement.

The Optimum Margin of Preferences with 16-Country Continents

In reality, the world comprises more than three continents of two countries each, of course. In figure 8.7, we repeat the experiment for the more realistic (if still stylized) case in which the world comprises four continents of 16 countries each. (As noted, we could get to four continents either by counting North and South America separately or adding the Mideast and

in a symmetric world and can be interpreted as the cooperative solution (again, given the tariff level, t).

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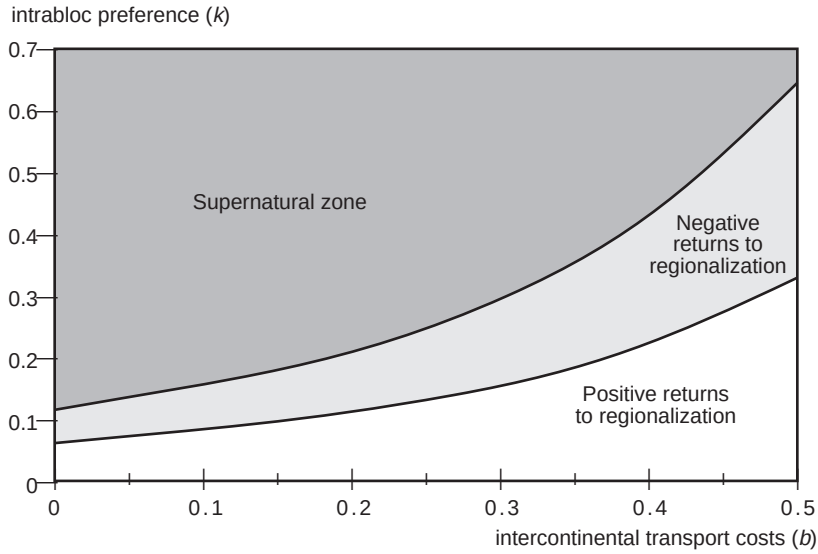
Figure 8.7 Returns to regionalization in 64-country case
($\theta = 0.75$; $t = 0.3$; $a = 0$; $N = 16$; $C = 4$)



Supernatural blocs are even more likely to occur in the (more realistic) case in which there are many countries on each continent.

Africa as a fourth bloc.) This 64-country setup has the virtue of corresponding roughly to the data set in our gravity model. We see that negative returns to regionalization set in sooner than before (compare with figure 8.5). If intercontinental transport costs are .2, then the world reaches the welfare optimum when intrabloc preferences are as low as 10.4 percent and enters the supernatural zone when they are 20.4 percent. If intercontinental transport costs are as low as .1, then negative returns to regionalization set in even sooner.

How Much Should We Conclude from This Result?

This third application, together with the second one, has provided some answers, within the limitations imposed by the structure of our model, to what Bhagwati (1993a) calls the static impact effect question regarding the creation of trading blocs. If intrabloc preferences are somehow set at the optimal level, regionalism will have an immediate positive effect on global welfare. (We haven't yet ascertained whether blocs, acting in an uncoordinated way, would be inclined to pick the optimal level of regional preferences, even if allowed to do so.) If countries are constrained to choose between no preferences and 100 percent preferences, as is apparently called for in Article XXIV, the impact of regionalism on welfare will

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depend on the values of parameters such as transportation costs and consumers' preference for variety. The larger the intercontinental transportation costs and the lower the preference for variety (the higher the value of θ), the more likely it is that regionalism will have an immediate positive impact. Furthermore, the closer that trading blocs follow along lines of geographical proximity, the more likely they are to increase welfare.

Does this mean that members of the World Trade Organization (WTO) should eliminate Article XXIV's requirement that FTAs stipulate complete liberalization (and perhaps substitute a requirement that they be permissable only among neighbors)? From the purely static point of view of our model, the answer to this question so far would seem to be yes. Blocs with a less than 100 percent preference formed along the lines of geographical proximity provide the best possible outcome in terms of immediate impact on welfare.

However, five important caveats should be noted. First, the welfare effects appear to be small. They always are in trade studies (at least those that do not build in dynamic effects on growth). In the simulation results shown in figure 8.6, welfare effects are expressed in the dimension of real GDP. To focus on the case of $b = .2$ in a six-country world (three continents of two countries each), the welfare benefit of moving from MFN to a system of optimally calibrated PTAs is only about 0.5 percent of real GDP. The welfare gain from forming a system of continental FTAs is less than 0.1 percent. In other words, the difference between the two kinds of regional trading arrangements is less than 0.5 percent of GNP. On the other hand, 0.5 percent of world income is about $100 billion, which is a lot of money. About one-quarter of this gain would accrue to the United States. The principle of cost-benefit analysis says that the benefits should be compared, not to a denominator as big as gross world income, but to the costs. If the costs are only the plane fares and salaries of the trade negotiators, the benefit-cost ratio is enormous. Even if one counts buying off interest groups as part of the cost, the benefit-cost ratio is still probably far above one.

Second, and more important, a major motivation for Article XXIV's stipulation that barriers on all trade be removed is a well-founded fear that barriers will otherwise be removed selectively, in sectors in which politically powerful interest groups in the member countries are least likely to be hurt. In other words, the fear is not partial liberalization in all sectors, but extensive liberalization in some sectors and little liberalization in others. Allowing such selectivity has two adverse effects: First, it is a recipe for maximizing trade diversion and thus imposing costs on nonmember countries. Second, it is a recipe for encouraging interest groups to lobby competitively to obtain favorable treatment (what is known as rent-seeking behavior), entailing a loss of resources. Our model omits these considerations because it treats all goods the same.

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Third, and more important still, even when all formal trade barriers are removed, as in a true FTA, there are inevitably institutional differences that discourage trade between countries. The tendency of Canadian provinces to trade far more with each other than with American states is one illustration of this proposition. By implication, what is commonly called an FTA should perhaps be classed analytically, for our purposes, as a PTA. We address this issue in chapter 11.

Fourth, and most important of all, Bhagwati's ''dynamic time path'' question remains. If the ultimate goal is the achievement of multilateral free trade among all countries, limiting the formation of blocs to geographically proximate countries might not be the best way to go if it were to lead to the permanent fragmentation of world trade rather than to a process of continuous integration. The answers are not clear once we include dynamic political-economy considerations in the analysis. These considerations are covered in chapter 10.

Fifth, the model is special in many ways. It leaves many factors out. These limitations do not prevent the model from being useful in helping one think about the role that geography plays in the trade-off between trade creation and trade diversion. It would be nice to know, however, whether the results are robust. Sensitivity to parameter values within the model is easily tested. The simulations in appendix D show that the basic results are indeed relatively robust.[11]

Relaxing fundamental assumptions takes more work. In the remainder of this chapter we discuss the relaxation of some of the simplifying assumptions. Perhaps the highest priority is generalizing the highly stylized model of trade in imperfect substitutes.

How Sensitive Are the Results to the Assumption of Trade Based Solely on Variety?

Deardorff and Stern (1994) and Srinivasan (1993) question the realism of using the Krugman model of trade based solely on goods as imperfect substitutes. In their view, the result that a few large FTAs are worse than many small ones can be attributed to excessive emphasis on the utility of consuming a large variety of goods that may differ only in the location of production (i.e., brand name). They suggest that classical theories of comparative advantage—based, for example, on differences in endowments of capital and labor—would imply that welfare is steadily increasing in the number of countries per bloc and that FTAs among a few dissimilar countries may be sufficient to attain most of the gains from

11. Based on the appendix in Stein (1994) and in Frankel, Stein, and Wei (1994).

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trade to be had.[12] Their misgivings would presumably apply equally to the Frankel-Stein-Wei model presented here, which simply introduces transportation costs into the earlier Krugman model.

The Deardorff-Stern conclusion that economic welfare steadily increases with the size of the blocs, if it holds up, would offer a more optimistic outlook for regionalism. If 60 countries combine into 12 blocs of 5 countries each and then combine into 6 blocs of 10 each followed by 3 blocs of 20 each, then economic welfare is improved at every step of the way. This suggests that small FTAs can be steppingstones toward the ultimate goal of one bloc of 60 countries, also known as worldwide free trade. But does the critique hold up?

Haveman (1992) studies FTAs using a model in which trade arises from comparative advantage rather than from product differentiation, following the Deardorff-Stern critique. He gets a result similar to Krugman's (1991a) that expected world welfare is minimized in a world of only two customs unions.

In reality, trade clearly arises both for reasons of comparative advantage and for reasons of imperfect substitution. Fratscher (1994) retains the basic framework of monopolistic competition but assumes that each country has a comparative advantage in one industry in the form of lower marginal costs. The simulation results depend very much on the values of parameters such as the magnitude of scale economies, the extent of specialization, and the magnitude of external tariffs. This includes the crucial result regarding whether economic welfare reaches a minimum at a small number of blocs or steadily declines with a decline in the number of blocs.

An appealing approach is to model industries as determined by comparative advantage, which is in turn determined by differences in factor endowments (as in the traditional Heckscher-Ohlin model), but then to assume that consumers treat different varieties *within* a particular industry as imperfect substitutes. Thus industrialized countries produce automobiles rather than textiles because the former are capital-intensive and the latter labor-intensive, but American autos are imperfect substitutes for autos from Japan, Germany, and other countries.

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12. The factor endowments approach suggests that preferential trading arrangements are more likely to succeed if the prospective members are different from each other than if they are similar. (This theoretical proposition is the reverse of what used to be the conventional wisdom, that FTAs were more likely to succeed among countries at a similar stage of development.) Kreinin and Plummer (1994) argue that a better criterion than proximity for determining whether a group of countries would make a ''natural'' trading bloc is the correlation between the commodity composition of each member's exports to the world and their exports to each other. Similarly, Leamer (1994) argues that the criterion for a natural trading bloc should be the extent to which the proportions of factor endowments within the group mirror those worldwide. The intuition is that a bloc wants to encompass the full range of variation of factor endowments in order to get the full gains from trade.

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Spilimbergo and Stein (1997) have recently extended the Frankel-Stein-Wei results to allow for this mixture of factor-endowment trade and imperfect-substitutes trade. They first look at the case in which transportation costs are zero, which is the traditional assumption. The Krugman (1991a) result once again emerges, provided the elasticity of substitution parameter is not too high—that is, consumers' love for variety is not too low. Welfare reaches a minimum at three large blocs and then improves for larger numbers of smaller blocs. Thus, the model behaves like the imperfect-substitutes model.

As in the simulation results already reported in this chapter, the base-case results in Spilimbergo and Stein set intracontinental transport costs at zero, worldwide tariffs equal to 30 percent, and an elasticity of substitution equal to 4. The parameter representing the share of capital-intensive goods in consumption is set at .5.[13] As in our standard model without factor endowments, the key results are not particularly sensitive to perturbation of most of the parameters but can change if some parameters are pushed far enough. If the love for variety is low, then welfare is lower with four blocs than three. If love for variety is very low, $\theta = .95$ (or an elasticity of substitution of 20), then welfare steadily increases with an increase in the size of blocs (and increases with a decrease in the number of blocs), which would justify those who are skeptical of the robustness of the Krugman model. Similarly, the welfare-minimizing number of blocs becomes greater than three when Spilimbergo and Stein introduce substantial transport costs to reproduce the fact that the trade-income ratio is always lower than predicted by models with costless trade ($a = .3$). The transport costs have a relatively greater discouraging effect on intra-industry trade (which is based on imperfect substitution) than on interindustry trade (which is based on factor endowments). As a result, the model behaves like the factor-endowments model. These results hold only for parameter values that seem implausible, however. For plausible parameter values, consolidation into three blocs remains the welfare-minimizing configuration.

The authors go on to consider the effects of blocs formed between ''rich'' (capital-intensive) and ''poor'' (labor-intensive) countries, as compared with blocs among the rich and those among the poor. As long as all countries have similar tariff levels, poor countries will always prefer to integrate with rich countries to gain both increased product variety and the benefits of comparative advantage. The rich will do best by joining other rich countries. These results are modified if different countries have different tariff levels. Joining a high-tariff country in an FTA will enhance welfare more than joining a low-tariff country, other things being equal.

13. This parameter is referred to as δ in figures 8.8 and 8.9.

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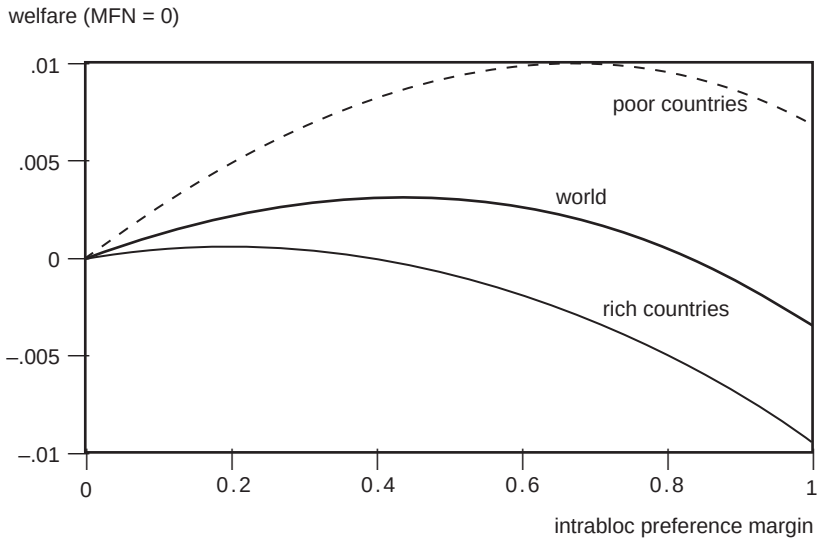
Figure 8.8 Effect of intrabloc preference margins on welfare in blocs with rich and poor members
($\delta = 0.5$; $t = 0.3$; $a = 0$; $b = 0.35$; $k = 3$; $C = 4$; $Nr = Np = 4$)



Source: Spilimbergo and Stein (1997).

To the extent, then, that Mexico has higher tariffs than Canada, it makes a more attractive partner for any country, rich or poor.

For our purposes, we are most interested in what Spilimbergo and Stein find when they allow for intercontinental transport costs. Their simulations assume a world of four continents, with eight countries on each continent, four of them rich and four of them poor. Figures 8.8 and 8.9 reproduce one of their simulations. Notwithstanding the introduction of differences in factor endowments as a determinant of trade, the results are qualitatively the same as in the model laid out earlier in this chapter. Specifically, the three most important results continue to hold:

- Free trade areas put the world into the supernatural zone (for a wide range of intercontinental costs, b). With the benefit of figure 8.8, however, we can now see that the effect is quite different in rich countries than in poor countries. The latter are likely to be better off from a move to four continental blocs, even though the rich are worse off.
- Preferential trade arrangements can raise welfare, even for rich countries, provided the margin of preferences is not set too high.
- The optimal margin of preferences rises with the level of intercontinental costs, as we can see in figure 8.9. Unless intercontinental costs exceed .25, however, the optimal margin of preferences is in the range of 26

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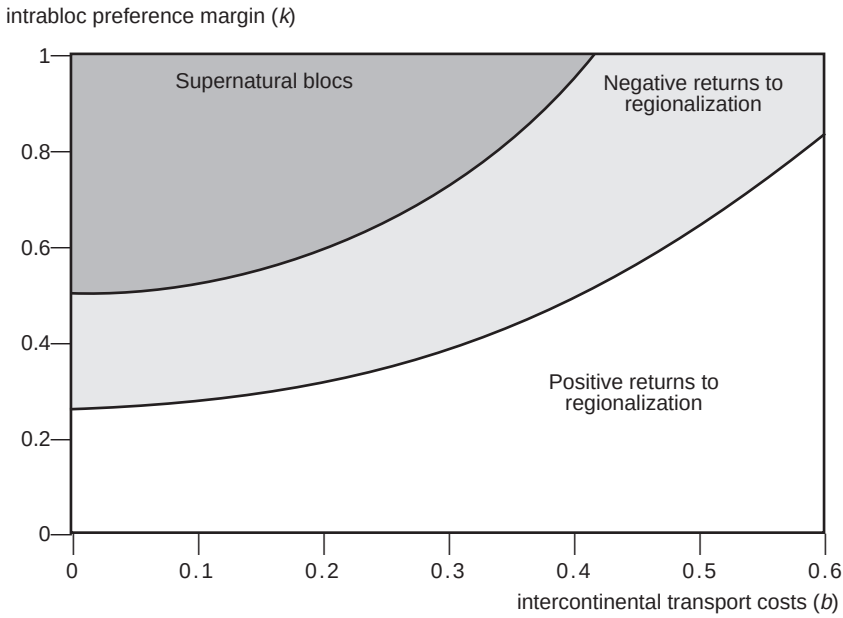
Figure 8.9. Returns to regionalization in case of four blocs with four rich and four poor members
($\delta = 0.5$; $t = 0.3$; $a = 0$; $k = 3$; $C = 4$; $Nr = Np = 4$)



Source: Spilimbergo and Stein (1997).

to 34 percent. Any preference margin above that level enters the zone of negative returns to regionalization, and anything over 65 percent enters the supernatural zone. (When distinguishing rich countries from poor, however, the latter optimize at a higher level of preferences, k, than the former.) Even quantitatively, these results are not very different from those we obtained in the model that ignored factor endowments (for similar numbers of countries).

Welfare Effects of Regional Blocs That Do Not Coincide with Continents

Not all existing and proposed regional trading arrangements, even if truly regional in the sense of membership that is geographically determined, coincide with continents. Many are smaller than continent-sized, and some are larger.

Subcontinental Free Trade Areas

In our third application, we showed one sense in which a partial movement toward regionalization may be better than a total one. We now look

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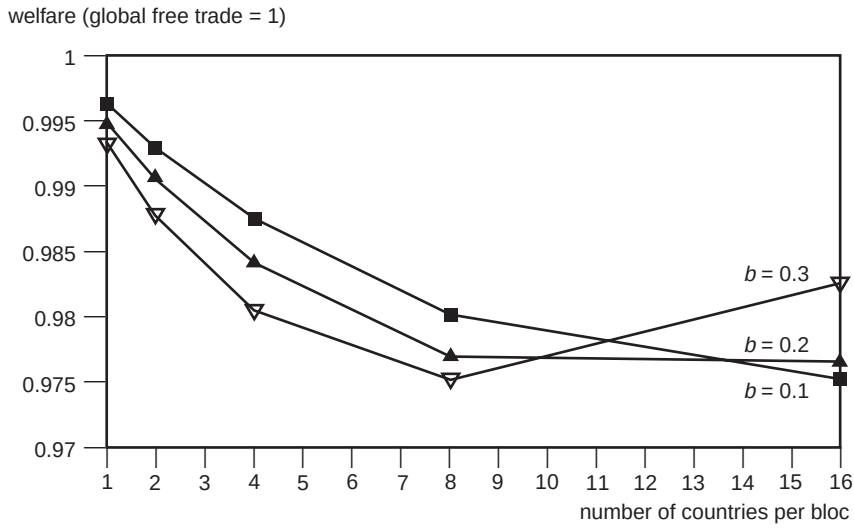
Figure 8.10 Effect of subcontinental free trade areas on global welfare ($\theta = 0.75$; $a = 0$; $b = 0.2$; $2 = 0.3$; $N = 16$; $C = 4$)



at another way in which ''partial'' trends toward regionalization can be understood: the formation of multiple small blocs on each continent. We have in mind recent ''subcontinental'' FTAs of two countries each, such as the Australia-New Zealand Closer Economic Relationship (CER) pact of 1983, the Canada-US FTA of 1988, and the customs union between Colombia and Venezuela that was instituted in January 1992. We also consider somewhat bigger groups, such as NAFTA, the Central American Common Market (CACM), Mercosur, and the Andean Community in the Western Hemisphere.

For this purpose, we run a simulation in which the world consists of four continents, each of them containing 16 countries. This allows us to compare welfare under the MFN rule with that associated with eight subcontinental FTAs on each continent, composed of two countries each; four FTAs of four countries each; or two of eight each. The results of this simulation are seen in figure 8.10. The starting point is the case of 16 blocs on each continent made up of one country each (the MFN case), and the end point is one free trade area on each continent made up of 16 countries.

According to the figure, the formation of FTAs between regional subsets of countries is not a good idea, and the more countries that participate, the worse it gets. Even at the last stage, when two half-continental blocs of 8 members each are merged into a continental FTA, welfare falls slightly

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if b is .2 or less.[14] These results seem to bode ill for recent regional agreements.[15] But we must relax some extreme assumptions.

Subcontinental Preferential Trade Arrangements

We have found that forming several FTAs within each continent, for our parameter values, lowers welfare regardless of the number and size of the FTAs. But we found earlier that partial liberalization in continentwide PTAs is better than either MFN or fully liberalized FTAs. Is the same true for the formation of several PTAs within each continent?

Figure 8.11a looks at subcontinental PTAs for the case in which $b = .1$. Figure 8.11b addresses the same question for the case in which $b = .2$. The right edge confirms that the formation of eight two-country FTAs on each continent reduces welfare and that larger blocs are even worse. But for partial preferences, ideally around 10 percent, the picture for multiple PTAs looks much better. Two-country PTAs (eight of them to a continent) are slightly better than the MFN status quo, which consists of 16 one-country groups. Four-country PTAs (four to a continent) are better still, and so on until the optimum is reached at a single continentwide group of 16 countries. At this point, preferences of 10.4 percent are the precise optimum in the simulation, as we saw in figure 8.7. In other words, welfare increases steadily with an increase in the size of the PTAs rather than steadily decreasing as it did in the case of the FTAs. Clearly, the distortionary or trade-diverting effects are less important when internal tariffs are reduced only partway.

The pattern is similar when $b = .1$ or $b = .3$, but the level of preferences that maximizes welfare for each size of PTA becomes approximately 5 to 8 percent and 10 to 15 percent, respectively (figures 8.11a and 8.11c). The pattern whereby each expansion in membership is an improvement is preserved for every margin of preferences up to 21 percent, even when b is as low as 10 percent. If b is as high as 30 percent, then the margin of preferences can be as high as 44 percent; each doubling of the size of the blocs will still be welfare-improving.

Why might countries wish to negotiate small two-country PTAs that would raise welfare only slightly if larger PTAs would be even better? Perhaps for the same reason that it seems to be impossible to negotiate

14. We have also tried a simulation of a world consisting of three continents, each of them containing 12 countries. The results are similar to those in figure 8.10. But carving up each continent into two blocs of six countries each, when $b = .2$, turns out to be the welfare minimum. Not only is the outcome worse than under a system of MFN or of smaller FTAs, but it is also worse than under a system of continental FTAs.

15. These results do not allow for the fact that transport costs between potential subregional free trade areas, such as North and South America, Australia and East Asia, or Western Europe and Eastern Europe, are greater than between countries within the same subregion.

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Figure 8.11a Effect of subcontinental preferential trade arrangements on global welfare when *b* = .1
($\theta = 0.75$; $a = 0$; $t = 0.3$; $N = 16$; $C = 4$)

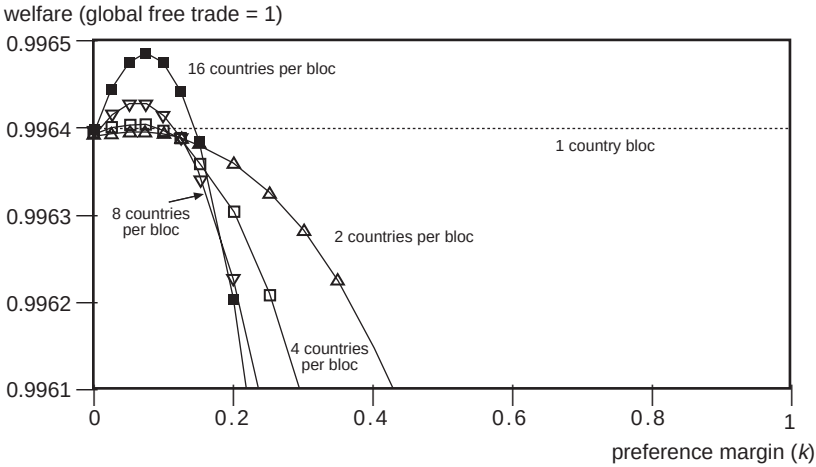

Figure 8.11b Effect of subcontinental preferential trade arrangements on global welfare when *b* = .2
($\theta = 0.75$; $a = 0$; $t = 0.3$; $N = 16$; $C = 4$)

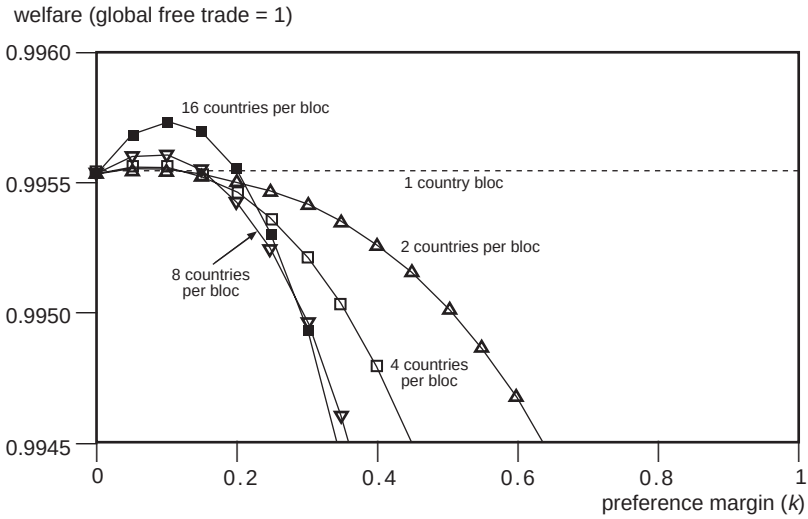

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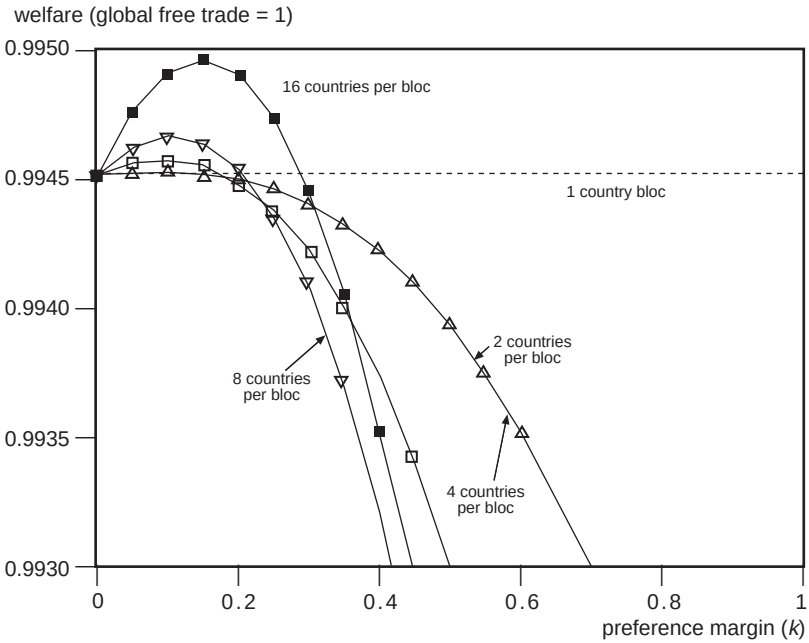
Figure 8.11c Effect of subcontinental preferential trade arrangements on global welfare when *b* = .3
($\theta = 0.75$; $a = 0$; $t = 0.3$; $N = 16$; $C = 4$)



worldwide liberalization. Although these political-economy considerations lie outside the scope of our model, one could easily posit costs to international negotiation that increase with the number of partners involved.[16] The issue is discussed in chapter 10. We have in mind not so much the salaries or air fares of the negotiators as the adjustment costs of harmonizing standards and administrative procedures or the difficulty of satisfying adversely affected interest groups. Two-country PTAs could then be viewed as steppingstones or building blocks for four-country PTAs, leading to eight and, finally, to the continentwide arrangement.

Transoceanic Blocs

We have seen that unnatural blocs, which join a country from one continent with a partner on another, are likely to be deleterious, under the terms of our model, while natural blocs may be beneficial. Currently under discussion are several proposed blocs that are a hybrid of natural and unnatural: they combine many countries, some of which are on one

16. Deardorff and Stern (1994) suggest as much.

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continent and some on another. This book has at times referred to the Western Hemisphere as a single continent, but the hemispheric bloc envisioned by the Free Trade Area of the Americas (FTAA) does in fact span two Americas. The Trans-Atlantic Free Trade Agreement (TAFTA) is another proposed bloc that spans two continents.

Largest of the transoceanic blocs is the Asia Pacific Economic Cooperation (APEC) forum, which actually spans three continents. Europe's links to Africa and the western half of Asia are stronger than America's. One can imagine the world dividing up into an APEC half and a European-centered non-APEC half.

We now turn attention to the welfare effects of blocs formed across continents. We consider a world composed of four continents and six countries per continent in order to answer the following question: under what circumstances will it be beneficial for the world to consolidate into two blocs, each formed by two continents? We already know the conditions under which a move from the MFN status quo to a world of four natural blocs will be an improvement. Let us now pursue the steppingstone logic and ask under what conditions a further movement from four continental blocs to two transoceanic blocs could be a further improvement.

For the parameters $\theta = 0.75$ and $t = 0.3$, we find that the consolidation will be an improvement over the MFN status quo, under any level of intra- or intercontinental transportation costs, a or b. We might have predicted this: if we look at figure 8.2, we can see that, in the absence of transport costs, two FTAs are better than four for these parameter values. And we know, at least in the case of figure 8.3, that the welfare effects of even unnatural consolidation (e.g., across oceans) rise steadily as transportation costs rise. Thus it follows *a fortiori* that a two-bloc scheme beats a four-bloc scheme when there are transport costs.

The interesting cases are those that correspond to parameter values such that, in the absence of transport costs, four blocs are better than two. In these cases, our results show that there is a critical value of intercontinental transport costs, b, above which the consolidation becomes beneficial. We ran several simulations for $\theta = 0.6$, different values of tariffs, t (0.2 and 0.3), and different values of intracontinental transport costs, a (0, 0.2, and 0.5). We found that the critical value of b will be lower (and therefore consolidation more likely to be improve welfare) the higher the tariff level and the higher the transportation costs, a.

Should Chile Join NAFTA or Mercosur?

Our results on regional trading arrangements that do not coincide with continents have left out an element that is crucial to such questions as

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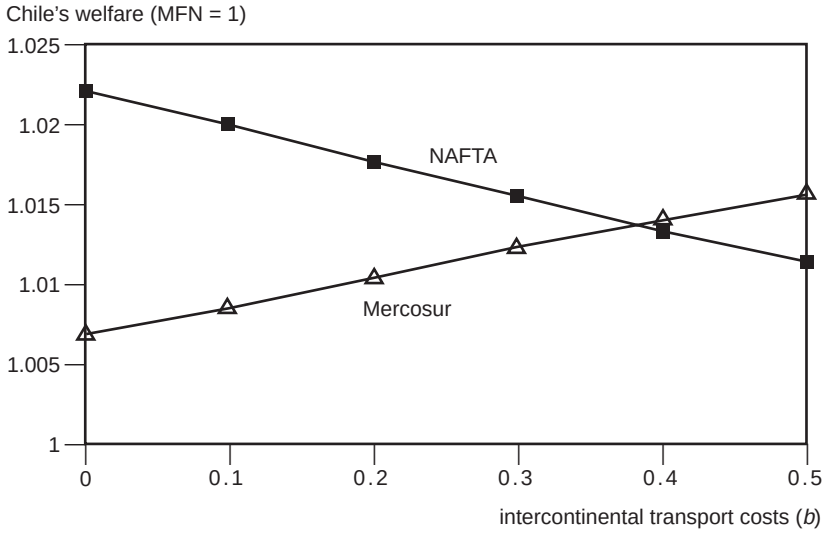
Figure 8.12 Should Chile join NAFTA or Mercosur?
($\theta = 0.95$; $\delta = 0.9$; $t = 0.3$; $a = 0$; $k = 3$; $C = 2$; $N = 4$)



Source: Spilimbergo and Stein (1997).

whether individual South American countries would be better off forming FTAs among themselves or joining NAFTA so as to be able to trade more easily with the United States. The omitted element is that South American countries are labor-abundant and capital-poor, while the United States and Canada are the reverse. From the viewpoint of a South American country, the enhanced ability to trade with a rich country would be one of the major motivations of joining NAFTA.

Recall that Spilimbergo and Stein (1997) extended many of the results in this chapter to a model in which trade takes place, not only so consumers can obtain more varieties, but also to exploit differences in factor endowments. One fascinating contribution of their paper is to address this question: ''Should Chile join NAFTA or Mercosur?'' Here, North America and South America are considered to be different continents. The question is whether the benefits to a labor-abundant country are greater from joining an FTA with poor neighbors that have the advantage of proximity or from joining an FTA with rich partners that are far away but that have the advantage of different factor endowments. The answer depends on various parameters but most crucially on the magnitude of the transportation costs between North and South America. In the simulation illustrated by figure 8.12, if transport costs are in the area of 30 percent or lower, then Chile is better off joining NAFTA and getting the benefits of trade with a capital-rich country.

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The relative attractiveness of joining NAFTA is reversed, however, if Chile's tariffs are already low and those of Mercosur are high. In that case, the outcome is dominated by the benefits of joining a high-tariff FTA, namely that it exempts Chile from those high tariffs. It should be emphasized that this simulation's parameters do not match Chile in any particular respects. The question could as easily be phrased, are poor countries in South Asia, or Africa, or Eastern Europe, better off forming blocs with their immediate neighbors or trying to improve links with far-flung trading arrangements that include rich countries such as APEC or the European Union.[17]

The Asymmetric Formation of Individual Blocs, the Terms of Trade Effect, and the Symmetric Noncooperative World Equilibrium

The central conceptual exercise of this chapter, indeed of this book, is to evaluate the implications of worldwide regionalization—that is, a world comprising three or four symmetric blocs. Each bloc is the same size and contains the same number of countries, each of which is also of the same size, and no countries are left outside all blocs. But there are several reasons, which we pursue in this section, for relaxing the assumptions of symmetry.[18]

The Importance of Considering Asymmetries

Before introducing asymmetries, we should reiterate our reasons for assuming symmetry up to this point. First, the central policy question we have been implicitly addressing is not, should the United States (or some other regional hegemon that does not feel responsibility for the global system) form a bloc in its part of the world? Rather, it has been, should the WTO retain Article XXIV in its present form, modify the conditions in some way, or eliminate it altogether in favor of strict nondiscriminatory tariffs?

Nevertheless, the first question is also an important one. Furthermore, we as yet have no grounds for asserting that if the global trading system allows regional FTAs under an Article XXIV, that each region will in fact form an FTA. After all, we have seen that everyone is likely to be worse off from such an equilibrium if the bloc is in the supernatural zone. Why then would any given region choose to take advantage of the ability to

17. The simulation assumes that the share of labor-intensive goods is 90 percent, θ is .95, and there are four nations on each of the two continents.

18. This section draws heavily on Stein (1994, chapter 2).

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form an FTA, regardless of what Article XXIV says? Can we rely on the good sense of governments not to go down this road if it is in fact economically harmful? Put differently, if governments are in reality pursuing the regionalist strategy, as the statistical estimates in the preceding chapters suggest they are, could that possibly be prima facie evidence that it must be beneficial, contrary to our model? To consider these questions, we must consider versions of the model that do not assume symmetry.

A second reason we have assumed symmetry up to this point is that it simplifies the model. For example, all goods sell for the same price in their country of production. But the model has left out a major element in the analysis of customs unions: the terms of trade effect. A major motive for forming an FTA is often deliberately to divert trade away from nonmembers and toward FTA members. The switch in demand bids up the prices of the goods produced within the FTA and lowers the prices of goods produced outside. Thus it shifts the terms of trade against outsiders. To consider this effect, we need to relax the assumption of symmetry.

This is particularly necessary if we want to think about the plight of countries that might get left out of any bloc. When we talk about the world breaking up into the three blocs of Western Europe, the Americas, and East Asia, we conveniently neglect the fact that a large fraction of the world's population resides in the many relatively small (economically speaking) countries that do not belong to any of these three groups. For example, African countries that were left out of a three-bloc world would suffer a loss in demand for their products and thus an adverse shift in their terms of trade. We need to consider the asymmetric case if we have any interest in the effects of regionalism on them.

There is an additional reason for relaxing the simplifying assumption of symmetry that is quite different in nature. We have claimed the differentiated products model as a theoretical foundation for the gravity model that was estimated econometrically in chapters 4 through 6. In chapter 9, we will be using some estimates from that model to flesh out the welfare analysis. But the real world reflected in the statistics is clearly not a world of equal-sized countries. The United States is many times larger than the smaller countries in the sample. To bring the econometrics and the theory slightly closer together, it helps to have a version of the theory that allows for countries to vary in size. This strengthens the claim to theoretical foundations for the gravity model (Stein 1994, chapter 2, section 4).

The Terms of Trade Effect in the Model

Starting from a nondiscriminatory MFN world, the members of group B form a bloc, excluding the rest of the world, A. Let us assume that group B obeys Article XXIV, in that they do not seek to raise their external tariffs vis-a-vis A. (We leave a discussion of such possibilities for chapter 10.)

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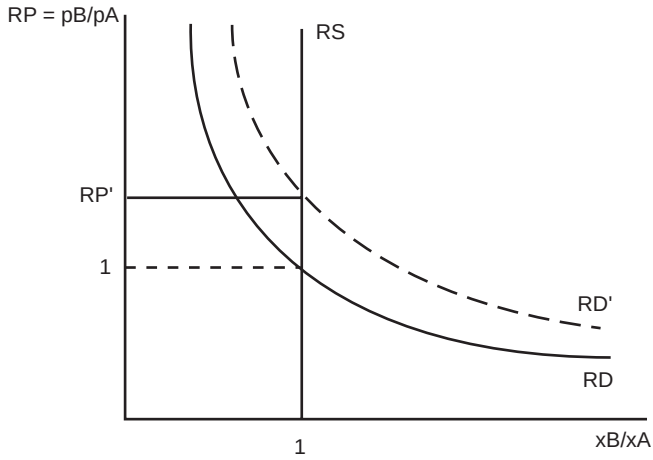
Figure 8.13 Effect on terms of trade of bloc formation



pB/pA = relative price of B's goods in terms of A's goods
xB/xA = quantity of B's goods relative to A's goods
RS = relative supply
RD = relative demand
RP = relative price

Source: Stein (1994).

Some of the demand coming from residents of bloc B will be shifted away from A's goods toward B's own goods. This will affect the terms of trade. The effect will be adverse from A's viewpoint: an increase in the relative price of B's goods in terms of A's.

How can we see this terms of trade effect in the differentiated products model? It is easy enough. Figure 8.13 illustrates the supply and demand for B's goods relative to A's. One property of the model continues to make life simple: the quantity produced (x_i) of a given variety, i, is determined by the structural parameters of the production technology and by consumers' universal elasticity of substitution among varieties:

$$x_i = \frac{\alpha\theta}{\beta(1 - \theta)} \tag{8.2}$$

(Recall that α is the fixed cost of production, which captures the extent of scale economies in the production function, β is the constant marginal cost of production, and $1-\theta$ reflects consumers' love for variety.) In other words, supply of a given variety is inelastic with respect to price. This convenient property, the inelasticity of supply, is illustrated by a vertical line in figure 8.13.

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The action in the model comes on the demand side. From equations 7.4 and 7.5 in the previous chapter, we see that the relationship between the relative quantities for any two varieties, demanded by any given individual, and the relative prices of the two varieties faced by that individual, is very simple. The relationship is a proportionate one (in logs), where the elasticity of demand $\frac{1}{1-\theta}$ is the constant of proportionality. We wish to express the aggregate demand for goods produced within bloc B relative to goods produced in A. In the case of symmetry, relative demand is given by

$$\frac{x^B}{x^A} = \left(\frac{p^A}{p^B}\right)^{\frac{1}{1-\theta}} \tag{8.3}$$

Thus there is a simple inverse relationship between the relative price of B's goods and the relative demand for them, which is illustrated in figure 8.13, along with supply. When the members of B form an FTA, the consumers face lower prices on goods from other bloc members than from nonmembers. In response, demand is diverted from A's products to B's. The demand curve shifts out from RD to RD', driving up the price of B's goods relative to A's goods. In other words, the terms of trade shift against A and in favor of B. This happens even though bloc B does not raise its external tariff to exploit its monopoly power deliberately. The algebra to show the precise effect on the relative price—and with it the effect on patterns of trade and consumption and thus the utility level of the representative citizen of A or of B—is too complicated to show here (Stein 1994, section 2.2.ii). But the direction of the effect is intuitively clear. From the viewpoint of B, the terms of trade effect provides an extra incentive to form a bloc. From the viewpoint of A, the terms of trade effect means a welfare loss from the formation of the bloc. This is sometimes known as the problem of the innocent bystander.

A Noncooperative Global Equilibrium of Continental FTAs

We now use simulations with sample parameter values to illustrate the welfare implications of the formation of FTAs, one at a time rather than worldwide. Assume again a world of four continents of 16 nations each. As before, we will for simplicity's sake set intracontinental transport costs (a) at 0, intercontinental transport costs (b) at .2, external tariffs (t) at .3, and the substitutability parameter (2) at .75. Regardless of how many of the continents opt to form FTAs, those that do (if there are two are more) are symmetric, and those that do not (if there are two are more) are also

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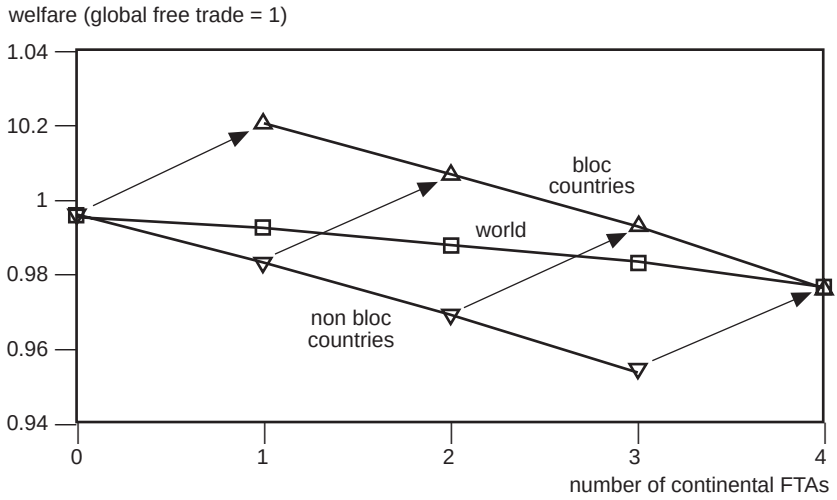
Figure 8.14 Continental FTAs as a noncooperative global equilibrium



Source: Stein (1994).

symmetric. Figure 8.14 illustrates the economic welfare for bloc countries and for nonbloc countries. Both are functions of the number of continents, out of four, that have opted to form FTAs, which is indicated along the horizontal axis. The welfare of the bloc countries is always higher than that of the nonbloc countries because of the terms of trade effect. The figure also shows a measure of world welfare, the weighted average of the welfare of the individual countries, which lies between the other two relationships.

One can see from the figure how it is in the interest of any given continent to form an FTA, regardless of how many other continents have already decided to form FTAs. Let us start from a world of pure MFN—that is, zero FTAs. Then we start from the left-hand margin. For our parameter values, welfare is only slightly lower than it would be under global free trade. But from the viewpoint of the first continent that has the idea of forming an FTA, it is clear that its welfare will be enhanced, taking the trade policies of the other continents as given. This is represented by the first arrow, which shows an increase in welfare of more than 2 percent. The explanation is the shift in terms of trade in favor of the continent forming the bloc, which is also the explanation for the decline in welfare for the other three continents. But it is also in the interest of a second continent to follow suit, raising its welfare by a similar amount, as shown by the second arrow. The welfare of the two remaining continents has now fallen further. It is also in the interest of the third continent to form an FTA, at which point they are no better off than

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before they started, but a large burden has been imposed on the one remaining nonbloc continent (a welfare loss of 4.3 percent, for our parameter values). Finally, it is in the interest of the fourth continent to form an FTA as well. After it has, at the right margin, the world is stuck in a noncooperative equilibrium, or ''prisoner's dilemma.'' All four continents have formed FTAs, correctly perceiving it to be in their interest to do so, taking as given the policies of the others, and yet everyone is worse off than they were under MFN. While the precise shape of these curves depends on the parameter values, intercontinental transport costs, b, would have to be as high as .6 before it would change the conclusion that a system of four continental FTAs is supernatural—that is, leads to a lower level of economic welfare than the MFN starting point.

Thus the symmetric world in which all continents form FTAs, which we analyzed above, does not rest on an arbitrary assumption. It is the noncooperative equilibrium that falls out of a regime that allows the formation of FTAs. The next question is what happens if the groups are not restricted to full-fledged FTAs (as they theoretically are under Article XXIV) but are allowed to form preferential trade arrangements with margins of preference that are less than 100 percent.

A Noncooperative Global Equilibrium of Continental Preferential Trade Arrangements

Let us now assume only two continents, so we can represent them on a contract curve (figure 8.15). Assume there are two countries on each continent choosing whether to form a preferential trade arrangement with each other. Let k^A be the margin of preferences for the PTA on continent A and k^B be the margin of preferences in the PTA on continent B. The indifference curves show levels of welfare corresponding to various combinations of k^A and k^B. Each continent would prefer the other to set its preferences as low as possible, and that it be the one to set its preferences high, so as to shift the terms of trade in its own favor.

Let us first consider the problem from the viewpoint of A. A would like B to set its own preferences as low as possible. But whatever B does, if A takes as given the trade policy of B, it will want to set its own preferences, k^A, as high as possible. Its welfare is maximized at $k^A = 1$, an FTA on its continent. The problem is analogous from the viewpoint of continent B. Whatever A does, it will benefit from setting its own preferences, k^B, as high as possible. Thus, even if the continents are allowed to set margins of preferences of less than 100 percent, in the noncooperative equilibrium they will both opt for FTAs. Yet both will be worse off in this equilibrium than if they had stopped with partial preferences. Earlier in the chapter, we saw that a world of partial preferences within every bloc is better than a world of FTAs; now we see this superior

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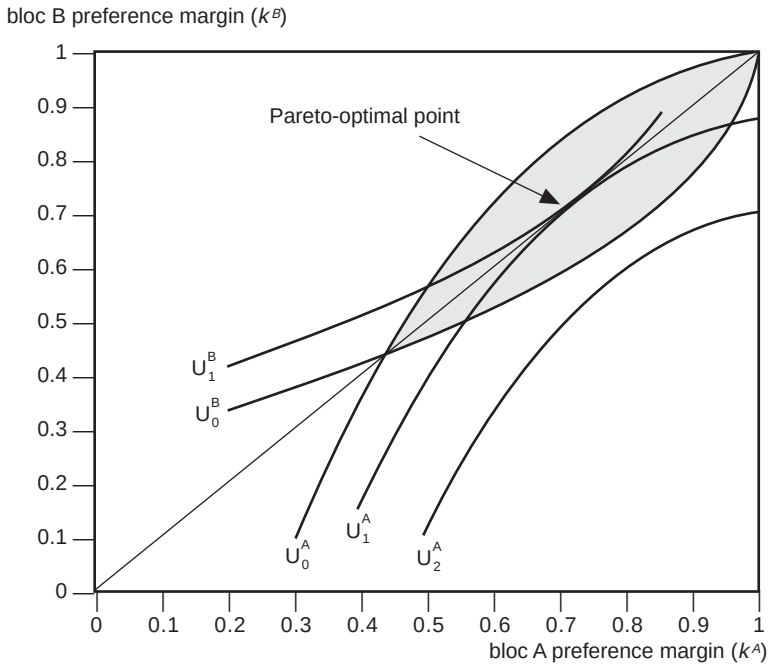
Figure 8.15 FTAs as the noncooperative global equilibrium even when PTAs are allowed ($\theta = 0.75$; $a = 0$; $b = 0.2$; $t = 0.3$; $N = 2$; $C = 2$)



U = Utility.

Source: Stein (1994).

outcome will not occur if blocs are left to set policies on their own. The Pareto-optimal point occurs where the two indifference curves are tangent. For our parameter values, this turns out to be where k^A and k^B are both equal to .73.

In theory, the two continents could enter into negotiations, agreeing not to raise their margin of preferences above .73. It is the role of a multilateral institutions such as the WTO to try to design a set of rules under which the equilibrium will come close to the Pareto optimum. The model analyzed here suggests that Article XXIV should be modified so that the requirement of 100 percent preferences be replaced, not merely by allowing partial preferences, but by *requiring* that preferences be partial rather than 100 percent.

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