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Trading blocs and the Americas: The natural, the unnatural, and the super-natural

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Abstract

Is world trade becoming more regionalized, as a result of preferential arrangements such as NAFTA, the Andean Pact and MERCOSUR? If so, is this deviation from the principle of MFN (non-discriminatory trade policies) good or bad? This paper attempts to answer both questions.

Using the gravity model to examine bilateral trade patterns throughout the world, we find evidence of trading blocs in the Western Hemisphere and elsewhere, as in earlier work. Intra-regional trade is greater than could be explained by natural determinants: the proximity of a pair of countries, their sizes and GNP/capitas, and whether they share a common border or a common language.

Within the Western Hemisphere, MERCOSUR and the Andean Pact countries appear to function as significantly independent trading areas, but NAFTA much less so (as of 1990). The intra-regional trade bias within MERCOSUR increased the most rapidly during the 1980s. In East Asia, on the other hand, increased intra-regional trade can be explained entirely by the rapid growth of the economies.

We then turn from the econometrics to an analysis of economic welfare. Krugman has supplied an argument against a world of three trading blocs (that they would be protectionist), in a model that assumes no transport costs. He has supplied another argument *in favor* of trading blocs, provided the blocs are drawn along 'natural' geographic lines, in a model that assumes prohibitively high transportation costs between continents. In this paper we

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attempt to resolve the Krugman vs. Krugman debate. We complete the model of the welfare implications of trading blocs for the realistic case where inter-continental transport costs are neither so high as to be prohibitive nor zero. We consider three applications of the model.

(1) Continental Free Trade Areas (FTAs). We show that it is not only Krugman's 'unnatural' FTAs that can leave everyone worse off than under MFN, but that under conditions of relatively low inter-continental transport costs, FTAs that are formed along natural continental lines can do so as well. We call such welfare-reducing blocs *super-natural.*

(2) Partial regionalization. We find that partial liberalization within a regional Preferential Trading Arrangement (PTA) is better than 100 percent liberalization. In the super-natural zone the regional trading arrangement, in contrast to the Article 24 provision of the GATT, reduces welfare. It occurs for combinations of low inter-continental transport costs *and* high intra-bloc preferences, i.e., when the regionalization of trade policy exceeds what is justified by natural factors.

(3) The formation of several sub-regional PTAs on each continent. We find that multiple FTAs on each continent could lower welfare, but that multiple PTAs, with partial internal liberalization, would raise welfare.

We conclude the paper with an attempt to extract estimates of transportation costs from the statistics. Estimates suggest that trading blocs on the order of the EC are in fact super-natural.

Keywords: Free trade area; Trading blocs; MFN; Gravity model; Regional trade preferences; MERCOSUR; Andean Pact; NAFTA

JEL classification: F15

1. Introduction

We have recently seen an upsurge around the world of steps toward Free Trade Areas and other special regional trading arrangements, from the European Union (EU, formerly the EC) to the Association of SouthEast Asian Nations (ASEAN). Currently the momentum for regionalization appears as strong in the Western Hemisphere as anywhere.

Most of the regional trade agreements that were announced in the past did not initially come to much, such as the 1960 Central American Common Market (CACM), the 1960 Latin America Free Trade Association (LAFTA), or the 1969 Andean Pact. [1] More recent agreements have been more serious, however. The Canadian–U.S. Free Trade Agreement was successfully concluded in 1988, and

[1] The Latin American Integration Association (LAIA) replaced the LAFTA in 1980. De la Torre and Kelly (1992) and Fieleke (1992) chronicle the lapses between proclamation and practice in these cases [and others, such as ECOWAS in West Africa], in their surveys of the post-war history of regional trading arrangements. Edwards (1993) reviews the history of regional economic arrangements in Latin America.

Table 1
Intra-regional trade shares [a]

	1965	1970	1975	1980	1985	1987	1990
EAsia	0.199	0.198	0.213	0.229	0.256	0.263	0.293
WH	0.315	0.311	0.309	0.272	0.310	0.279	0.285
EC	0.358	0.397	0.402	0.416	0.423	0.465	0.471
EFTA	0.080	0.099	0.104	0.080	0.080	0.084	0.076
MERCOSUR	0.061	0.050	0.040	0.056	0.043	0.050	0.061
ANDEAN	0.008	0.012	0.020	0.023	0.034	0.026	0.026
NAFTA	0.237	0.258	0.246	0.214	0.274	0.238	0.246

[a] Intra-regional trade/Total trade of the region.

went into effect in 1989. MERCOSUR was negotiated between Brazil, Argentina, Uruguay and Paraguay in March 1990, scheduling an elimination of all regional tariffs by the end of 1994. The MERCOSUR customs union took effect January 1, 1995. Venezuela and Colombia reinvigorated the Andes Pact in 1990–1991, establishing a common market in 1992. More agreements are in the works, throughout the Western Hemisphere [2] and elsewhere.

In the 1990s, the talk has moved to expansion of the regional trading arrangements. The North American Free Trade Agreement (NAFTA), was negotiated between the U.S., Mexican and Canadian governments in 1992, and went into effect January 1, 1994. There are provisions to add other Western Hemisphere countries; the Clinton Administration has confirmed that Chile is the first in line to negotiate joining NAFTA. Brazil in March 1994 proposed extending MERCOSUR into a customs union spanning all of South America, whether as a rival bloc to North America or as a step toward hemisphere-wide integration. [3] In Europe, three members of the European Free Trade Association (EFTA) joined the EU when their populations approved in 1994 votes. In Asia, the Malaysians would like to expand ASEAN into an East Asian Economic Caucus.

Table 1 presents statistics on the intra-regional share of trade undertaken by members of these groupings. Intra-regional shares increased between 1965 and 1990 in some parts of the world: from 0.8 percent to 2.6 percent among the Andean countries, from 35.8 percent to 47.1 percent among the EC 12, and from 19.9 percent to 29.3 percent among the East Asian countries.

All this regional activity leaves some observers concerned that world trade is becoming more regionalized. Is the apparent movement toward regionalization of

[2] The CACM, comprising six Central American countries, was strengthened in 1991. Central American countries have recently joined Caribbean countries (who have their own arrangement, CARICOM), in asking North America for 'parity' with Mexico of access to NAFTA in at least some of their exports. Twenty-three regional agreements within the hemisphere had appeard by 1994.

[3] Consistent with the Enterprise for the Americas Initiative proposed by the Bush Administration in 1990 and the Free Trade Area of the Americas proposed by Clinton in 1994.

the world trading system good or bad? Let us begin by reminding ourselves that such a question is an exercise in the 'second best'.

First-best would be a worldwide regime of free trade, where all countries agree to refrain from erecting barriers and there is a serious international institution to enforce the agreement. Modern trade theory, with its emphasis on imperfect competition and so on, has done little to change this bottom line. [4] But the first-best is an ideal that is rather unlikely to be reached in practice. What sort of international trading arrangement is second-best?

Since its founding, the GATT has been predicated on the assumption that second-best is a regime where each member accords others the status of Most-Favored Nation (MFN), i.e., treats its trading partners equally. The GATT incorporated an important exception to the MFN principle in its Article 24: a subset of members could form a Free Trade Area (FTA), provided certain conditions were met, including that barriers within the FTA were removed completely, rather than only partially, and that barriers against non-members not be raised.

Arguments for the merits of the MFN-cum-Article 24 system could take either of two possible tacks. [5] First one might try to argue, in a static economic sense, that the formation of FTAs under the conditions specified in Article 24 is likely to raise economic welfare, and that other deviations from the MFN principle are not. [6] Second one could argue, in a dynamic political economy sense, that FTAs can act as stepping stones, which help build the political support necessary to negotiate freer trade worldwide. [7] Neither of these possible arguments is especially clear or well-established. It is the first that we examine critically in this paper.

[4] Modern trade theory has come up with a number of circumstances in which unilateral subsidy or other intervention by one country's government is capable of making that country better off (e.g., certain technological spillovers, and strategic industries). But the models do not undermine standard 'free-trade *policy*', which holds that a world in which governments cooperatively agree to limit subsidies or tariffs is better than a world where all are left free to undertake them. To the contrary, the new models usually tend to strengthen the case for multilateral agreements, though this is not explicitly recognized as often as it might be. (These models' conclusions also tend to be very sensitive to imperfect knowledge on the part of governments, or vulnerability to political influence by interest groups.)

[5] Bhagwati (1992), Deardorff and Stern (1992), and de Melo et al. (1992) review the literature. Fieleke (1992) is a useful non-technical review of regional trading arrangements.

[6] Jackson (1993, p. 123), for example, has suggested that the goal of the Article 24 exception to the MFN principle is that FTAs would be trade-creating rather than trade-diverting.

[7] See Lawrence (1991). A good argument for the NAFTA, for example, is that it locks into place trade liberalization that Mexico had undertaken anyway, but that future political forces in Mexico might seek to change. Many considered this argument to be as important as the economic gains from the NAFTA provisions in their own right [or as other considerations such as immigration or U.S.–Mexican political relations].

Paul Krugman has helped to focus the recent debate on whether a global trend toward the formation of trading blocs would be a good thing or a bad thing. But he has supplied equally clever arguments on both sides. In his first contribution (Krugman, 1991a), he focused on the idea that when individual countries form larger groupings, they are liable to become more protectionist, and thus to move farther from the ideal of world free trade. The reasoning was that as a group they would set higher tariff levels vis-à-vis the rest of the world, since they would have more monopoly power to exploit. Units were assumed to set tariffs at a self-maximizing optimal level. [8] He showed that world welfare is lower with a few trading blocs than with the extremes of one or many, and that for specific plausible parameter values, three turned out to be the worst possible number of blocs to have!

His second contribution, Krugman (1991b), provided a useful review of the whole array of issues and factors involved. But it also included a very simple argument that leads to the diametrically opposite conclusion from the first one, that trading blocs are good. It is observed that even without the formation of regional free trade areas or preferential trading arrangements of any sort, countries trade more with their neighbors than with countries from which they are far removed, in part because of transportation costs. To the extent that there is less inter-continental trade, there is less to be diverted (in the language of classical customs union theory).

Imagine, in the limit, that transoceanic transportation costs were so high that all trade took place within continents. Then it must follow from standard trade theory that removal of trade barriers within each continent, that is, the formation of regional free trade areas, would be a good thing: this move within each area would represent the first-best solution of free trade within its own relevant world. Krugman's conclusion is that, to the extent that trade follows the 'natural' lines dictated by proximity, the formation of regional trading blocs is good. Such natural blocs are contrasted with 'unnatural blocs', free trade agreements between individual countries on different continents, which are less likely to be welfare-improving. [9]

[8] A later contribution, Krugman (1992), dropped the assumption of optimal or endogenous tariffs. The conclusions were similar, which showed that another effect was at work in addition to the monopoly-power effect, as explained below.

[9] In what the *Economist* called 'the shootout at Jackson Hole', Summers (1991) agreed with Krugman that natural blocs were likely to be beneficial, while Bergsten (1991) was on the other side. [It should be noted that the idea of proximity as a desideratum for successful FTAs, on the grounds that it would minimize the amount of trade diversion, was not entirely new with Krugman. (See Balassa, 1987, p. 44; Wonnacott and Lutz, 1989.)] The leading opponent is Bhagwati (1992), whose reaction to reports from Jackson Hole was: "The prescription is sufficiently strange and hard to defend for me to wonder whether these distinguished economists truly expressed these views" (footnote 8).

Each of these two arguments is valid within its own assumptions. One way to characterize them is as the limiting polar cases of zero inter-continental transportation costs and infinite inter-continental transportation costs, respectively. The analysis, to be complete, cries out for a more general model that can handle the intermediate realistic case where transportation costs between continents are less than infinite, while greater than zero (and greater than transportation costs *within* continents).

One can imagine several possible rules regarding general preferential trading arrangements (PTAs), in addition to the question of whether the FTA deviation from MFN practice should be encouraged or allowed at all. First, should FTAs be restricted to natural trading partners, as Krugman (1991b) suggests? This would mean that FTAs could only be formed among countries that are located in the same part of the world (e.g., the Western Hemisphere) or perhaps only among neighbors located in the same sub-region (e.g., North America, which would exclude even an agreement between NAFTA and Chile). Second, is the rule sensible that technically requires 100 percent liberalization within a grouping, i.e., that allows only FTAs? Or should partial liberalization be allowed, as de facto prevails in most PTAs? Is there an optimal degree of regionalization that should be encouraged? Third, is it desirable to allow the formation of sub-continental trading arrangements like the Andes Pact or MERCOSUR?

We attempt to do several things in this paper. First, we shall measure the extent to which regionalization is actually taking place, by looking at the magnitude of bilateral trade flows *after one adjusts, by means of the gravity model, for such natural determinants of bilateral trade as GNPs and proximity.*

We consider two alternative possibilities regarding the relevant place to draw the boundaries of the regional groupings: at the level of continental blocs, or at the level of sub-continental FTAs consisting of a few members each (e.g., NAFTA, MERCOSUR, and the Andean Pact). [10]

That the share of intra-regional trade is increasing within a given grouping, as in Table 1, does not necessarily mean that the members of this grouping are undertaking explicit discriminatory trade policy measures to bring this about. Rapid growth in intra-regional trade could be the result of natural factors, i.e., rapid growth in per capita GNPs. Indeed we find that this is the case for East Asia. In Europe and the Americas, on the other hand, there appears to be a statistically significant role for regional trade policies, even after correcting for natural determinants.

Second, we address welfare implications of different possible rules for the formation of preferential trade groupings. At a theoretical level, we shall attempt to complete the Krugman model of the welfare implications of trading blocs for

[10] In this paper we emphasize the sub-regional groupings. A companion paper emphasizes the continents: Frankel et al. (1993).

the realistic case where transportation costs between continents are neither so high as to be prohibitive nor so low as to be the same as costs among neighbors. We consider three applications of the model in turn.

We start with continental FTAs, where intra-continental tariffs are completely eliminated. We shall see that it is not only unnatural FTAs that can leave everyone worse off than under MFN, but that under certain conditions FTAs that are formed along natural intra-continental lines can do so as well. We call such welfare-reducing blocs *super-natural.* [11] We shall see in simulations that this possibility may obtain, in particular, when intercontinental transportation costs, while not necessarily as low as intracontinental costs, are as low as 10 or 20 percent.

Next we consider two different kinds of 'partial regionalization'. One is partial preferential treatment within regional trade groupings. We allow for the formation of Preferential Trade Agreements (PTAs) that differ from the FTAs in that the tariff level is reduced among partners, but not necessarily eliminated. Even though it is technically prohibited by Article 24, many existing regional arrangements are in fact of this partial kind. [12] We will show that a partial movement towards regional integration, as in the case of PTAs with preference below 100%, is superior to FTAs. The super-natural zone, where the regional trading arrangement reduces welfare, occurs for combinations of low intercontinental transport costs *and* high intra-bloc preferences.

A different way to look at a partial trend toward regionalization is to recognize that each continent has many countries, and to consider the formation of several sub-blocs within each continent. The final application of the model is to the question of sub-regional FTAs. We have in mind, for example, the regionalization of trade within the Americas into four FTAs consisting of NAFTA, Central America, the Andean Pact and MERCOSUR. We find that such an arrangement, like continental FTAs, would be worse than the status quo of MFN. If the constraint of Article 24 is relaxed however, and partial liberalization within each regional trading arrangement is allowed, then the formation of several PTAs within each continent is a good thing, although continent-wide PTAs are even better.

In the final part of the paper, we attempt to get a better idea of which of the theoretical welfare possibilities is actually most likely in practice by adopting estimates of the parameters from the 1965–1990 data on bilateral trade that are used in the first part of the paper. An estimate of intra-continental transport costs based on the ratio of c.i.f. to f.o.b. values (and trade shares) is 10 percent, suggesting that super-natural blocs are a real danger. Distance may generate costs

[11] The term was introduced in Frankel (1993).

[12] The United States initially opposed discriminatory tariff policies such as the British Commonwealth preferences in the founding of the GATT, but dropped its opposition in the 1950s in the context of European integration, the GATT rules notwithstanding. Irwin (1993) and Finger (1993) review the history.

beyond the freight and insurance required by physical transport of goods however. An alternative to the c.i.f./f.o.b. calculation is to use the gravity model estimates of the effect of distance on trade. A tentative estimate of the intra-continental parameter, based on the gravity model, is 16 percent. Such an estimate, combined with our other simulation parameter values, would imply that negative returns to regionalization may begin to set in when regional preferences reach about 23 percent.

Most of our conclusions regarding economic welfare presume worldwide symmetry. In other words, we look at the consequences of a worldwide regime of allowing continental blocs or regional FTAs to form; the consequences of the unilateral formation of a single bloc or FTA in one part of the world is not addressed in this paper. [13] It should be noted from the outset that many of the conclusions are tentative, and that many possible considerations are omitted from the analysis.

2. Are regional trade blocs forming?

Frankel (1993) applied to the trading bloc question the natural framework for studying bilateral trade, the gravity model. The gravity model says that trade between two countries is proportionate to the product of their GNPs and inversely related to the distance between them, by analogy to the formula for gravitational attraction between two masses. It has a fairly long history and fits the data remarkably well empirically, though its theoretical foundations are limited. [14] There are not many recent applications of the gravity model to a large cross-section of countries throughout the world. Three others are Wang and Winters (1991), Hamilton and Winters (1992), and Havrylyshyn and Pritchett (1991). [15]

Frankel (1993) and Frankel and Wei (1994), looking at the period 1980–1990, found that: (1) there are indeed intra-regional trade biases in the EC and the Western Hemisphere, and perhaps in East Asia; but (2) the greatest intra-regional bias was in none of these three, but in the APEC grouping, which includes the U.S. and Canada with the Pacific countries; and (3) the bias in the East Asia and Pacific groupings did not *increase* in the 1980s, contrary to the impression that many have drawn from intra-regional trade statistics such as are reported in Table 1.

[13] Saxonhouse (1993) considers this question.

[14] The results of one extensive early project along these lines were reported in Linnemann (1966). Foundations for the gravity model are offered in papers surveyed by Deardorff (1984, pp. 503–506) and Wang and Winters (1992), such as Linnemann (1966).

[15] The focus of these papers was on potential Eastern European trade patterns. The Winters papers report statistically significant within-region biases to the following groupings: EC, Latin America, ASEAN, former British colonies, GSP, and EC preferences under the Lome convention. Havrylyshyn and Pritchett (1991) report significant effects for the EC, LAFTA and CACM.

Frankel and Wei (1993a, b) extend those results in a number of directions. The papers consider various econometric extensions of the original gravity model estimation: the inclusion of pairs of countries that are reported as undertaking zero trade, and a correction for heteroscedasticity based on the size of the countries. The time period is extended 15 years farther back. The results turn out to be robust to these extensions. The papers also considered some economic extensions, in particular testing whether stabilization of bilateral exchange rates has been a factor in promoting intra-regional trade.

Here we focus more on sub-regional groupings in a world of many countries, especially Western Hemisphere groupings such as NAFTA, MERCOSUR, and the Andean Pact. We also describe economic extensions, such as the effects of factor-endowment differences and the difference between a customs union effect and a PTA effect, and social/political extensions such as the effect of common languages or colonial links.

2.1. The gravity model of bilateral trade

One cannot meaningfully investigate the extent to which regional policy initiatives are influencing trade patterns without holding constant for natural economic determinants. The gravity model offers a systematic framework for measuring what patterns of bilateral trade are normal around the world. A dummy variable can then be added to represent when both countries in a given pair belong to the same regional grouping. The goal, again, is to see how much of the high level of trade within each region can be explained by simple economic factors common to bilateral trade throughout the world, and how much is left over to be attributed to a special regional effect.

The dependent variable is trade (exports plus imports), in log form, between pairs of countries in a given year. We have 63 countries in our data set, so that there are 1,953 data points ($= 63 \times 62/2$) for a given year. [16]

The two most important factors in explaining bilateral trade flows are the geographical distance between the two countries, and their economic size. Indeed, these two variables give the gravity model its name.

A large part of the apparent bias toward intra-regional trade is certainly due to simple geographical proximity. Indeed Krugman (1991b) suggests that *most* of it may be due to proximity, so that the three trading blocs are welfare-improving 'natural' groupings. Despite the obvious importance of distance and transportation costs in determining the volume of trade, empirical studies surprisingly often neglect to measure this factor. Our measure is the log of distance between the two

[16] The list of countries, and regional groupings, is given in an Appendix to Frankel (1994) and the Frankel and Wei papers. The Andes Pact grouping consists of Bolivia, Peru, Ecuador, Colombia and Venezuela, as well as Chile (even though Chile, and more recently Peru, have pulled out).

major cities (usually the capital) of the respective countries. We also add a dummy 'Adjacent' variable to indicate when two countries share a common land border.

Entering GNPs in product form is empirically well-established in bilateral trade regressions. It can be justified by the modern theory of trade under imperfect competition. In addition there is reason to believe that GNP per capita has a positive effect on trade, for a given size: as countries become more developed, they tend to specialize more and to trade more. [17] The equation to be estimated, in its most basic form, is

$$\log(T_{ij}) = \alpha + \beta_1 \log(GNP_i GNP_j) + \beta_2 \log(GNP/pop_i GNP/pop_j) + \beta_3 \log(DISTANCE_{ij}) + \beta_4(ADJACENT_{ij}) + \gamma_1(EA_{ij}) + \gamma_2(EC_{ij}) + \gamma_3(NAFTA_{ij}) + u_{ij}. \quad (1)$$

EA, *EC*, and *NAFTA* are three of the dummy variables we use when testing the effects of membership in a common regional grouping standing for East Asia, European Community, and North America.

Table 2 reports results that extend from 1965 to 1990. We find all four standard gravity variables to be highly significant statistically (> 99% level).

The 1990 coefficient on the log of distance is about −0.6, when the adjacency variable (which is also highly significant statistically) is included at the same time. This means that when the distance between two non-adjacent countries is higher by 1 percent, the trade between them falls by about 0.6 percent. We have also tried distance measures that take into account the greater distances involved in sea voyages around obstacles like the Cape of Good Hope and Cape Horn, generously supplied by Winters and Wang (1992), with little effect on the results.

The coefficient of distance varies a bit over the course of the earlier observations, but with no clear trend. Disaggregated results show higher distance effects for manufactures than for agricultural products or other raw materials, which are bulkier. [18] These findings suggest to us that physical transport costs may not be the most important component of costs associated with distance.

The estimated coefficient on the product of per capita GNPs varies in the 0.26–0.40 range from 1965 to 1980, indicating that richer countries do indeed trade more. This term declines during the 1980s. The estimated coefficient for the log of the product of the two countries' GNPs holds roughly steady at about 0.7, indicating that, though trade increases with size, it increases less-than-pro-

[17] In other words, a rich country will trade more with another rich country than with a poor country, even if the latter has a larger population so that its total GNP is as large as the others. This property of some modern trade theories directly contradicts the classical Heckscher–Ohlin theory of comparative advantage based on differences in factor endowments. Bergstrand (1989) includes both imperfect-competition effects and factor-proportions effects in his econometric gravity model.

[18] Reported as Table 2 in the original conference paper version [available as CIDER working paper no. C94-034], but omitted here to save space.

Table 2
Gravity model with western hemisphere broken into sub-regions (aggregate trade, 1965–1990) [a]

	1965	1970	1975	1980	1985	1990
GNP	0.63 **	0.64 **	0.72 **	0.74 **	0.53 **	0.75 **
	(0.02)	(0.02)	(0.18)	(0.02)	(0.02)	(0.01)
GNP per capita	0.26 **	0.36 **	0.27 **	0.29 **	0.06 **	0.09 **
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	0.02
Distance	−0.44 **	−0.53 **	−0.68 **	−0.56 **	−0.35 **	−0.56 **
	(0.04)	(0.04)	(0.05)	(0.04)	(0.05)	(0.04)
Adjacency	0.62 **	0.58 **	0.45 *	0.68 **	0.85 **	0.79 **
	(0.17)	(0.17)	(0.19)	(0.18)	(0.20)	(0.16)
EAEC	1.40 **	1.71 **	0.86 **	0.78 **	−0.41 #	0.63 **
	(0.29)	(0.29)	(0.31)	(0.27)	(0.28)	(0.24)
APEC	0.61 **	0.76 **	0.97 **	1.49 **	1.58 **	1.32 **
	(0.21)	(0.21)	(0.22)	(0.18)	(0.20)	(0.17)
EC	0.24 ##	0.11	−0.06	0.21	1.51 **	0.49 **
	(0.17)	(0.17)	(0.18)	(0.18)	(0.19)	(0.16)
EFTA	0.04	0.07	0.01	0.58	0.06	−0.05
	(0.30)	(0.30)	(0.32)	(0.32)	(0.36)	(0.29)
NAFTA	−0.12	−0.41	−0.44	0.08	−0.58	0.05
	(0.63)	(0.64)	(0.70)	(0.71)	(0.75)	(0.63)
MERCOSUR	−0.18	0.46	0.43	0.81 ##	0.72	2.09 **
	(0.46)	(0.46)	(0.50)	(0.51)	(0.55)	(0.46)
ANDEAN	−0.51	−0.13	1.15 **	1.11 **	−0.17	0.90 **
	(0.39)	(0.32)	(0.35)	(0.32)	(0.59)	(0.29)
# Observations	1194	1274	1453	1708	1343	1573
SEE	1.07	1.08	1.18	1.20	1.28	1.08
Adjusted R^2	0.68	0.71	0.71	0.71	0.51	0.77

[a] Standard errors are in parentheses.
** denotes significant at 1% level ($t \geq 2.576$);
* denotes significant at 5% level ($t \geq 1.96$);
# denotes significant at 10% level ($t \geq 1.645$);
denotes significant at 15% level ($t \geq 1.44$).
All variables except the dummies are in logarithms.

portionately (holding GNP per capita constant). This reflects the familiar pattern that small economies tend to be more dependent on international trade than larger, more diversified, economies.

2.2. *Estimation of trade-bloc effects*

If there were nothing to the notion of trading blocs, then these four basic variables might soak up all the explanatory power. There would be nothing left to attribute to a dummy variable representing whether two trading partners are both located in the same region. In this case the level and trend in intra-regional trade

would be due solely to the proximity of the countries, and to their rates of overall economic growth.

But we found that dummy variables for intra-regional trade *are* highly significant statistically. [19]

In earlier results, if two countries were both located in the Western Hemisphere, they traded with each other by an estimated 86 percent more in 1980 than they would have otherwise [exp(0.62) = 1.86], after taking into account distance and the other gravity variables. (Table 4 below shows even bigger effects.) Table 2 replaces the Western Hemisphere bloc variable with separate dummy variables for three sub-regions: NAFTA, MERCOSUR, and the Andean Pact. Tight standard errors and significant coefficients are not to be expected, in light of the small number of observations: 3 ($= 3 \times 2/2$) for NAFTA, 6 ($= 4 \times 3/2$) for MERCOSUR, and 10 ($= 5 \times 4/2$) for the Andean Pact. But the point estimates are of interest nonetheless, as these are the groupings with explicit trade preferences. The estimates for MERCOSUR and the Andean Pact turn positive in 1970, the latter significantly so in 1975 and 1980, and both significant in 1990. Remarkably, members of MERCOSUR in 1990 trade with each other eight times as much [exp(2.09) = 8.08] as would similar neighbors elsewhere in the world. The NAFTA coefficient only turns positive in 1985. As one would certainly expect from the extremely small number of observations, it is not statistically significant.

As recently as 1980, the EC bloc effect was not statistically significant. The effect in 1985 is highly significant. A 1985 coefficient of 1.14 suggests that if two countries are both located in the European Community, their bilateral trade is three times as high as it would otherwise be [exp(1.14) = 3.13]. EFTA is never significant.

As in earlier results, the coefficient for the East Asian grouping [not including Australia and New Zealand] is highly significant, but diminishes in the 1980s, rather than increasing as often assumed. The same is true of APEC. The rapid growth of East Asian economies is in itself sufficient to explain the increase in the intra-regional trade shares evident in Table 1.

We tried dropping the specific sub-regional groupings in the Western Hemisphere and replacing them with one dummy variable to indicate whenever a pair of countries belongs to the same PTA or FTA, regardless which one it is, and another to indicate whenever the pair belongs to the same Customs Union or Common Market. The distinction is that in the latter two arrangements, external tariffs are made uniform. The PTA/FTA variable is often statistically significant, particu-

[19] In some cases, e.g., the EC, these results confirm what one might have guessed from looking simply at intra-regional trade shares, as in Table 1. But in other cases, e.g., EFTA and MERCOSUR, the corrections of the gravity model make a big difference. Typical of many studies using simple intra-regional shares, Wonnacott and Lutz, p. 76, show increases in intra-regional trade attributed to the formation of the EC, EFTA and the Andes Pact, and not to LAFTA or ASEAN.

larly when the tests are run on manufacturing products alone. The CU/CM variable is not. [20]

Next, we added a dummy variable to represent when both countries of a pair spoke a common language or had colonial links earlier in the century. We allowed for English, Spanish, Chinese, Arabic, French, German, Japanese, Dutch, and Portuguese. [21] Two countries sharing linguistic/colonial links tend to trade roughly 65 percent more than they would otherwise [exp(0.5) = 1.65]. [22] We tested whether some of the major languages were more important than the others. Chinese is the only one that might qualify. Two Chinese-speaking countries appear to trade four times as much as other countries [23].

Somewhat surprisingly, the inclusion of the linguistic/colonial terms has little effect on the other coefficients. The trade blocs remain significant, with increasing trends over the period 1965–1990 in each case but APEC and East Asia.

Finally, we also tried to capture classic Heckscher–Ohlin effects. First we tried including bilateral absolute differences in GNP/capita figures for 1990, reported in Table 3. The variable did not have the positive effect that one would expect if countries traded capital-intensive products for unskilled-labor-intensive products. Rather, it had a moderately significant *negative* effect, as in the Linder hypothesis that similar countries trade more than dissimilar ones.

Next we tried, in Table 4, gravity estimates that include more direct measures of factor endowments: the two countries' differences in capital/labor ratios, educational attainment levels, and land/labor ratios. The data (for a subset of 656 of our 1,953 pairs of countries) was generously supplied by Gary Saxonhouse. There is only a bit of support for these terms, specifically for capital/labor ratios and educational attainment in 1980. The coefficients on the bloc variables and other effects change little qualitatively.

The gravity model results thus show that statistically significant regional trading arrangements are indeed springing up in a number of places. The next

[20] Tables 4 and 4a in the original conference paper version [available as CIDER working paper no. C94-034], omitted here to save space.

[21] Havrylyshyn and Pritchett (1991) found that three languages are significant in the gravity model – Portuguese, Spanish and English, in decreasing order of magnitude. In a study of poor countries, Foroutan and Pritchett (1992) find that French, Spanish and English are statistically significant.

[22] The results are reported in Table 5a of the original conference paper version and in Table 5b for the case of manufactured goods [available as CIDER working paper no. C94-034]. The language coefficient is not statistically significant when the test is run as in Table 5b, where the inclusion of five individual major languages create multicollinearity with the general language term. But the coefficient is significant for half the years when the analogous test is run on aggregate trade (Table 6 in Frankel and Wei (1993b)) and is highly significant for all years when the coefficient is constrained to be the same for different languages (Table 1 in Frankel and Wei (1993a)).

[23] Taiwan-China trade does not appear in the statistics, because it is officially non-existent. Much of it goes through Hong Kong, and is thus counted twice. An attempt to correct for this factor eliminates the extra effect of the Chinese language term (Table 3 of Frankel and Wei (1993a)).

Table 3
Income difference in a gravity model

Equation	Const	GNP	GNP/capita	Difference in GNP/capita	Dist	Adja	WH	EC	APEC	R^2/S.E.E.
(1)	3.23 **	0.79 **	0.09 **	−0.06 *	−0.62 **	0.98 **				0.74/1.14
	0.35	0.02	0.02	0.02	0.04	0.17				
(2)	2.89 **	0.76 **	0.10 **	−0.04 #	−0.50 **	0.74 **	0.88 **	0.42 **	1.63 **	0.77/1.07
	0.34	0.02	0.02	0.02	0.04	0.16	0.14	0.16	0.12	

[a] **, (*), [#] denote significant at the 99%, (95%), [90%] level. 'R^2' is degree-of-freedom adjusted R^2. 'S.E.E.' is 'standard error of regression'. All variables (dependent variable and regressors) except the dummies are in logarithms. GNP – product of two GNPs; GNP/capita – product of two per capita GNPs; Difference in GNP/capita – absolute value of the difference in two per capita GNPs; Dist – 'great circle distance' between the economic centers of two countries; Adja – dummy for countries with a common land border; WH – dummy for membership in Western Hemisphere; EC – dummy for membership in the EEC; APEC – dummy for membership in the Asia Pacific Economic Cooperation forum.

question is whether this trend constitutes an undesirable threat to the world trading system.

3. The theory of trade with imperfect substitutes and transportation costs

This and the next parts of the paper attempt to settle the Krugman vs. Krugman controversy regarding the desirability of trading blocs, by constructing a more general model that can handle the intermediate realistic case where transportation costs between continents are less than infinite, while greater than zero (and greater than transportation costs *within* continents). The ultimate goal is a preliminary matching-up of the theory up with the preceding section's empirical estimates of the effects of transportation costs and regional trading arrangements on the volume of bilateral trade, in order to allow an evaluation of different trade arrangements.

3.1. The differentiated products model

We work with a familiar model of trade under monopolistic competition due to Krugman (1980). Our contribution is to extend this model to many countries, allowing for tariffs and transportation costs, both within continents and between continents, and to apply it to study the welfare implications of the formation of trading blocs.

The Krugman market structure has the property of ruling out strategic interaction among firms. Goods enter symmetrically into the utility function

$$U = \sum_i c_i^{\theta}; \quad 0 < \theta < 1, \tag{2}$$

Table 4
Factor endowment in a gravity model [a]

	GNP	GNP/capita	Dist	Adja	WH	EAEC	APEC	EC	EFTA	K/L	Edu	Land/L	adj. R^2/SEE	#Obs
1980	0.71 **	0.38 **	−0.49 **	0.54 *	1.07 **	0.95 **	1.70 **	0.30 #	0.03	0.08 *			0.78/0.98	656
	0.02	0.02	0.06	0.21	0.27	0.26	0.19	0.17	0.34	0.03				
	0.65 **	0.44 **	−0.48 **	0.51 *	1.00 **	0.95 **	1.67 **	0.28 #	0.06		0.10 **	0.79/0.98	656	
	0.03	0.03	0.06	0.21	0.27	0.26	0.19	0.17	0.19		−0.03			
	0.72 **	0.41 **	−0.45 **	0.55 **	1.06 **	0.80 **	1.79 **	0.29 #	−0.01			−0.08 *	0.78/0.99	656
	0.02	0.03	0.06	0.21	0.28	0.27	0.19	0.17	0.34			0.03		
	0.65 **	0.42 **	−0.46 **	0.56 **	1.06 **	0.86 **	1.72 **	0.31 #	0.10	0.08 *	0.10 **	−0.06 *	0.79/0.98	656
	0.03	0.03	0.06	0.21	0.27	0.27	0.19	0.17	0.33	0.03	0.03	0.03		
1985	0.73 **	0.40 **	−0.60 **	0.52 *	0.79 **	0.73 **	1.34 **	0.46 **	−0.27	0.03			0.80/0.95	652
	0.02	0.03	0.05	0.21	0.28	0.25	0.18	0.16	0.33	0.03				
	0.74 **	0.40 **	−0.60 **	0.51 *	0.78 **	0.72 *	1.34 **	0.46 **	−0.29		−0.004		0.80/0.96	652
	0.02	0.03	0.05	0.21	0.28	0.25	0.18	0.16	0.33		0.03			
	0.74 **	0.41 **	−0.57 **	0.53 **	0.79 **	0.62 *	1.40 **	0.47 **	−0.29			−0.06 #	0.81/0.95	652
	0.02	0.03	0.05	0.21	0.28	0.25	0.18	0.16	0.32			0.03		
	0.74 **	0.40 **	−0.58 **	0.54 *	0.81 **	0.63 **	1.40 **	0.47 **	−0.27	0.03	−0.01	−0.06	0.81/0.95	652
	0.02	0.03	0.05	0.21	0.28	0.26	0.18	0.16	0.32	0.03	0.03	0.03		
1990	0.65 **	0.15 **	−0.48 **	0.75 **	1.36 **	0.51 *	1.34 **	0.40 **	−0.31	0.01			0.82/0.87	655
	0.02	0.02	0.05	0.21	0.24	0.23	0.17	0.15	0.30	0.03				
	0.62 **	0.17 **	−0.48 **	0.74 **	1.33 **	0.52 **	1.33 **	0.40 **	−0.29		0.04		0.82/0.87	655
	0.03	0.03	0.05	0.19	0.24	0.23	0.17	0.15	0.30		0.03			
	0.64 **	0.15 **	−0.50 **	0.72 **	1.33 **	0.63 **	1.28 **	0.39 **	−0.32			0.06 *	0.82/0.87	655
	0.02	0.02	0.05	0.19	0.24	0.24	0.17	0.15	0.30			0.03		
	0.62 **	0.17 **	−0.51 **	0.72 **	1.32 **	0.67 **	1.26 **	0.39 **	−0.28	0.02	0.04	0.07 *	0.82/0.87	655
	0.02	0.02	0.05	0.19	0.24	0.24	0.17	0.15	0.30	0.03	0.03	0.03		

[a] **, (*), [#], {##} denote 'significant at the 99%, (95%), [90%] and {85%} levels', respectively. All regressions have an intercept, which is not reported here. All variables except the dummies are in logs. 'K/L, Edu, and Land/L' are differences in capital–labor ratio, educational attainment, and land-labor ratio, respectively. The endowment variables are for 1980 only, but used in regressions for 1985 and 1990 as well.

where c_i is the consumption of the ith variety. There is a large number of goods being produced (n), but this number is much smaller than the potential number of goods or varieties.

This utility function results in preference for variety by the consumers. The higher the parameter θ, the lower the love for variety. In the limit of perfect substitutability, $\theta = 1$: consumers care only about the total quantity consumed, not about different brand names. In the limit of complete love for variety, $\theta = 0$: consumers, like stamp collectors or bird watchers, care only about the number of varieties consumed, and not at all about the quantity of each.

Labor is the only factor of production. The total national supply of labor is L. Increasing returns are introduced by assuming a fixed cost and a constant marginal cost in the production of each of the varieties. We assume that individual consumers maximize their utility, individual firms maximize their profits, and free entry assures a zero-profit equilibrium. Under these simple assumptions, the scale of output of each variety does not depend on the size of the economy. Rather, it is the number of varieties n that increases when the size of the economy (L) increases:

$$n = \frac{L(1-\theta)}{\alpha} \tag{3}$$

where α is a parameter representing the fixed costs of setting up production of a new variety. Notice that in the limit, approaching the case of zero substitutability ($\theta = 0$), the bare minimum (one unit) of each of L/α varieties will be produced, since consumers care only about the number of varieties available. (Details of this derivation, and of others below, are given in Stein and Frankel, 1993.)

To see the gains from international trade that arise here from the opportunity to consume a greater variety of goods, we assume that countries have similar tastes and technologies. If we have two countries of equal size, allowing for unfettered trade will double the number of available varieties in each country and thus raise utility.

3.2. *Introduction of transport costs and tariffs*

We will think of the world as being divided into a number of continents (C), each of them equidistant from one another. Each of these continents is composed of a number of nations (N). Transport costs will be assumed, following Krugman (1980), to be of Samuelson's iceberg type, which means that only a fraction of the good shipped arrives; the rest is lost along the way. [24]

The cost of transport within a continent will be represented as a, while that of transport significant (across the ocean), is an additional b, where $0 \leqslant a,b \leqslant 1$. The

[24] The notion of transportation costs should probably be understood as transactions costs, encompassing not just physical transportation of goods but also costs of communications and the idea that countries tend to have a better understanding of their neighbors and their institutions.

fraction of a good shipped intra-continentally that arrives to the market is $1 - a$. The fraction of a good that arrives in the case of trade between countries in different continents is $(1 - a)(1 - b)$.

Tariffs will be treated in a standard way. When a consumer buys a foreign good, the government levies an ad-valorem tariff t. [Our basic theoretical model will assume that the tariff is levied as a percent of the value of the good expressed in f.o.b. terms, i.e., not including transportation costs. For some purposes it may be more convenient, as well as more realistic, to assume that it is levied as a proportion of the value of the good in c.i.f. terms, i.e., including transportation costs. [25]] The level of tariffs is exogenous, and assumed to be uniform across countries, representing the MFN principle, until we are ready to examine preferential trading arrangements.

For simplicity, we will assume that each one of the countries is equal in size. The symmetry of the model now assures that the producers' prices are the same in every country, as well as the number of varieties and the quantity of each variety produced in every country. Prices of foreign goods faced by home consumers are higher than prices of home goods, due to transportation costs and tariffs. If the producer prices in every country are p, then the price the domestic consumer will have to pay for every unit of foreign good consumed will be

$$p_{c,t} = \frac{p}{1-a} + pt, \quad p_{nc,t} = \frac{p}{(1-a)(1-b)} + pt \tag{4}$$

where the subscript c refers to goods imported from within the continent, and nc inter-continentally. Notice that import prices depend positively on tariffs and transportation costs. In the absence of tariffs, the prices faced by the home consumers are $p_c = p/(1 - a)$ and $p_{nc} = p/(1 - a)(1 - b)$.

Since the home consumer will be paying different prices for the consumption of home and foreign products, he or she will be consuming them in different quantities. The next step is to derive, from the utility function, the consumption of each foreign variety (both from neighbor countries and from countries in other continents) relative to the consumption of each home variety. We continue to assume that tariffs t are levied on all foreign goods.

The first-order conditions for the consumer's problem yield the relative consumption of each variety:

$$\frac{c_i^c}{c_i^h} = \left(\frac{p}{p_{c,t}}\right)^{1/(1-\theta)}, \tag{5}$$

$$\frac{c_i^{nc}}{c_i^h} = \left(\frac{p}{p_{nc,t}}\right)^{1/(1-\theta)}, \tag{6}$$

[25] The c.i.f.-based assumption is pursued in another paper.

where c_i^c and c_i^{nc} are the domestic consumer's consumption of foreign varieties, from countries within the continent and across the ocean respectively, and c_i^h is the domestic consumer's consumption of the home varieties. Thus the elasticities of demand are $\epsilon_x = 1/(1-\theta)$.

We derive the bilateral volume of trade (BVT) in Frankel et al. (1993). [26] It has the desired property that, to the extent that tariffs and transportation costs raise the price in an importing country, the volume of trade will fall, to an extent determined by the elasticity. By assigning values to the parameters a, b, t, θ, N and C, we can obtain the exact effect on BVT of any symmetrical arrangement.

In order to explore the desirability of potential trading blocs, we now need to introduce a measure of welfare.

3.3. Welfare implications of trade agreements

Given that we are working with a symmetric model, the natural way to look at world welfare is to derive the utility of a representative individual in any country. To determine the utility of the consumer, we need to know how much he or she is consuming of each good, and introduce these values into the utility function. Eqs. (5) and (6) above gives us the relative consumption of each home and foreign variety, so we only need to determine the consumption of each home variety, c_i^h. We do this by expressing the budget constraint in terms of c_i^h, and taking into account the redistribution of the tariff revenue to consumers.

If we normalize n, p, and w to be 1, we can obtain, after some algebra,

$$c_i^h = 1/\left[1 + (N-1)\left(\frac{1}{p_{c,t}}\right)^{1/(1-\theta)}(p_{c,t} - t) + (C-1)N\left(\frac{1}{p_{nc,t}}\right)^{1/(1-\theta)}(p_{nc,t} - t)\right]. \tag{7}$$

Once we have the consumption of domestic varieties, the consumption of foreign varieties can be obtained from the relative consumption Eqs. (5) and (6):

$$c_i^c = c_i^h\left(\frac{1}{p_{c,t}}\right)^{1/(1-\theta)} \quad ; \quad c_i^{nc} = c_i^h\left(\frac{1}{p_{nc,t}}\right)^{1/(1-\theta)} \tag{8}$$

Replacing these into the utility function, we obtain the value of the utility of the representative individual:

$$U = c_i^{h\theta}\left[1 + (N-1)\left(\frac{1}{p_{c,t}}\right)^{\theta/(1-\theta)} + (C-1)N\left(\frac{1}{p_{nc,t}}\right)^{\theta/(1-\theta)}\right]. \tag{9}$$

[26] In Stein and Frankel (1993), we also examine implications of FTAs for trade diversion and trade creation, which contributes some intuition to the welfare results.

Given values for the parameters a, b, t, θ, N and C, we can plug the price Eqs. (4) into (7), plug the value of c_i^h into Eq. (8), and finally substitute into (9) to obtain the value of the utility of the representative individual, which is our measure of world welfare.

Eq. (9) is the expression for utility in the absence of free trade agreements. It is simple to calculate utility under other arrangements in the same manner. When trading blocs are formed, we just introduce the new set of relative prices faced by the home consumers into the model, and we can obtain new results for utility in a similar way.

4. Welfare implications of free trade areas

We have presented a model that allows us to analyze the desirability of different trade arrangements from the perspective of world welfare. We now present some applications.

4.1. The number of blocs and welfare in the absence of transportation costs

The purpose of this exercise is to check that our model yields Krugman's U-shaped welfare curve as a function of the number of blocs, in the absence of transportation costs. We assume a world consisting of 60 countries, and study the welfare implications of dividing the trading system equally into different numbers of blocs. Fig. 1 shows the results of our simulations for a value of $\theta = 0.75$, and tariffs of ten, twenty and thirty percent. [27] We can see that welfare is minimized for a small number of blocs, three in the cases of twenty and thirty percent tariffs, and two blocs in the case of a tariff rate of ten percent. Welfare increases gradually beyond the minimum-welfare number of blocs. [28]

In Krugman's model (1991a), there are two reasons for the increase in welfare as the number of blocs becomes larger. One reason is that blocs set tariffs optimally, and become less protectionist as the market power of each one declines. The other reason is that as the number of blocs increases, a larger portion of their demand is satisfied from outside the bloc, and tariffs become less distortionary. Tariffs introduce a wedge between the prices of bloc varieties and those of non-bloc varieties, but not between two non-bloc varieties. The greater the number of non-bloc varieties relative to those from within the bloc, the smaller the

[27] Krugman (1991a) considers for his simulations three different values for the elasticity of substitution: 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 $\theta = 0.75$.

[28] In Fig. 1 the level of welfare is normalized to be 1 in the case of a single bloc, i.e., the case of worldwide free trade.

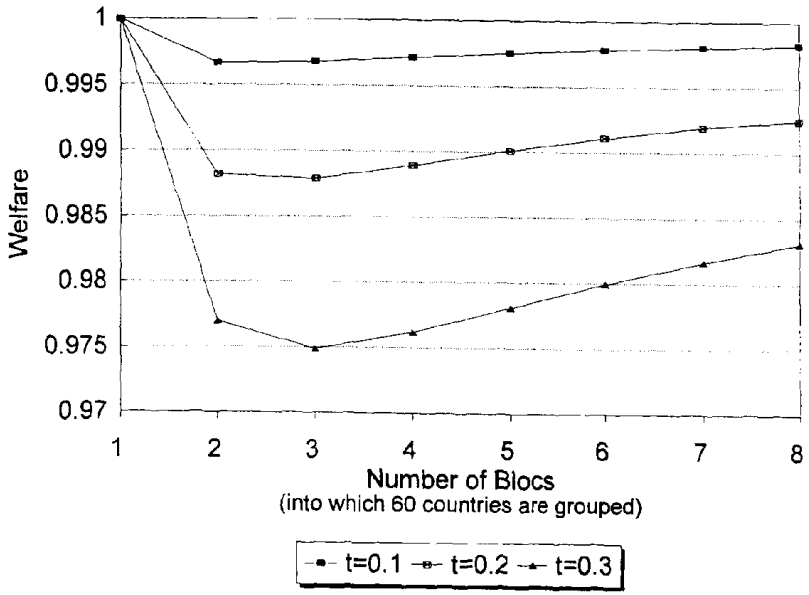

Fig. 1. Number of blocs and welfare (zero transport costs; $\theta = 0.75$).

distortionary effect of a given tariff level. In our model, where tariffs are assumed exogenous, the shape of the curve is explained completely by this latter reason. [29]

4.2. *Transport costs and the welfare effects of continental free trade agreements*

In this application, we study how the effect of the formation of free trade agreements on welfare depends on intercontinental transportation costs. Thus we are able to fill in the realistic intermediate case between Krugman's polar cases of zero and infinite intercontinental transportation costs.

For the purposes of the simulations presented here, transportation costs within continents are for simplicity kept at zero. Our base-case substitution parameter is $\theta = 0.75$ and our base-case worldwide level of multilateral tariffs is $t = 0.3$. We begin with a Krugman (1991b) world that consists of three continents, with two countries in each continent.

Fig. 2 shows the percentage change in welfare associated with the formation of trading blocs, both of the natural and unnatural type. 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 a bloc with its neighbor, the critical value of b is approximately 0.15. For higher values of b, the formation

[29] As in Krugman (1992).

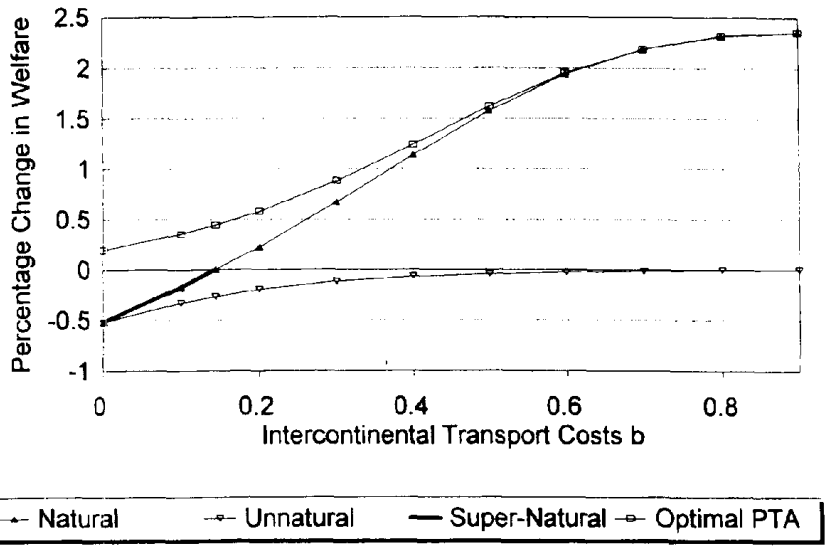

Fig. 2. Effect of continental blocs: Natural, unnatural, and super-natural ($\theta = 0.75$; $t = 0.3$; $a = 0$; $N = 2$; $C = 3$).

of continental trading blocs will result in improvements in welfare. (Remember, in the limit, Krugman's case where $b = 1$.) For lower values of b, continental blocs would reduce welfare. (Remember the limit case where $b = 0$.) As noted in the introduction, we label such welfare-reducing arrangements 'super-natural blocs', to indicate that intercontinental transportation costs are not high enough to justify the formation of blocs even along the lines of geographical proximity. The benefit of forming trading blocs becomes much larger, and the danger of entering the super-natural zone diminishes, as t and θ increase. (An appendix to CIDER working paper No. C94-034 undertakes the sensitivity analysis. [30])

Unnatural trading blocs, where each country forms a bloc with one other country outside the continent, result in distinctly lower welfare for small values of b. When $b = 0$ they coincide with natural blocs. Unnatural blocs then have a steadily smaller effect as b tends to 1. The reason for this is intuitive: as b gets closer to 1, the bilateral volume of trade between countries in different continents

[30] Fig. 3 in Stein and Frankel (1993) represents the effects of agreements on welfare for $\theta = 0.85$ and $t = 0.35$. In this case, the effect of the formation of natural trading blocs on welfare is substantial, even for low levels of intercontinental transportation costs. Indeed, for these parameter values, blocs are welfare-improving even when $b = 0$. [The intuitive explanation is that residents consume so much of the home good, that it is a net gain to realign correctly the relative price of a neighbor's good in terms of the home good, even though this distorts the relative price of the neighbor's good in terms of all goods produced elsewhere in the world.] Thus Krugman's idea that the consolidation of six blocs into three in the absence of transportation costs is bad depends on the values of the parameters t and θ.

will tend to 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.

5. The effects of preferential trading arrangements with partial liberalization

Regionalization can fall short of full continental FTAs, either with respect to the magnitude of the tariff preferences or the fraction of the continent covered by each bloc.

5.1. Allowing for preferential trade agreements on each continent

In this application, we will have another look at trading blocs of the 'natural' kind (among neighbors), but we will allow for the formation of PTAs, i.e., partial liberalization. To do this, we need to modify our model slightly. The tariff level between partners, instead of zero, will now be $(1-k)t$, where $0 \leqslant k \leqslant 1$, and k is the degree of preference for intra-bloc trade or intra-bloc liberalization. The price of partner varieties faced by domestic consumers now becomes

$$p_c = \frac{p[1+(1-a)(1-k)t]}{1-a}. \tag{10}$$

Until now we were only considering the two special cases of $k=0$ (absence of blocs) and $k=1$ (Free Trade Areas). Now intra-bloc preferences can be set at any level. We will begin, as in the previous application, with a world that consists of three continents, each formed by two countries.

What is the level of intra-bloc preference that will maximize welfare? Fig. 3 shows the welfare level as a function of k, for $t=0.3$, $\theta=0.75$, $a=0$, and several values of b. [31] For example, for $b=0.1$ the level of welfare for the extreme of full continental FTAs ($k=1$) is lower than the opposite endpoint of MFN or non-discrimination ($k=0$). This is the case of the super-natural FTA.

The important thing to notice in Fig. 3 is that for every level of intercontinental transport costs, the degree of intra-bloc preference associated with maximum welfare is in between 0 and 1. This implies that, in general, PTAs with less than 100% preference are superior to FTAs. [32] This result is not new in the literature. It was first suggested by Meade (1955). But it is significant if we contrast it with

[31] For each set of parameter values (transport cost and θ) welfare is normalized to be 1 under free trade in the figure.

[32] 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.

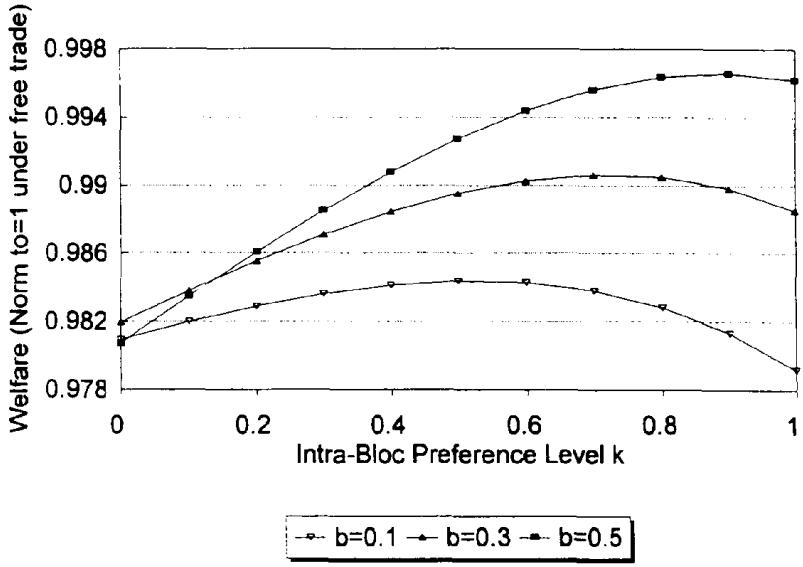

Fig. 3. Effects of preferential trade arrangements ($\theta = 0.75$; $t = 0.3$; $a = 0$; $N = 2$; $C = 3$).

GATT's article 24, which allows for FTAs and Customs Unions as exceptions to the Most Favored Nation (MFN) clause, but not for PTAs with less than 100% preference. [33]

Fig. 3 suggests that starting from the absence of trading blocs, a small movement in the direction of increased regionalization (by increasing intra-bloc preference) is always a good thing. We can say that there are positive returns to regionalization up to the point of maximum welfare, and negative returns to regionalization thereafter.

Another way of looking at this issue is to show all possible combinations of intercontinental transport cost b and intra bloc preference k, for a given set of values chosen for the other parameters. Frankel et al. (1993) does this for a world of six countries (= 3 continents of 2 countries each) and tariffs levied in c.i.f. form. [34]

In reality, the world of course consists of more than three continents of two countries each. In Fig. 4 we here repeat the experiment for the more realistic (if still stylized) case where the world consists of four continents of 16 countries each. We could get to four continents either by counting North and South America

[33] Bhagwati (1992) discusses possible reasons for the inclusion of Article 24 in the GATT.

[34] Fig. 4. Fig. 4b in that working paper also does it for the 64-country case. Fig. 4 in the CIDER working paper C94-034 version of this paper does the 64-country case with tariffs levied on the f.o.b. price.

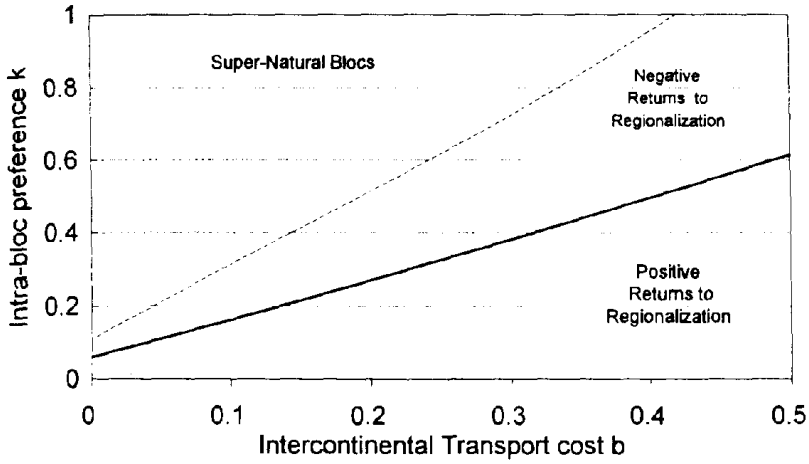

Fig. 4. Returns to regionalization ($a = 0$; $\theta = 0.75$; $t = 0.3$; $N = 16$; $C = 4$).

separately, or adding the Mideast/Africa. This 64-country set-up has the virtue of corresponding roughly to the data set in our gravity model. The solid line represents the level of intra-bloc preference that maximizes welfare at each level of transportation cost b. Below this line, there are positive returns to regionalization, i.e., increasing the degree of preference will result in higher welfare. Above this line, increases in the preference are welfare-reducing. We call this the area of negative returns to regionalization NRR.

Within the NRR area, the dotted line represents, for every level of intercontinental transportation cost, the intra-bloc preference level that yields the same welfare as $k = 0$ (i.e., the absence of trading blocs). The trade arrangements that lie above this dotted line are welfare-reducing, relative to the status quo of MFN. These are the ones we call super-natural trading blocs. [35]

We see that negative returns to regionalization set in sooner than in the six-country case. If inter-continental transport costs are 0.2, then the world reaches the welfare optimum when intra-bloc preferences are as low as 27 percent, and enters the super-natural zone when they are 51.5 percent. If inter-continental transport costs are as low as 0.1, then negative returns to regionalization set in even sooner. [36]

We have seen, within the terms or our model, that (1) a little bit of regionalization, defined as a small degree of preferences for continental neighbors, is a good thing, but that (2) 100 percent liberalization within a continental FTA is carrying

[35] Note that the 'super-natural' bloc area does not always exist. It depends on the parameter values.

[36] The levels of welfare corresponding to the FTA extreme and the optimally-chosen PTA are graphed, for the range of values of b, in Fig. 5 of Frankel et al. (1993).

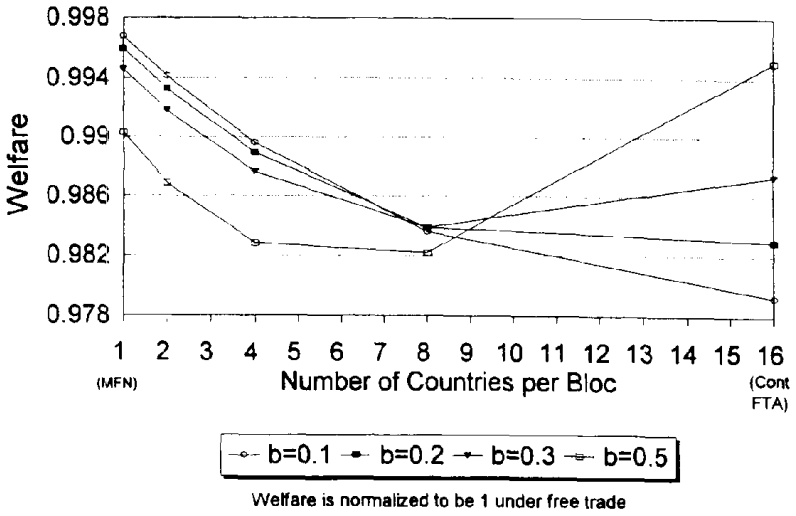

Fig. 5. Effects of sub-continental free trade areas ($a = 0$; $\theta = 0.75$; $t = 3$; $N = 16$; $C = 4$).

regionalization too far. In terms of static economic welfare, the apparent conclusion under our assumptions is that Article 24 of the GATT would do well to relax the stipulation that liberalization within a preferential trading area be complete.

5.2. *Welfare effects of sub-continental blocs*

Application 3 has shown a sense in which a partial movement towards regionalization may be better than a total one. We now look at another way in which 'partial' trends toward regionalization can be understood: the formation of multiple blocs on each continent. We have in mind recent sub-continental FTAs of two countries each, like the Canada–U.S. FTA or the customs union between Colombia and Venezuela that was instituted in January 1992. We also wish to consider somewhat bigger groupings, like the NAFTA, CACM, MERCOSUR, and Andean Pact in the Western Hemisphere.

For this purpose, we run a simulation where the world consists of 4 continents, each of them containing 16 countries. This allows us to compare welfare under the MFN rule with that associated with 8 sub-continental FTAs on each continent of 2 countries each, 4 of 4 each, or 2 of 8 each. The results of this simulation are seen in Fig. 5. MFN in this figure is the starting point: 16 sub-continental blocs, each formed by one country.

Fig. 5 shows that the formation of FTAs between regional subsets of countries is not a good idea, and the more countries that participate, the worse the idea. Even at the last stage, when two half-continental blocs of 8 members each are

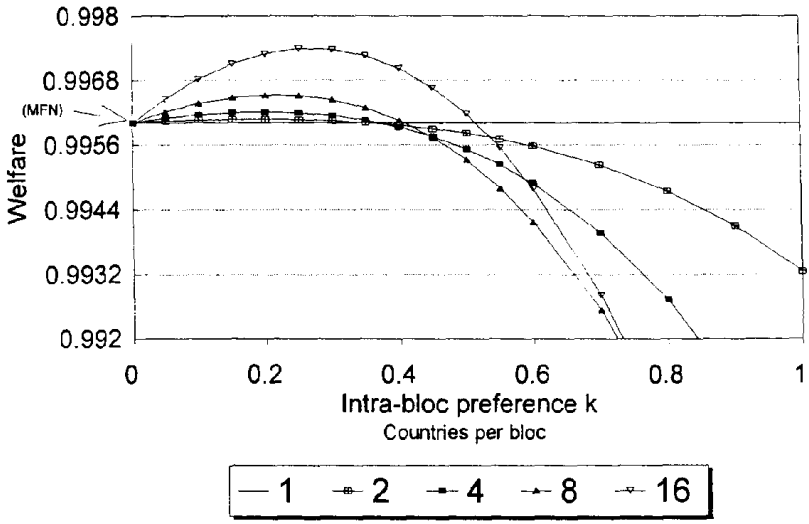

Fig. 6. Effects of sub-continental preferential trade arrangements ($a = 0$; $b = 0.2$; $\theta = 0.75$; $t = 0.3$; $N = 16$; $C = 4$).

merged into a continental FTA, welfare falls slightly, if b is 0.2 or less. [37] These results seem to bode ill for recent regional agreements. [38]

We have found that the formation of a number of 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 continent-wide PTAs is better than both MFN and fully-liberalized FTAs. Is the same true for the formation of a number of PTAs within each continent?

Fig. 6 addresses this question for the case where $b = 0.2$. The right edge confirms that the formation of eight two-country FTAs on each continent reduces welfare, and larger blocs are even worse. But for partial preferences, ideally in the range of 20 to 25 percent, the picture for multiple PTAs looks much better. Two-country PTAs are slightly better than the MFN status quo (1-country groupings). Four-country PTAs are better still, and so on until the optimum is

[37] We have also tried a simulation where the world consists of 3 continents, each of them containing 12 countries. The results are similar to those shown here. But carving up each continent into two blocs of six countries each, when $b = 0.2$, turns out to be the welfare minimum: not only worse than MFN or smaller FTAs, but worse also than continental FTAs.

[38] These results do not allow for the fact that transport costs between potential sub-regional Free Trade Areas, such as North and South America are greater than between countries within the same sub-region. Transport costs are said to be higher between North and South America than the distance would indicate, due to oligopolistic and protected shipping industries.

reached at a continent-wide grouping of 16 countries (at which point preferences of 27 percent are the precise optimum in the simulation, as we saw in Fig. 4). In other words, welfare increases monotonically with the size of the PTAs, rather than decreasing monotonically as it did for the case of FTAs. Clearly the distortionary (or trade-diverting) effects are less important when internal tariffs are only reduced partway. The pattern is similar when $b = 0.1$ or $b = 0.3$, but the level of preferences that maximizes welfare for each size of PTA becomes approximately 15 percent and 25–35 percent, respectively. [Graphs are available in CIDER working paper C94-034, but omitted here to save space.]

Why might countries wish to negotiate small two-country PTAs that would raise welfare only slightly, if larger PTAs would be even better? For the same reason that it seems to be impossible to negotiate 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. [39] We have in mind, not just the hours, salaries, or airfares of the negotiators, but 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 stepping stones or building-blocks for four-country PTAs, leading to eight and, finally, to the continent-wide arrangement.

The stepping-stone idea would be particularly attractive if there was reason to think it could be sustained across continents. We now turn attention to blocs formed across continents. We consider a world formed by 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?

For the parameters $\theta = 0.75$ and $t = 0.3$, we find that the consolidation will be beneficial under any transportation costs a and b. We might have predicted this: if we look at Fig. 1, we can see that, in the absence of transport costs, two blocs are better than four for these parameter values. And we know, from application 2, that consolidation is more likely to improve welfare the higher the transportation 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 b above which the consolidation becomes beneficial. We ran several simulations for $\theta = 0.6$, different values of t (0.2 and 0.3) and different values of 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 cost a. This kind of analysis can be useful to study the welfare consequences of potential blocs such as the hemisphere-wide one, which would include both North and South

[39] Deardorff and Stern (1992, pp. 17–20) suggest as much.

America, or a trans-Pacific grouping, as often discussed in meetings of such organizations as APEC, PECC, and PAFTAD. These groupings transcend individual continents.

6. Some estimates of transport costs to evaluate the extent of regionalization

To get a better idea where the world economic system lies in terms of the welfare spaces mapped out above, we would like to have some estimates of the parameters, especially the crucial magnitude of intra-continental transportation costs, b. We can think of four ways of estimating b. First is direct data on bilateral shipping costs. The disadvantage here is that the range of variation of actual shipping costs is extremely wide across modes of transport and kinds of goods, especially as a percentage of value, and it would be difficult to know how to aggregate different measures.

Second is the ratio of the c.i.f. value of a country's trade to its f.o.b. value. One disadvantage here is that full data are not available on a bilateral basis. Another disadvantage of using aggregate c.i.f./f.o.b. numbers is that they depend on the composition of trade (which is in turn endogenous).

The ratio of total worldwide import values, including insurance and freight, to export values is about 1.06. [40] We can infer a rough upper bound on b by assuming that 6 percent is a weighted average of intra-continental costs and inter-continental costs where the weight is designated ICS:

$$0.06 = (ICS)a + (1 - ICS)/(a + b - ab), \quad \text{or}$$

$$b = (0.06 - a)/[(1 - ICS)(1 - a)] < 0.06/(1 - ICS). \tag{11}$$

We get our ICS estimate from Table 1. Considering only the set of 63 countries examined statistically in the first part of the paper, the intra-continental trade share is about 0.4. Thus (11) implies an upper bound on b of $0.06/(1 - 0.4) = 0.10$.

If 10 percent is a realistic estimate of intra-continental transport costs, then we can see from the simulations that super-natural trading blocs are a real danger. Indeed, for $b = 0.10$, our base-case parameter values, and a world consisting of three continents of two countries each, negative returns to regionalization set in when preferences are 52.4 percent; any greater degree of regional preference moves into the zone of negative returns to regionalization (Fig. 3). For this world, 95 percent preferences are in the super-natural zone. For a world consisting of four 16-country continents, negative returns set in even sooner (Fig. 4). The optimum degree of continental preferences is just over 16 percent, and the super-natural zone begins at 32 percent.

[40] Table 36 from *Review of Maritime Transport 1990*, UNCTAD, U.N.: New York, 1991.

It is possible that the c.i.f./f.o.b. ratio substantially understates the costs of trade by focusing solely on the cost of physical transport. Within the confines of our theoretical model, the parameter b could be estimated in a simple way from the data on intra-regional trade shares, if we were willing to assume that the observed current tendency for countries to trade with neighbors was the result solely of geographical proximity, and not of preferential trading policies. [41] We pursue this logic next.

If b is high, then inter-continental trade will be low relative to continental trade. In CIDER working paper C94-034, we derive an expression for b,

$$b = 1 - \left[\frac{\sigma_{nc}}{\sigma_c}\right]^{(1-\theta)/\theta}, \tag{12}$$

where σ_c and σ_{nc} are the continental and inter-continental ratios of demand, respectively (relative to home varieties).

Total intra-continental trade on a continent is $\Sigma S_{c_i} GNP_i$. Total trade undertaken by the continent with other continents (including both imports and exports) is $2\Sigma S_{nc_i} GNP_i$. Thus $ICS = \Sigma S_{c_i} GNP_i / [\Sigma S_{c_i} GNP_i + 2\Sigma S_{nc_i} GNP_i]$. In the special case where intra-continental trade as a share of GNP in each country i is the same, and the inter-continental share of each country is the same, the intra-continental trade share becomes

$$ICS = S_c \Sigma GNP_i / [S_c \Sigma GNP_i + 2S_{nc} \Sigma GNP_i] = \frac{S_c}{S_c + 2S_{nc}}. \tag{13}$$

It follows that

$$ICS = \frac{\sigma_c(N-1)}{\sigma_c(N-1) + 2\sigma_{nc}(C-1)N}.$$

Solving for σ_{nc}/σ_c and substituting into (12),

$$b = 1 - \left[\frac{(1/ICS) - 1}{2(C-1)N/(N-1)}\right]^{(1-\theta)/\theta}. \tag{14}$$

The set of countries from which our trade data come can be approximately described as four continents (including Africa/Mideast along with the other three [42]) consisting of 16 countries each. Substituting $C = 4$, $N = 16$, and $\theta = 0.75$,

[41] Krugman (1991) and Summers (1991), for example, use simple calculations to infer roughly the importance of distance in determining trading patterns, without explicitly distinguishing the effect of existing trade preferences.

[42] Foroutan and Pritchett (1992) find that the 19 African countries in their sample trade more with each other than the other gravity variables would predict, though the bloc effect is only of borderline significance.

Table 5
Bilateral distance for some major cities (in kilometers)

	Tokyo	Chicago	Geneva	Sydney	Sao Paolo
Tokyo					
Chicago	10142.4				
Geneva	9803.0	7056.8			
Sydney	7835.4	14891.3	16788.5		
Sao Paulo	18546.6	8415.8	9406.3	13370.9	
Nairobi	11278.6	12894.0	6078.1	12162.7	9289.96

into Eq. (14), we obtain an illustrative estimate of $b = 0.383$. This is quite a high estimate of inter-continental costs, and it would imply a corresponding reduction in the risk of trade policies becoming excessively regionalized.

We know from our gravity estimation, however, that statistically significant tendencies toward regional trade preferences already exist, and thus explain part of the proclivity toward intra-regional trade that shows up in Table 1 and in this estimate of b. We thus conclude the paper by using our preferred estimate of b, which comes from the gravity estimates in Section 2. They hold constant for the effects of regional trading arrangements already in existence, as well as the effect of common languages, etc.

Table 5 gives distance in kilometers between some major world capitals. [An analogous table in Frankel et al. (1993) gives the average distance between all the pairs of countries in our sample, by continent.] European countries tend to be both closer to each other and closer to the other two continents than is the case for countries in the Western Hemisphere or East Asia. Averaging over all countries in the sample, the mean distance between countries on the same continent is 2896 kilometers, and on different continents is 11776 kilometers – four times as great. The gravity equations estimate the coefficient of the log-distance between a pair of countries at about 0.56. It follows that trade between two countries on the same continent will on average be twice as great as trade between countries on different continents, other things equal [$0.56\{\log(11776/2896)\} = 0.7855$ and $\exp(0.7855) = 2.19$].

In the algebra in Section 3 of the paper, the elasticity of demand, $\epsilon_x = \mathrm{d}\log(Trade)/\mathrm{d}\log(P)$, is given by $1/(1-\theta)$. If transport costs show up fully in the price facing the consumer, the percentage change in price associated with being in a different continent is given by $(p_{nc,t}/p_{c,t}) - 1 = b/(1-b)$ (for the case of tariffs levied on the c.i.f. value). From the data on bilateral trade, this should be approximately equal to

$$\frac{\mathrm{d}\log(P)}{\mathrm{d}\log(Distance)}\log(11776/2896) = \frac{\mathrm{dlog}(Trade)/\mathrm{dlog}(Distance)}{\mathrm{dlog}(Trade)/\mathrm{dlog}(P)}1.403$$

$$= [0.56^{(1-\theta)}]1.403.$$

Choosing again our baseline value $\theta = 0.75$, our illustrative calculation suggests that the difference between inter-continental transportation costs and continental costs is roughly on the order of 16.4 percent.

Such an estimate for b might still seem a bit high. But recent literature on spillovers and geographic concentration suggests that the effects of proximity on stimulating production are much greater than mere transportation costs. In the classic gravity model of world trade, Linnemann (1966) concluded that the effect of distance on trade consisted of three kinds of effects rather than one: (i) transportation costs, (ii) the time element (involving concerns of perishability, adaptability to market conditions, irregularities in supply, in addition to interest costs), and (iii) 'psychic' distance (which includes familiarity with laws, institutions and habits).

The 0.164 estimate, if taken at face value, together with our simulations suggests that the optimal degree of preferences within a continental grouping is roughly 60 percent, i.e., intra-regional liberalization to 40 percent of the level of world-wide trade barriers, in a stylized six-country world. Only if regionalization proceeds past that point, does it enter into the zone of negative returns to liberalization. For the more realistic 64-country world (Fig. 4), negative returns to regionalization set in as early as at 23.1 percent preferences, and the super-natural zone at 44.2 percent preferences.

The last step is to try to extract from our gravity estimates of Section 2 a measure of k, the degree of preferences prevailing in existing regional trading blocs, in order to help evaluate whether the world trading system has in fact become excessively regionalized. Our gravity estimates in Table 2 suggest that the EC in 1990 operated to increase trade among its members by about 50 percent. Other parts of the world have weaker or stronger arrangements. We have found that such FTAs as MERCOSUR and the Andean Pact actually have effects on trade that are considerably greater (proportionally) than the EC. Let us ask the following hypothetical question: what would be the effect on world economic welfare if the trading system settled down to an array of regional blocs that each had the same level of preferences as the EC?

Let the percentage effect on trade of bloc formation be represented by γ. [43] It is shown in Frankel et al. (1993), that the desired preference parameter is monotonically related to γ:

$$k = \gamma(1 + t)(1 - \theta)/t.$$

Taking $\gamma = 0.5$ from the EC estimate, $\theta = 0.75$, and $t = 0.30$, the implied estimate of k is 0.54. In other words, EC preferences operate to reduce trade barriers by 54 percent for intra-bloc trade. This parameter value lies within our super-natural zone. It follows, within the assumptions of our model, that if all continents

[43] The coefficient in the gravity equation is actually the log of $(1 + \gamma)$.

followed the EC example, the regionalization of world trade would be excessive, in the sense that world economic welfare would be reduced relative to the MFN norm.

7. Conclusion

The tentative conclusion of this study is that some degree of preferences along natural continental lines, such as the Free Trade Area of the Americas or enlargement of the European Union to include EFTA and Eastern Europe, would be a good thing, but that the formation of Free Trade Areas where the preferences approach 100% would represent an excessive degree of regionalization of world trade. This is especially true if the prospective FTAs consist of entire continents. (For sub-continental regions like the Andean Pact, the finding remains that partial PTAs can be welfare-improving, while FTAs are super-natural; but the welfare effects are smaller than they are in the case of the continent-wide blocs.) The overall conclusion is that the world trading system is currently in danger of entering the zone of excessive regionalization.

Any such conclusion must register some important caveats, especially of a political economy nature. First, although our definition of partial preferences has been a partial reduction for neighbors in the tariff on all goods, in practice partial preferences usually take the form of special consideration or outright exemption for some industries at the expense of others. Inter-sectoral distortions and rent-seeking behavior can make this kind of partial preferences very costly. Second is the question of the role that regional arrangements play in further unilateral or multilateral liberalization. Assuming the ultimate goal is the achievement of free trade among all countries, limiting the formation of blocs to geographically proximate countries might not be the best way to go, if it leads to permanent fragmentation of the world's trade rather than to a process of continuous integration. The answers are not clear once we include dynamic political economy considerations in the analysis. [44]

Within the terms of our model, however, the optimal path to liberalization appears to feature a sharp departure from Article 24. It entails reducing intra-regional barriers by only 10 percent or so. Apparently the optimal path concentrates on extending the scope of the Preferential Trading Arrangements from two-country agreements to wider sub-continental agreements, and then to the continental level, and then finally to the worldwide level, *before* liberalizing completely

[44] Political economy considerations like those mentioned in the introduction – a country that joins an FTA may then experience an increase in political support for further steps toward liberalization – are modelled by Baldwin (1993), and also in a preliminary way in Wei and Frankel (1993).

within any unit. At least, such a path would under our assumptions raise economic welfare at each step of the way.

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References

Balassa, Bela, 1987, Economic integration, in: J. Eatwell et al., eds., The new Palgrave dictionary of economics (MacMillan, London) 43–47.

Baldwin, Richard, 1993, A domino theory of regionalism, Working paper no. 4465 (NBER, Cambridge, MA) Sep.

Bergsten, C. Fred, 1991, Commentary: The move toward free trade zones, in: Policy implications of trade and currency zones, A Symposium Sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, WY, Aug., 43–57.

Bergstrand, Jeffrey, 1989, The generalized gravity equation, monopolistic competition, and the factor-proportions theory in international trade, Review of Economics and Statistics 71, no, 1, 143–152.

Bhagwati, Jagdish, 1971, Trade-diverting customs unions and welfare improvement: A clarification, Economic Journal 63.

Bhagwati, Jagdish, 1990, Regional accords be-GATT trouble for free trade, Wall Street Journal, Dec. 5.

Bhagwati, Jagdish, 1992, Regionalism and multilateralism: An overview, World Bank and CEPR Conference on New Dimensions in Regional Integration, April, Washington, DC.

Bhagwati, Jagdish and T.N. Srinivasan, 1983, Lectures on international trade (MIT Press, Cambridge) Ch. 27.

Deardorff, Alan, 1984, Testing trade theories and predicting trade flows, in: R. Jones and P. Kenen, eds., Handbook of international economics, Vol. I (Elsevier Science Publishers, Amsterdam) 467–517.

Deardorff, Alan and Robert Stern, 1992, Multilateral trade negotiations and preferential trading arrangements, in: A. Deardorff and R. Stern, eds., Analytical and negotiating issues in the global trading system (University of Michigan Press, Ann Arbor, MI) forthcoming.

de la Torre, Augusto and Margaret Kelly, 1992, Regional trading arrangements, Occasional paper no. 93 (International Monetary Fund, Washington, DC) March.

de Melo, J., A. Panagariya and D. Rodrik, 1992, Regional integration: An analytical and empirical overview, World Bank and CEPR Conference on New Dimensions in Regional Integration, April, Washington, DC.

Edwards, Sebastian, 1993, Latin American economic integration: A new perspective on an old dream, The World Economy (Basil Blackwell, Oxford) 317–338.

Fieleke, Norman, 1992, One trading world, or many: The issue of regional trading blocs, New England Economic Review (Federal Reserve Bank of Boston, Boston, MA) May/June, 3–20.

Finger, J.M., 1993, GATT's influence on regional arrangements, in: J. de Melo and A. Panagariya, New dimensions in regional integration (Cambridge University Press, New York).

Foroutan, Faezeh and Lant Pritchett, 1992, Intra-sub-Saharan African trade: Is it too little? Journal of African Studies, Dec.

Frankel, Jeffrey, 1991, Is a yen bloc forming in Pacific Asia?, in: R. O'Brien, ed., Finance and the international economy, The AMEX Bank Review Prize Essays (Oxford University Press, Oxford).

Frankel, Jeffrey, 1993, Is Japan creating a yen bloc in East Asia and the Pacific? in: Jeffrey Frankel and Miles Kahler, eds., Regionalism and rivalry: Japan and the U.S. in Pacific Asia (University of Chicago Press, Chicago, IL).

Frankel, Jeffrey and Shang-Jin Wei, 1993a, Is there a currency bloc in the Pacific?, in: Adrian Blundell-Wignall and Stephen Grenville, eds., Exchange rates, International Trade and Monetary Policy (Reserve Bank of Australia, Sydney).

Frankel, Jeffrey and Shang-Jin Wei, 1993b, Emerging currency blocs, in: H. Genberg, ed., The future of the international monetary system and its institutions (ICMBS, Geneva) (forthcoming 1995).

Frankel, Jeffrey and Shang-Jin Wei, 1994, Yen bloc or dollar bloc: Exchange policies of the East Asian economies, in: Takatoshi Ito and Anne Krueger, eds., Macroeconomic linkages, Third Annual NBER – East Asia Seminar on Economics (University of Chicago Press, Chicago, IL).

Frankel, Jeffrey, Ernesto Stein and Shang-Jin Wei, 1993, Continental trading blocs: Natural or supernatural? Working paper no. 4588 (NBER, Cambridge, MA) Dec.

Hamilton, Carl and L. Alan Winters, 1992, Opening up international trade in Eastern Europe, Economic Policy, April.

Havrylyshyn, Oleg and Lant Pritchett, 1991, European trade patterns after the transition. Policy, Research and External Affairs Working Paper Series no. 748 (World Bank, Washington, DC) Aug.

Helpman, Elhanan, 1987, Imperfect competition and international trade: Evidence from fourteen industrial countries, Journal of the Japanese and International Economies 1, 62–81.

Helpman, Elhanan and Paul Krugman, 1985, Market structure and foreign trade (MIT Press, Cambridge, MA).

Irwin, Douglas, 1993, The GATT's contribution to economic recovery in post war Western Europe, International finance discussion paper no. 442 (Federal Reserve Board, Washington, DC) March.

Jackson, John, 1993, Regional trade blocs and the GATT (The World Economy) 121–132.

Krugman, Paul, 1980, Scale economies, product differentiation, and the pattern of trade, American Economic Review 70, 950–959.

Krugman, Paul, 1991a, Is bilateralism bad? in: E. Helpman and A. Razin, eds., International trade and trade policy (MIT Press, Cambridge, MA).

Krugman, Paul, 1991b, The move toward free trade zones, in: Policy Implications of Trade and Currency Zones, A Symposium Sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, WY., Aug., 7–42.

Krugman, Paul, 1992, Regionalism vs. multilateralism: Analytical notes, World Bank and CEPR Conference on New Dimensions in Regional Integration, April, Washington, DC.

Lawrence, Robert, 1991, Emerging regional arrangements: Building blocks or stumbling blocks? in: R. O'Brien, ed., Finance and the international economy, The AMEX Bank Review Prize Essays (Oxford University Press, Oxford).

Linnemann, Hans, 1966, An econometric study of international trade flows (North-Holland, Amsterdam).

Meade, James, 1955, The theory of customs unions (North-Holland, Amsterdam).

Saxonhouse, Gary, 1993, Pricing strategies and trading blocks in East Asia, in: Jeffrey Frankel and Miles Kahler, eds., Regionalism and rivalry: Japan and the U.S. in Pacific Asia (University of Chicago Press, Chicago, IL).

Srinivasan, T.N., 1992, 'Regionalism vs. multilateralism: Analytical notes': Comment, World Bank and CEPR Conference on New Dimensions in Regional Integration, April, Washington, DC.

Stein, Ernesto and Jeffrey Frankel, 1993, Transport costs and the welfare effects of Free Trade Agreements, Chapter in Ph.D. thesis, E. Stein, Feb. (University of California, Berkeley, CA).

Summers, Lawrence, 1991, Regionalism and the World Trading System, in: Policy Implications of Trade and Currency Zones, A Symposium Sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, WY, Aug., 295–302.

Wang, Zhen Kun and L. Alan Winters, 1991, The trading potential of Eastern Europe, Discussion paper no. 610 (Centre for Economic Policy Research, London) Nov.

Wonnacott, Paul and Mark Lutz, 1989, Is there a case for free trade areas?, in: Jeffrey Schott, ed., Free trade areas and U.S. trade policy (Institute for International Economics, Washington, DC) Ch. 2, 59–84.