'Natural' Trading Blocs: A Closer Look*

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Abstract

It is occasionally argued that the formation of trading blocs between geographically proximate countries should be encouraged because positive welfare effects are more likely to outweigh negative welfare effects. This paper presents a simple differentiated products model that allows to test whether the formation of a 'natural' trading bloc, first, is indeed increasing world welfare and, second, is welfare-superior to the formation of an 'unnatural' trading bloc. Simulations show that, while the removal of trade barriers always improves world welfare, 'unnatural' bloc formation may, under some conditions, be welfare-superior to the formation of trading blocs along 'natural' lines. The concept of 'natural' trading blocs is therefore a misguided prescription. (JEL Classification: F15)

I. Introduction

In recent years, a huge body of literature has emerged attempting to analyze the potential welfare effects of the apparent global trend toward the for-

mation of trading blocs. As it is, however, impossible to say **a priori** that a preferential trading arrangement (PTA) will inevitably raise or diminish world efficiency, two issues have been of particular interest. First, there has been considerable work on formulating models that make the analysis of bilateralism tractable. Examples here include Baldwin [1993], Krugman [1993] and Frankel, Stein and Wei [1993, 1995]. Second, largely based on earlier work by Kemp and Wan [1976] who have shown formally that any subset of countries **could** form an unambiguously (world-)welfare-improving union, there has been an intensifying discussion about conditions to ensure that a PTA is enhancing world welfare. Paul Krugman, for example, has argued in a series of papers [1991a, 1991b, 1993] that free trade areas (FTAs) or customs unions (CUs) formed along 'natural' lines, **i.e.**, between neighboring or geographically-proximate countries, should be encouraged because the benefits are likely to outweigh the costs.[1]

The question whether there is a relationship between the proximity of potential partner countries and the possible welfare effects of a PTA, however, has become heavily discussed, mainly for two reasons. On the one hand, the issue is of particular relevance as (almost) all of the trading initiatives that currently prosper all over the world are of regional nature. From Europe to the Americas and Southeast Asia, everywhere appears to be a strong momentum for an expansion of existing trading arrangements along continental lines.

On the other hand, a number of authors have forcefully questioned Krugman's reasoning. Jagdish Bhagwati [1993], for example, has noted that the premises underlying the concept of 'natural' trading blocs are at best ambiguous and therefore not defensible likelihood propositions. More rigorously, Arvind Panagariya [1996] and Bhagwati and Panagariya [1996] have constructed models showing that some features of the 'natural' trading

might be better off forming a PTA with a distant rather than a proximate country given that these two countries are otherwise identical.

In sum, however, the debate on the welfare effects of 'natural' trading blocs has been inconclusive. Based on the well known fact that the case for PTAs is, ultimately, a question of the 'second-best' see, for example, Lipsey and Lancaster [1956-57] , critics have mostly concentrated on showing that one can easily build plausible models that yield contradictory results suggesting, in the end, that the answer to the question whether trading blocs based on geography are indeed welfare improving is likely to depend on the model chosen to address it. However, a clear attempt to assess whether the idea of 'natural' trading blocs is a helpful concept in the context of Krugman's differentiated products model has been missing.

This paper aims to fill this gap. Extending Frankel, Stein and Wei's [1993, 1995] version of the conventional Krugman trade model, this paper provides a detailed analysis of the welfare effects of continental versus non-continental bloc formation. In particular, the model now allows the study of asymmetric situations like, for example, bloc formation among countries with different sizes. Given different set-ups and parameter values, it is argued that if there is a case for 'natural' trading blocs one should expect, first, that the formation of continental PTAs is always increasing world welfare and, second, that the welfare effects of PTAs along 'natural' lines will be larger than of PTAs that are formed between individual countries on different continents, i.e., along 'unnatural' lines. It is shown that 'natural' trading blocs are not always welfare-improving and that for some reasonable parameter values 'unnatural' bloc formation is welfare-superior to bloc formation along 'natural' lines. Therefore, it is argued that the concept of 'natural' trading blocs is, at best, a questionable likelihood proposition.

The remainder of this paper is as follows. Section II reviews the basic

if there is global free trade. In contrast to other fields in economics (environ-mental economics, for example), where government intervention might result in higher levels of welfare, it is well established in trade theory that a world where all countries refrain from erecting barriers to trade will be bet-ter off than under any other combination of trade policies.

At least since Jacob Viner [1950], however, it is also well known that not any move toward freer trade is necessarily welfare-improving. A PTA, even if it only reduces trade barriers, may in fact worsen world welfare: while lib-eralizing trade among member countries (trade creation) it protects and dis-criminates against non-members (trade diversion).

Which of the welfare effects is actually dominant and, thus, whether a PTA is actually enhancing or decreasing world efficiency is *a priori* unclear. Although Murray Kemp and Henry Wan [1976] have shown formally that a CU between any subset of countries could be designed in a way that makes member countries better off while leaving non-members indifferent,[2] there were no convincing proposals ensuring *ex ante* that CUs and FTAs do not become trade-diversionary. Instead it became well established that the actu-al welfare implications of a particular trade integration scheme have to be determined on a case-by-case basis producing, in the end, a literature full of 'anything-may-happen' results.

The current move toward the establishment and the expansion of regional PTAs, however, has re-intensified the discussion about conditions to ensure that a PTA is rather enhancing world welfare. One of the most prominent arguments in this line of research is Paul Krugman's [1991a, 1991b, 1993] concept of 'natural' trading blocs stating that the formation of regional FTAs and CUs would be beneficial to world welfare. The rationale is as follows. Trade data shows that geography is still an important determinant of interna-tional trade flows. In spite of modern transportation and communication,

its neighbor. In this case, a bilateral agreement would free the majority of the country's trade. Without barriers, old trading partners will intensify their relations and the gains from freeing intra-regional trade will be large. On the other hand, there is only a small proportion of trade (at maximum, 10%) which can be diverted and so the costs of reducing inter-regional trade will be relatively small.[3] Notice that in the limit, approaching the case where intercontinental transportation costs are so high that all trade takes place within continents, the formation of continental FTAs, i.e., the removal of regional trade barriers, represents a move to the first-best situation of global free trade within each continent.

However, despite its intuitiveness, the question whether the concept of 'natural' trading blocs is an useful approach either as a rule of thumb to exclude PTAs that are likely to be trade-diversionary or as a condition ensuring that PTAs are welfare-improving has become a heavily discussed issue. In particular, two questions arise.

First, does the creation of a 'natural' trading bloc unambiguously improve world welfare? Here, Frankel, Stein and Wei [1993, 1995] have already raised some doubts arguing that continental trade blocs may, under some conditions, decrease world welfare, dubbing these blocs 'super-natural'. However, as Nitsch [1996] has shown, their results are not robust and the phenomenon of 'super-natural' trading blocs disappears after the inclusion of more realistic assumptions like intra-continental transportation costs.

Second, is bloc formation along 'natural' lines welfare-superior to the creation of 'unnatural' trading blocs? As there is nothing in theory that requires a PTA to be regional,[4] this issue is highly controversial. While Bhagwati [1993] and Panagariya [1995], for example, have questioned the presumption that trade diversion is minimal if potential PTA members trade disproportionately more with each other, Frankel, Stein and Wei [1995] have

III. The Model

The structure of the model is largely based on work by Frankel, Stein and Wei [1993, 1995] and Spilimbergo and Stein [1996] which itself is based on the familiar Krugman [1980] model of trade under monopolistic competition. For the purpose of comparing the welfare effects of 'natural' and 'unnatural' bloc formation, however, the general model is explicitly focused on two interesting features. First, in view of the rapidly growing model-based literature on the welfare implications of regionalism,[5] the basic model is general enough to incorporate a number of different approaches that have recently been discussed. In particular, the model allows to analyze the effects of bloc formation in a totally symmetric framework in which all countries are identical as well as in an asymmetric framework where different countries have different levels of welfare. Second, in both cases the model focuses on the simplest possible framework to examine the welfare implications of 'natural' trading blocs, i.e., the four-countries-two-continents case in a symmetric set-up and the three-countries-two-continents case in the asymmetric set-up.

A. The Basic Model

Consider, then, an economy k ($k = 1, 2, \ldots, M$) where a typical consumer chooses from a menu of goods (indexed by i) to maximize the utility function

$$U_k = \sum_i^N c_{ik}^\theta \qquad 0 < \theta < 1 \qquad (1)$$

where c_{ik} is the consumption of the ith good in country k, θ is a parameter indicating the degree of substitutability and N is the total number of types of

β, i.e., that the production technology exhibits increasing returns to scale.

Assume, further, that the total national supply of labor in country k is L_k. Equilibrium in the goods market is, then, given by

$$x_{ik} = \sum_{k}^{M} L_k c_{ik} \qquad (2)$$

It is also assumed that there is full employment so that the sum of labor input in all varieties produced in country k is equal to the domestic supply of labor:

$$L_k = \sum_{i}^{n_k} l_{ik} \qquad (3)$$

where n_k is the number of varieties produced in country k with $N = \sum_{k}^{M} n_k$.

Firms are monopolistically competitive and set the price to maximize the profit function $\pi_{ik} = p_{ik} x_{ik} - (\alpha + \beta x_{ik}) w_k$ where π_{ik} is the profit of the ith producer, p_{ik} is the price of the ith differentiated product, x_{ik} is the total output of that product and w_k is the wage rate in country k. Given the demand structure, where all goods enter symmetrically into demand, the profit-maximizing price is

$$p_{ik} = \frac{w_k}{\theta} \qquad (4)$$

Note that since the parameters β, w_k, and θ are the same for all varieties produced in country k the price of each variety produced in country k will be the same.

Assuming free entry and free exit of firms, profits are driven to zero ($\pi = 0$) and output per variety is given by

$$x_{ik} = \frac{\alpha \theta}{\beta (1 - \theta)} \qquad (5)$$

Thus, in equilibrium the production of each variety depends only on the

in equilibrium, national income is the sum of factor payment and tariff revenue which is assumed to be transferred to domestic consumers in a lump-sum fashion:

$$Y_k = w_k L_k + \sum_i^N \frac{t_k}{1+t_k} p_{ik} c_{ik} \tag{7}$$

where t_k is the tariff rate levied by the government in country k on the c.i.f. value of foreign varieties.

B. Symmetric World Geography

Now suppose that the world consists of two continents and four identical countries of the type just described. In particular, imagine that two countries (marked by subscripts h for the home country and c for the potential continental partner country) are located on the same continent (to allow for intracontinental trade), while the remaining two countries (marked by subscript nc_x $x = 1, 2$ for the potential non-continental partner country) are on the other continent (to allow for intercontinental trade).

Given this highly stylized world geography, the model is completely symmetric and it is assumed that whenever two countries form a bloc, the countries in the rest of the world would be forming a similar bloc at the same time so that the symmetry of the world is always maintained. This assumption, however, simplifies the analysis considerably because we can now describe the behavior of consumers and firms in a representative country as it is symmetric in the other countries.

A representative consumer in the home country, then, maximizes the utility function (1) subject to the budget constraint:

$$\sum_{i=1}^{n_h} c_{ih} p_{hh} + \sum_{n_h+1}^{n_h+n_c} c_{ic} p_{ch} + \sum_{n_h+n_c+1}^{n_h+n_c+n_{nc_1}} c_{inc_1} p_{nc_1 h} + \sum_{n_h+n_c+n_{nc_1}+1}^{n_h+n_c+n_{nc_1}+n_{nc_2}} c_{inc_2} p_{nc_2 h} = w + T \tag{8}$$

On the production side, the symmetry of the model assures that the producer's prices $p = p_{jk}$ for all $j = k$ are the same in the four countries. However, the home consumers face different prices of home and foreign goods due to transportation costs and tariffs. In particular, transport costs will be assumed to be of Samuelson's 'iceberg' type, i.e., for every unit of goods that is exported, only $1-\gamma$ unit of goods arrives, while γ% of the good is lost on the way.

Following Frankel, Stein and Wei [1993, 1995], we assume a hub-and-spoke transportation network where the cost of intracontinental transport (from spoke to spoke via the continent's hub) is given by a, while that of transport between two continents (from hub to hub) is given by b, where $0 \le a, b \le 1$.

Then, in the absence of trading blocs, for every unit of foreign goods consumed the domestic consumers will have to pay:

$$p_{ch} = \frac{p(1+t)}{1-a} \tag{9a}$$

$$p_{nc_1h} = p_{nc_2h} = \frac{p(1+t)}{(1-a)(1-b)} \tag{9b}$$

for a good from the continental neighbor country and the non-continental countries, respectively.

Without loss of generality, we can normalize the values of the parameters n, p, and w to be 1. After some algebra it is then possible to obtain from the budget constraint the domestic consumer's consumption of each home variety, c_h:

$$c_h = \frac{1}{1 + \dfrac{p_c^{\frac{1}{-1}}}{1-a} + \dfrac{p_{nc_1}^{\frac{1}{-1}}}{(1-a)(1-b)} + \dfrac{p_{nc_2}^{\frac{1}{-1}}}{(1-a)(1-b)}} \tag{10}$$

Incorporating (13) and the consumption fo foreign varieties, obtained from the first order conditions of the consumer's maximization problem, into (1), the utility level of the representative consumer is given by:

b. However, except in the special case where $b = 0$, in which case the issue of 'natural' and 'unnatural' blocs disappears, the model is now asymmetric.

In particular, due to different transportation costs, producers in different countries now face different levels of demand and therefore the home price of varieties in different countries will not be the same.

Let, then, ω_c and ω_{nc} denote the home price of goods produced in the home country (p_{hh}) relative to the domestic price of varieties produced in the continental (p_{cc}) and the non-continental country ($p_{nc\,nc}$), respectively:

$$\omega_c = \frac{p_{hh}}{p_{cc}} = \frac{w}{w_c} \tag{12a}$$

$$\omega_{nc} = \frac{p_{hh}}{p_{nc\,nc}} = \frac{w}{w_{nc}} \tag{12b}$$

Consumers in the home country facing these relative prices will demand the following relative quantities:

$$\frac{d_{ch}}{d_{hh}} = \frac{1}{1-a}\frac{c_{ch}}{c_{hh}} = \frac{1}{1-a}\left(\frac{p_{ch}}{p_{hh}}\right)^{\frac{1}{-1}} = \frac{1}{1-a}\left(\frac{1+t}{1-a}\frac{1}{\omega_c}\right)^{\frac{1}{-1}} \tag{13a}$$

$$\frac{d_{nch}}{d_{hh}} = \frac{1}{(1-a)(1-b)}\frac{c_{nch}}{c_{hh}} = \frac{1}{(1-a)(1-b)}\left(\frac{p_{nch}}{p_{hh}}\right)^{\frac{1}{-1}} \tag{13b}$$

$$= \frac{1}{(1-a)(1-b)}\left(\frac{1+t}{(1-a)(1-b)}\frac{1}{\omega_{nc}}\right)^{\frac{1}{-1}}$$

Using these relative quantities, the home consumption of home varieties can be derived from the consumer's maximization problem:

$$c_{hh} = \frac{L_h}{n_h + n_c\,\dfrac{1}{}\left(\dfrac{1+t}{}\dfrac{1}{}\right)^{-1} + n_{nc}\,\dfrac{1}{}\left(\dfrac{1+t}{}\dfrac{1}{}\right)^{-1}} \tag{14}$$

$$\frac{}{1-} = L_h c_{hh} + \frac{1}{1-a}\ \frac{1+t}{1-a}\bigg|_c^{\frac{1}{-1}} L_c c_{cc}$$

$$+ \frac{1}{(1-a)(1-b)}\ \frac{1+t}{(1-a)(1-b)}\bigg|_{nc}^{\frac{1}{-1}} L_{nc} c_{nc\,nc} \tag{15}$$

Analogously, equilibrium equations for varieties produced in the continental and the non-continental countries can be derived. Notice that, as given by equation (5), output per variety depends only on a number of fixed parameters implying that the supply for each variety is constant. Moreover, as these parameters are identical in the three countries, all varieties are supplied in the same quantity. On the other hand, total demand depends on the set of relative prices in the different countries and the respective transportation costs.

As the above system of equilibrium conditions is nonlinear, it cannot be solved explicitly. So, following Spilimbergo and Stein [1996], the model is solved through simulations. Once the relative prices are determined, relative consumptions can be calculated and, plugging these into the utility function, the level of welfare in the respective country is obtained.

IV. Welfare Implications

The model outlined above, although highly stylized and unrealistic, has at least three advantages. First, it is a variant of models that are currently extensively used in the literature. In that sense, it is possible to test some of the results of earlier applications.

Second, it is a very simple model that allows to compare **directly** the welfare effects of continental versus non-continental bloc formation. In particular, it is easily possible to check whether the formation of a 'natural' trading

In a first application, then, the symmetric set-up of the model is used to analyze whether the simultaneous formation of continental trading blocs is unambiguously improving world efficiency. In particular, as the symmetric structure of the model is similar to that of Frankel, Stein and Wei [1993, 1995], the aim is to check whether it is possible to replicate their result of continental blocs which, for some parameter values, tend to reduce world welfare.
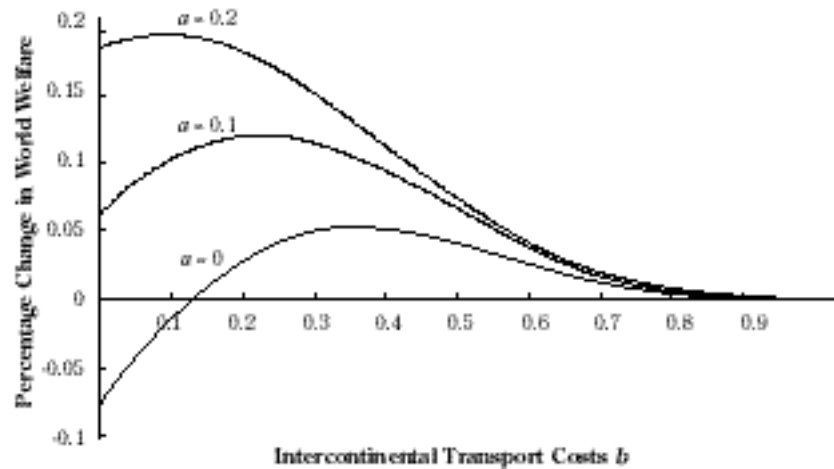
Figure 1 plots the percentage change in welfare as a function of intercontinental transportation costs **b.** As expected, the welfare effects of continental bloc formation depend positively on interbloc transportation costs. In particular, for a given value of a, the percentage change in world welfare will be the larger the higher the costs of intercontinental trade.[6] Figure 1, however, also illustrates that for a special combination of low values of transportation costs the formation of continental PTAs can decrease world welfare and, thus, confirms the results of Frankel, Stein and Wei [1993, 1995].[7] Even though the phenomenon of welfare-reducing 'super-natural' trading blocs is not robust and depends, for example, on the (questionable) assumption of extremely low intracontinental transportation costs,[8] this finding

Figure 1
The Welfare Effects of Continental Bloc Formation
in a Symmetric Framework

Figure 2
The Welfare Effects of Non-Continental Bloc Formation
in a Symmetric Framework

Notes: The following parameter values are used in the simulations: = 0.75; t = 0.2.

clearly raises some doubt on Krugman's 'natural' trading bloc argument.

In a second simulation, we check whether the formation of continental PTAs is welfare-superior to the formation of non-continental PTAs. As a first approximation, figure 2 plots the welfare effects of the complete removal of trade barriers between the home country and one of the non-continental partner countries accompanied by simultaneous trade integration between the remaining two countries. As may be seen, in the simple symmetric set-up of our model also trading blocs formed along 'unnatural' lines are increasing world efficiency except, again, for the special case of extremely

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6 Remember that a higher relative price of goods from the non-continental country

low transportation costs. Not surprisingly, the welfare effects of 'unnatural' bloc formation will be the larger, the higher the costs of intracontinental transportation costs a. In contrast to figure 1, however, the welfare effects do not depend monotonically on b which supports our finding that rising transportation costs between partner countries can lead to larger welfare gains. In fact, there exists a value of intercontinental transportation costs b (> 0) where the welfare gains of trade integration are maximized. Only for values of b above that critical value, the changes in welfare associated with 'unnatural' bloc formation become smaller.

The intuitive explanation for 'unnatural' blocs that increase world welfare – a finding that is surprisingly different from that in Frankel, Stein and Wei [1993, 1995] – is that for higher levels of transportation costs and therefore higher levels of home consumption it can be a net gain to realign correctly the relative price of a good from a partner country in terms of the domestic good, even though this distorts the relative price of the partner's good in terms of all goods produced elsewhere in the world.[9] The intuition is therefore similar to that behind the result of the disappearance of 'super-natural' trading blocs if one allows for intra-continental transport costs.

Having illustrated the welfare effects of continental as well as non-continental bloc formation, we can now analyze the question which bloc is welfare-superior by simply subtracting the changes in the level of welfare associated with the formation of different trading blocs. Figure 3, then, shows the difference in the percentage change in welfare of continental and non-continental bloc formation with positive values implying that the change in welfare resulting from a removal of trade barriers between two continental neighbor countries are larger than the welfare effects of 'unnatural' bloc formation. As may be seen, in the symmetric four-countries-two-continents set-up the formation of 'natural' trading blocs is always welfare-superior to

tal blocs, the higher the costs of intercontinental transportation. This result supports Krugman's intuition.

B. *Asymmetric Set-up with Identical Country Size*

In a second application, basically the same steps are repeated to check whether the results reported above also hold in an asymmetric framework with three equally-sized countries and two continents. Moreover, the asymmetric set-up should also yield some additional insights as the welfare effects are expected to differ in different countries.

Figure 4, then, illustrates the welfare implications of bloc formation between the two countries located on the same continent leaving the non-continental country behind. Facing the same relative prices, the welfare levels in the two continental neighbor countries are always identical. The removal of trade barriers, then, raises the welfare in both countries substantially and largely irrespective of intercontinental transport costs **b**. As both countries divert demand from the (non-continental) non-member towards the fellow (continental) bloc member so that the relative world demand for
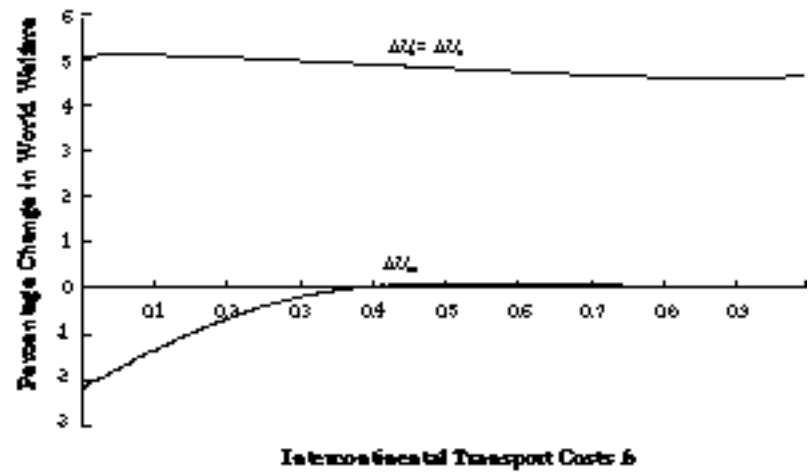
Figure 3

The Welfare Effects of Continental Versus Non-Continental Bloc
Formation in a Symmetric Framework

Figure 4
The Welfare Effects of Continental Bloc Formation
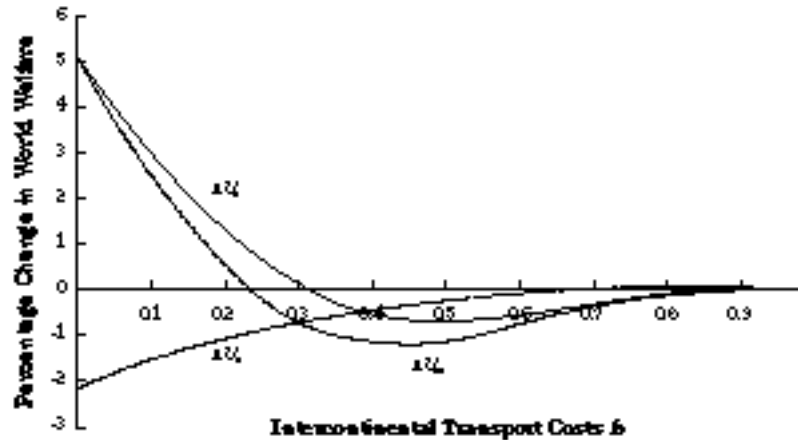in an Asymmetric Framework with Identical Country Size

Notes: The following parameter values are used in the simulations: = 0.75; t = 0.2; a = 0.1.

goods from the non-continental country declines, the terms of trade in both
(continental) bloc member countries improve. On the other hand, if inter-
continental transportation costs are low, continental bloc formation leads to
a distinctly lower level of welfare in the non-continental country.[10] The
change in welfare, however, becomes smaller as the geographic barrier
between the two continents becomes larger and, thus, reduces interconti-
nental trade flows.[11]

   Figure 5 illustrates the welfare effects of 'unnatural' bloc formation. For
low values of intercontinental transportation costs, again, both integrating
countries benefit considerably, while the welfare in the country that is left
behind is lowered. However, now the welfare gains from integration are the

Figure 5
The Welfare Effects of Non-Continental Bloc Formation
in an Asymmetric Framework with Identical Country Size

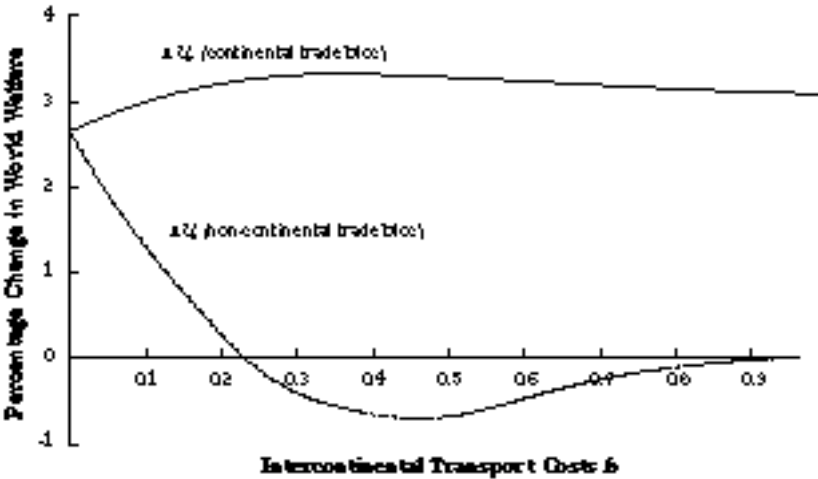Notes: The following parameter values are used in the simulations: = 0.75; t = 0.2; a = 0.1.

between the two continents, the formation of an 'unnatural' bloc has almost
no impact on the level of welfare in the three countries at all.

To make the welfare effects of continental and non-continental bloc for-
mation in an asymmetric framework comparable, the level of world welfare
is determined by summing up the welfare levels of the individual countries.
Figure 6, then, shows that the removal of trade barriers between continental
neighbor countries always leads to an improvement of world welfare. Now
even for low values of transportation costs, no welfare-reducing 'super-nat-
ural' blocs can be detected. On the other hand, trade integration along
'unnatural' lines leads to lower gains in world welfare and might even – for
values of b above a critical value - reduce world welfare.

In sum, the simple asymmetric set-up of three countries and two conti-

Figure 6
The Welfare Effects of Continental and Non-Continental Bloc
Formation in an Asymmetric Framework With Identical Country Size

Notes: The following parameter values are used in the simulations: = 0.75; t = 0.2; a = 0.1.

nents clearly supports Krugman's intuition on 'natural' trading blocs. Continental trade integration unambiguously improves world welfare and also dominates bloc formation along 'unnatural' lines.
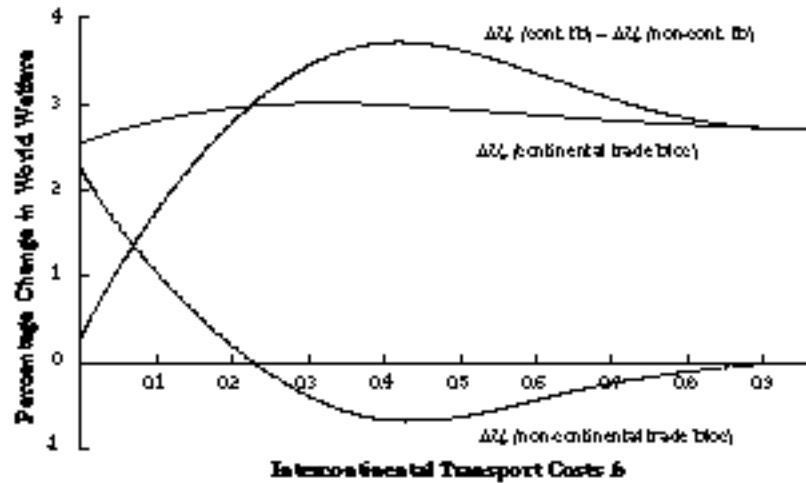
C. Asymmetric Set-up with Large and Small Countries

In a final application, we check whether the results reported in the previous section also hold for integration schemes between countries with different labor endowments.[13]

Assume, then, that a small home country has the option of forming a trade bloc with a larger continental neighbor country or a non-continental

Figure 7
The Welfare Effects of Continental and Non-Continental Bloc Formation
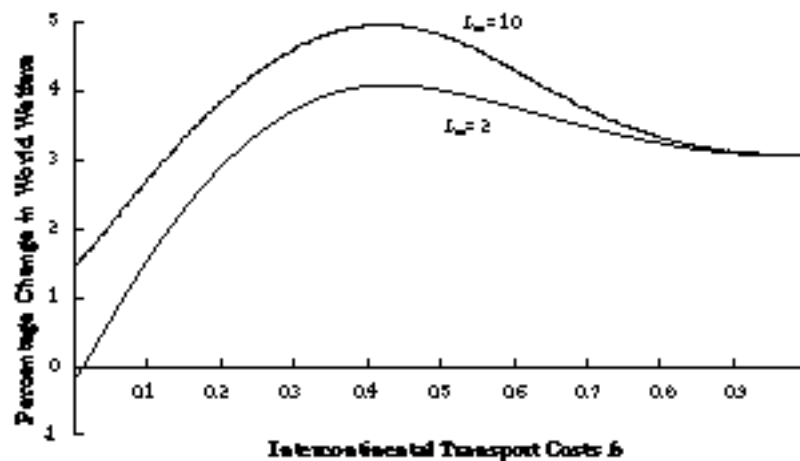in an Asymmetric Framework with a Large Continental Country

Notes: The following parameter values are used in the simulations: = 0.75; t = 0.2; a = 0.1;
$L_h = L_{nc} = 1$; $L_c = 2$.

countries (h and c) while the third country (nc) is large and located on a dif-
ferent continent. Figure 8 again illustrates the world welfare effects of conti-
nental versus non-continental trade integration. As may be easily observed,
now for a special combination of relatively low transportation costs, a PTA
between a small country and a large partner country ($L_{nc} = 2$) located on a
different continent, i.e., along 'unnatural' lines, improves world welfare
more than a PTA between two small continental neighbor countries. The
reason for this result, which is robust for all reasonable values of a and t, is
intuitive. On the one hand, one should expect that trade integration with a
large country leads, ceteris paribus, to smaller amounts of trade diversion
than trade integration with a small country. On the other hand, one should

Figure 8

The Welfare Effects of Continental versus Non-Continental Bloc Formation
in an Asymmetric Framework with a Large Non-Continental Country

Notes: The following parameter values are used in the simulations: $= 0.75$; $t = 0.2$; $a = 0.1$; $L_h = L_c = 1$.

large'. If both continental neighbors represent only a tiny share of world demand, the formation of a continental bloc raises the welfare in both integrating countries while the terms of trade of the non-continental country are not significantly worsened. Similarly, intercontinental bloc formation increases the level of welfare in the large (non-continental) country only marginally while the welfare levels in both small countries, i.e., also in the member country of the trade bloc, is decreased.

In sum, this analysis suggests that the formation of a trade bloc between two geographically-proximate countries is not always the 'second-best' result. Instead there are reasonable set-ups possible where the world is bet-

to trade a lot with each other are 'natural' trading partners and that therefore regional arrangements among them are beneficial.

This paper presents a model that allows to take a closer look on the issue of 'natural' trading blocs. In particular, it is argued that, for the argument to make sense, two conditions have to be met. First, one should expect that the creation of a 'natural' trading bloc always improves world efficiency. Second, the gains in the level of welfare associated with the formation of a 'natural' trading bloc should exceed the welfare gains of bloc formation between (geographically) 'unnatural' countries.

Simulations show that in the most simple asymmetric set-up of the model in which a country has the option of forming a PTA with an equally-sized continental neighbor country or an equally-sized country that is located on a different continent, the 'natural' trading bloc argument is valid. Continental trade blocs unambiguously improve world welfare and dominate the formation of 'unnatural' blocs.

The analysis, however, also shows that one can model reasonable set-ups that yield ambiguous results. As has been previously noted by Frankel, Stein and Wei [1993, 1995], in a symmetric framework the simultaneous formation of 'natural' trading blocs is, for special parameter values and in particular the unlikely case of zero intra-continental transportation costs, welfare-reducing. Moreover, in an asymmetric framework with countries of different sizes, the formation of 'unnatural' trade blocs can be (world)-welfare-superior to the formation of 'natural' trading blocs. Therefore the paper adds to the analysis of Spilimbergo and Stein [1996] who have shown in a model with rich and poor countries and differentiated tariff levels that **an integrating country** might be better off by joining a distant partner.

This paper, in sum, suggests that by judging the potential welfare effects of PTAs the concept of 'natural' trading blocs is, at best, a likelihood proposi-

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