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GEOGRAPHICALLY DISCRIMINATORY TRADE ARRANGEMENTS

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This paper contains preliminary findings from research work still in progress and should not be quoted without prior approval of the author.

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Geographically Discriminatory Trade Arrangements

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I Introduction

In this paper we use a numerical eight-region general equilibrium model of world trade to examine possible impacts on both global and regional trade and welfare of a number of alternative geographically discriminatory trade arrangements (GDA's). The model used is an extension of earlier four- and seven-region models used by Brown and Whalley (1980), and Whalley (forthcoming).

The results reported are of interest to two separate groups of trade policy analysts. For those interested in current policy issues, our findings provide indications of the threat which various possible bilateral trade arrangements with explicitly geographically discriminatory features among major world trading regions might pose to current multilateral arrangements negotiated under the GATT. For those interested in more than theoretical issues, our results are relevant to recent theoretical debates on the customs union issue, and especially the recent Wonnacott and Wonnacott (1981) paper. The analysis of customs unions in Wonnacott and Wonnacott implies that the reduction in a partner's tariff on entering a customs union is (i) the major source of gain to countries participating in a customs union, and (ii) a feature neglected in previous theoretical discussion of this issue. Using our numerical approach we are able to evaluate the significance of this and other factors in determining which regions gain or lose and by how much in particular geographical arrangements.

The paper is also noteworthy in providing a further example of how the computational approach to general equilibrium analysis which is becoming more popular in applied fields such as trade can be used to provide fresh insights on both policy issues and theoretical debates. This approach uses demand and production structures with particular parametric specifications through which more specific statements are sought than are typically yielded by theoretical work. Thus, instead of investigating such issues as existence, stability, or uniqueness, the attempt is to gain insight into policy and other issues through a quantitative assessment of whether or not particular regions gain or lose from sepcified policy changes. Although the numerical results obtained from the approach are inevitably dependent on key parameter values (particularly elasticities), significant insights can be obtained through this route, especially if the broad themes of results prove reasonably robust under sensitivity analysis.

II Policy and Literature Background

Current concerns among trade policy makers over GDA's are a reflection of a number of different themes. One is that many commentators on trade policy matters are now taking an increasingly pessimistic view on the future of multilateralism within the GATT. Another is the increasing level of discussion of explicitly geographically discriminatory arrangements as instruments of trade policy.

In the seven GATT rounds to date, two principles have dominated negotiations; multilateralism--all negotiations should take place on a multilateral rather than a bilateral basis, and non-discrimination--a cut in protection against any one country is a cut in protection granted to all. However, further cuts in tariffs through GATT negotiating rounds

are viewed as relatively unimportant because tariffs are already low.[1] Furthermore, it is widely agreed that the main issues in trade liberalization concern non-tariff barriers[2] rather than tariffs.

Those who are pessimistic about the GATT process argue that successive GATT rounds have not produced substantive progress in limiting and reducing non-tariff barriers. They also argue that non-tariff barriers are increasingly being used as a way of offsetting reductions in protection produced by negotiated tariff cuts. A cynical view of trade liberalization sometimes expressed, is that countries participate in GATT tariff cuts hoping that partners will take the tariff cut seriously, with the reduction in own protection subsequently offset by an erection of non-tariff barriers. These frustrations with the GATT are therefore producing pressure for bilateral rather than multilateral commercial policy negotiations on the grounds such negotiations are more manageable, can more easily focus on non-tariff barriers between pairs of countries, and result in agreements which are easier to police.

Another source of interest in GDA's arises from the increasing discussion in trade policy circles of explicit geographical discrimination as instruments of trade policy. . For instance, reciprocity proposals in the U.S. would set U.S. protection at the level of the trading partner, if that partner fails to reduce protection to U.S. levels. Such a proposal would

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[1] Averaged tariffs on manufactured products in industrialized countries will average around 5 percent by the end of the Tokyo Round implementation period of 1987.

[2] Non-tariff barriers include quotas, tariff valuation and administration procedures, standards, health and sanitary regulations and the like. While not all of these are explicitly directed towards impeding the flow of trade, most have that as one of their main impacts.

explicitly move the U.S. away from the non-discrimination in the GATT. The recent Caribbean Basin Initiative involves a set of arrangements giving duty-free access to the U.S. market to certain Caribbean countries. The way in which recent U.S. quotas on specialty steel were written, while not explicitly geographically discriminatory, were such de facto through the selection of products.

This orientation in recent trade policy discussion is not unique to the U.S. In Canada, there is currently much more active discussion of a possible U.S.-Canadian bilateral free trade initiative than has been true for many years. Some would even argue that the GATT itself is GDA because of the treatment of less developed countries. Trade liberalization among the developed countries concentrates on manufactured products, and does not include the agricultural and raw material items important to LDCs. In turn, those few manufactured items important to LDCs (particularly textiles) are effectively excluded from the GATT process.

These new directions in trade policy debate raise a number of important issues. Is it true that regions can improve on current multilateral GATT arrangements through bilateral or other GDAs? If so, what form are regional groupings likely to take if there is further fragmentation in the GATT, and how do the competing interests of the major industrialized countries come into play in determining what could happen? Should the GATT continue to operate on its present multilateral basis involving, effectively, only developed countries, how can developing countries be brought into this trade liberalization process?

The analyses presented in this paper bear on these questions, but are also relevant to current theoretical debates on the customs union issue. It therefore seems useful to also briefly indicate the context of the paper in terms of existing literature on this topic.

As is widely acknowledged, most customs union literature is based on the early work of Viner (1931) which identified trade creation and trade diversion as the two factors which affect any country participating in a customs union. In Viner's view of the customs union issue, two countries integrating their economic policies through a joint elimination of tariffs would each face a trade creation effect, reflecting the generation of new trade between them, and a trade diversion effect. The latter involves a country switching to sources of supply which are cheaper from a private point of view, but, are nationally more expensive because of the geographically discriminatory tariffs operating in the union between participating and non-participating countries. Trade diversion produces a reduction in real income while trade creation yields an improvement, with the net effect uncertain.

Subsequent contributions by Lipsey (1957), Gehrels (1956), and Meade (1956) all concentrated on the Vinerian distinction between trade creation and trade diversion emphasizing that trade diversion has consumption effects as well as the impacts on productive potential emphasized by Viner. These authors showed that it is possible for trade diversion to be welfare improving through a beneficial consumption effect. The implication drawn was that the Vinerian distinction between trade creation and trade diversion is itself somewhat confusing in that beneficial trade diversion can occur.

Following these literature developments of the 1950's major contributions in the 1960's and 1970's have focussed on the question of why customs unions occur. Cooper and Massell (1965), for instance, argue that it is possible for any country to obtain the trade creation effects associated with a customs union through unilateral free trade. They therefore queried why any country would participate in customs union. This theme was echoed by Johnson (1965) and taken further in a widely cited paper by Berglas (1979) which suggested that unilateral free trade and a customs union are equivalent, in so far that anything a country can achieve through a customs union it can also achieve through unilateral free trade.

However, the implication of the recent paper by Wonnacott and Wonnacott (1981) is that much of the previous customs union literature may have neglected a significant factor in both explaining customs union formation and analyzing gains and losses to individual countries. They implicitly argue that a major reason why any country would participate in a customs union is to penetrate the partner's market, and the main source of increased penetration (and the main benefit from participation) comes from the reduction in the partner tariff. This point is missing in previous literature discussion of the customs union issue. Wonnacott and Wonnacott take exception to the proposition by Berglas that unilateral free trade and customs unions are equivalent, and emphasize that in most cases where customs unions are involved, neogtiators concentrate almost exclusively on the reduction on the partner tariff as their main preoccupation.

Our numerical results also portray the Vinerian trade creation/ trade diversion issue as typically unimportant relative to other factors in evaluating the outcome in any particular customs union. Whether any individual country gains or loses, for instance, is much more heavily influenced by what the initial level of protection is in the partner country rather than any trade creation or trade diversion effects involving the country. We read our results as suggesting that in any particular GDA, it is usually relatively easy to identify what the main considerations are in determining both the total size of the joint gain and its division between regions. Traditional trade creation/trade diversion effects come surprisingly low on the list.

III A General Equilibrium Model of World Trade

The eight-region numerical general equilibrium model of world trade used to analyze impacts of GDA's is based on earlier four- and seven-region global trade models. The description in this and the following section is kept brief since the main focus here is on model results. More detail on the structure of the model (here expanded to eight regions) can be found in Whalley (forthcoming).

The model is most easily thought of as a numerical analogue of a Hecksher-Ohlin trade model, with the two departures from pure Hecksher-Ohlin form that demand and production function parameters differ across regions, and that products are heterogeneous across regions rather than homogeneous. The present model variant incorporates eight trading regions; the U.S., the EEC, Japan, Canada, Other Developed, Newly Industrialized (NICs), and Less Developed Countries (LDCs). The size of these regions in the model reflects their relative U.S. dollar GNP for 1977 in the World Bank Atlas.

The model incorporates six products produced in each region. These are: 1. Agriculture and Food; 2. Mineral Products and Extractive Ores; 3. Energy Products (including oil); 4. Non-Mechanical Manufacturing; 5. Machinery and Transport Equipment (including vehicles); and 6. Construction, Services, and other Non-Traded Goods. Each of the first five goods are internationally traded, with an assumed heterogeneity by region prevailing across production sources. The sixth commodity is non-traded for all regions.

The same commodity classification is used for trade, domestic production and final demands, with an approximate concordance adopted between the different classification systems appearing in the basic data used to parameterize the model. Problems of data availability for all regions, plus the large dimensionalities involved in obtaining a general equilibrium solution for an eight-region model limit the model to six products and eight regions; 48 regions in total.

The assumption or product heterogeneity by region (the so called 'Armington' assumption) implies that products are differentiated on the basis of geographical point of production as well as physical characteristics. Thus, 'similar' products are imperfect substitutes in both demand and production i.e. Japanese manufactures are treated as qualitatively different products from U.S. or EEC manufactures. This treatment is used both to accommodate the statistical phenomenon of cross-hauling in international trade data, and to exclude complete specialization in production as a behavioural response in the model. This structure also enables empirically based import demand elasticities to be incorporated into the model specification.

Production and demand patterns in each of the regions revolve around the domestic and world price systems. For each product in the model, the market price is the price at point of production. Sellers receive these prices, purchasers (of both intermediate and final products) pay these prices gross of tariffs, NTB tariff equivalents, and domestic taxes; no transportation costs are considered.

Explicit demand functions for each region are derived from hierarchical CES/LES preference functions, and CES functions characterize production sets. Producers maximize profits and competitive forces operate such that in equilibrium all supernormal profits are competed away. Investment flows, interest and dividends, and foreign aid flows also enter the model, with the second two of these being treated as income transfers.

The model examines international trade equilibrium situations, where demands equal supplies for all products, and in each industry in each region a zero-profit condition is satisfied representing the absence of supernormal profits. In equilibrium, a zero external sector balance condition (including investment flows, dividends, interest and transfers) also holds for each region.

An important feature of the model is the structure of substitution possibilities on both the demand and production sides, which are represented by the CES and CES/LES functions. The elasticities of substitution in these functions determine price elasticities of goods and factor demands, and because of the product heterogeneity assumption, these elasticities also control import and export demand elasticities for each region.

In production, each industry has a CES value-added production function which specifies substitution possibilities between the primary factor inputs, capital and labour services. No technical change is incorporated, and factors are immobile between regions. In addition to the CES value-added functions, each industry uses the outputs of other industries (both domestic and imported) as inputs in its own production process. Substitution between intermediate products is allowed, while fixed coefficients in terms of composite goods are assumed. Each fixed coefficient requirement is specified in terms of composite good, which itself is represented by a nested CES function with elements of the composite (i.e. products identified by geographical point of production) entering as arguments. Substitution occurs between comparable domestic and composite imported commodities at the top level of nesting, with further substitution taking place between import types differentiated by location of production.

On the demand side, a single set of final demand functions for each region are obtained by maximizing a nested CES/LES utility function. Within this functional form, a hierarchy of substitution possibilities is used involving similar products imported from the various regions, and composites of imports across sources and comparable domestic products. Use of these nested functions enables empirical estimates of price and income elasticities in world trade to be incorporated into the model. These values guide parameter choice for inter-nest elasticity values in the CES functions (i.e., between 'similar' products subscripted by location of production). The LES features in the hierarchy allow income elasticities in import demand functions to differ from unity.

Since each region generates demands from utility maximization, the market demand functions in the model satisfy Walras' Law. This is the condition that at any set of prices the total value of demands equals the total value of incomes. The incomes of regions are derived from the sale of primary factors owned by each region plus transfers received (including foreign aid).

The model incorporates tariffs and non-tariff barriers (NTBs) in ad valorem equivalent form, along with domestic tax policies. By changing the model specification of trade policy regimes, impacts of various GDA's can be considered by computing equilibria associated with alternative policy changes. With the exception of Canada, the parameter values adopted to represent these are given in Whalley (forthcoming) along with the sources used.

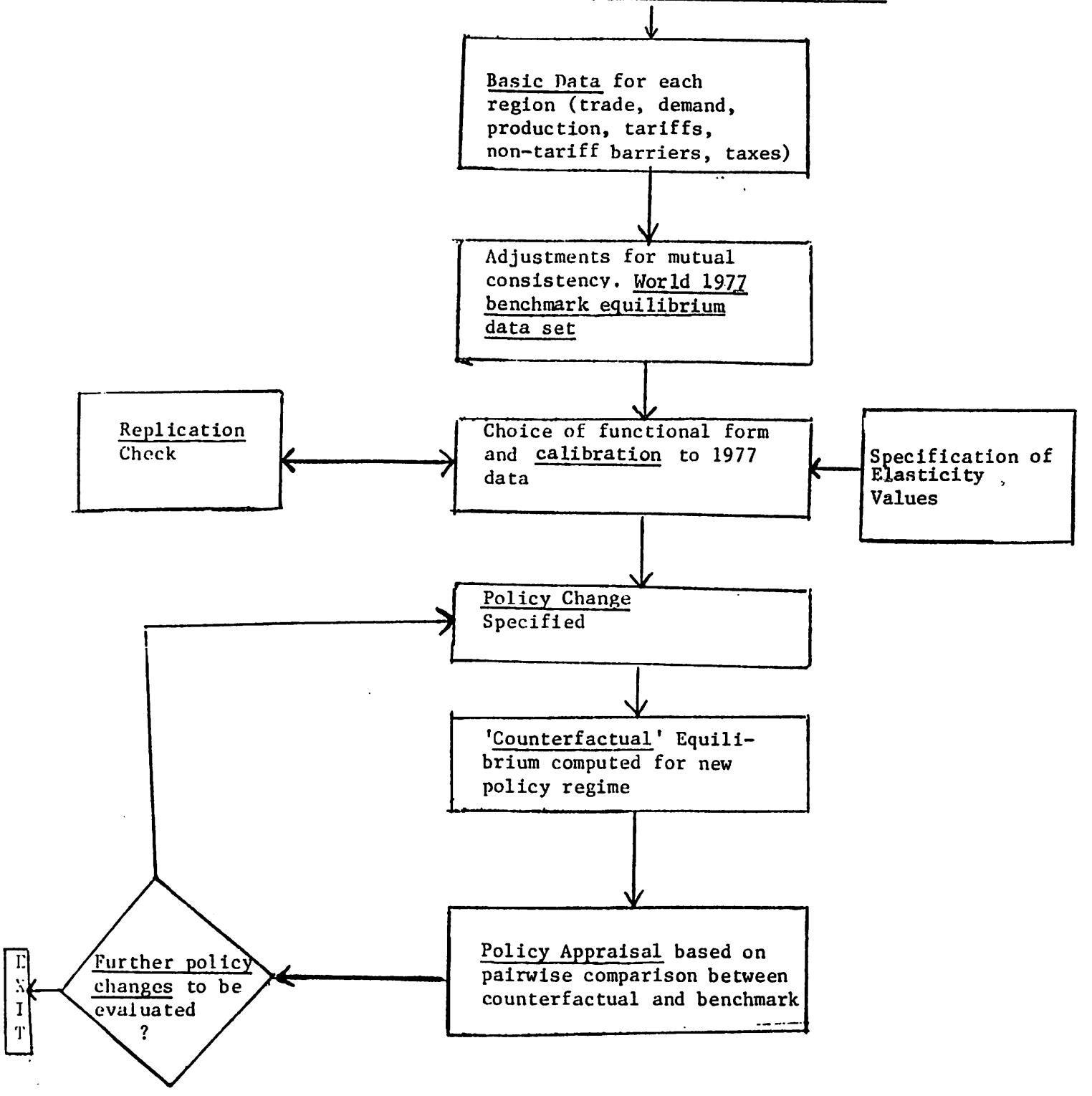
V Benchmark Calibration, Elasticities and Equilibrium Solution of the Model

The procedures used in applying the model are summarized in Table 1. A worldwide general equilibrium constructed from 1977 data is assumed to hold in the presence of existing trade policies in all regions. The model is calibrated to this data set through a procedure which determines parameter values for the model functions consistent with this equilibrium observation. Counterfactual analysis then proceeds for any specified policy change.

This calibration procedure first involves constructing a data set for a given year in a form which is consistent with the equilibrium solution concept of the model; a so-called benchmark equilibrium data set. Once assembled, parameter values for equations can be directly calculated from the equilibrium conditions using the calibration procedure described in Mansur and Whalley (1983). The model specification is then capable of reproducing the benchmark data as an equilibrium solution to the model. Comparative statics can be performed by computing new equilibria for alternative trade policy regimes, and comparing new and benchmark equilibrium data.

TABLE 1

MODEL FLOW CHART FOR WORLD TRADE GENERAL EQUILIBRIUM MODEL



The micro consistent benchmark equilibrium data set constructed for this purpose has the properties of a worldwide competitive equilibrium in that demands equal supplies for all products, no profits are made in any of the domestic industries, and each region is in zero external sector balance. The data set involves both the domestic and trading activity of each of the regions. A number of source materials are used which need adjustment for inconsistent classifications and definitions. A description of the methods used in assembling the 1977 data set appears in Whalley (forthcoming).

Parameter values consistent with the equilibrium observation are determined using the model equilibrium conditions and the benchmark data. Because of the CES/LES functional forms used, this procedure requires more information than that contained in the benchmark equilibrium data set. This information requirement is met by specifying elasticities of substitution and minimum requirements in the functional forms. Once these are chosen, demand functions are solved for share parameters consistent with both equilibrium prices and quantities. On the supply side, cost functions are similarly solved for share and unit parameters consistent with equilibrium prices and input use by industry.

As might be expected, the values chosen for substitution elasticities have a substantial impact on the results produced by the model, and the procedure followed is to adopt a central case model specification around which sensitivity analysis can be performed. Given the present focus on effects of changes in trade policies, an especially important set of parameters are the substitution elasticities which determine implicit trade elasticities. Import price elasticities for developed countries in the model reflect the Stern, Francis, Schumacher (1976) compendium of trade elasticities, and estimates for developing countries are due to Khan (1974). Recent estimates for the U.S., EEC, and Japan by Stone (1979) provide detailed estimates by product, and are also approximately consistent with the values used in the model. The low values (in absolute terms) of import

price elasticities produced by these and other studies have been extensively commented on in the literature. In the present model these produce significant terms of trade effects under alternative GDA's, and their role should thus be highlighted.

Once specified, the model is solved for a new general equilibrium for a policy or other change using a Newton method involving an estimate of the Jacobian matrix of excess factor demands and government budget imbalances. Although there is no ex ante argument of convergence with this Newton method, it has been successful in implementation.

VI Results and Interpretations

To analyze issues surrounding GDA's, we have considered a number of bilateral trade arrangements each involving various combinations of the regions identified in the model. Counterfactual equilibria under these alternative policy regimes are computed and compared to the 1977 benchmark equilibrium data. We focus on the annual welfare effects by region measured in Hicksian equivalent variations in 1977 billions of dollars, and regional terms of trade effects. We initially concentrate on free trade areas to abstract from the terms of trade effects which may accompany the adoption of common external protection as a further crucial element in the analysis of GDA's.

In Table 2 results are reported for a series to two region free trade areas, each involving the U.S. This particular series of free trade areas is somewhat arbitrarily chosen from the many combinations of regions which can be considered with the model. Although all protection is bilaterally removed in these cases, we have also considered comparable cases in which we only eliminate tariffs; these are not reported due to space constraints.

Table 2

Results for a Series of

Bilateral Free Trade Areas (FTA's) Involving the U.S.

(all protection bilaterally removed)

A. Annual Welfare Impacts (EV's in $bill, 1977)

	US - EEC FTA	US - Japan FTA	US - Canada FTA	US - Oth.Dev. FTA	US - NIC FTA	US - LDC FTA
EEC	.7	.0	- .2	- .9	- .4	- 1.0
US	5.1	2.8	.6	2.0	8.1	8.0
Japan	.2	1.2	- .1	- .1	- .4	- .3
Canada	- .4	- .3	1.3	.0	.2	.0
Oth.Dev.	- 2.6	- 1.5	.0	.5	.0	.5
OPEC	.1	.0	.0	.0	- .1	- .5
NIC	- .9	- .5	- .2	.0	- 2.9	.6
LDC	- 1.8	- 1.2	- .1	- .2	.0	- .2

B. Terms of Trade Impacts (% change, +ve indicates improvement)

EEC	- .3	.0	- .1	- .4	- .1	- .5
US	2.5	1.4	.0	.7	3.4	3.6
Japan	.2	.1	- .1	.0	- .4	- .2
Canada	- .8	- .6	.7	- .1	.2	- .2
Oth.Dev.	- 1.2	- .7	.0	- .2	.0	.2
OPEC	.2	.1	.1	.1	- .1	.2
NIC	- .6	- .4	- .1	.0	- 6.4	.3
LDC	- 1.0	- .7	.0	- .1	- .1	- 4.6

In the U.S.-EEC case, the U.S. receives a welfare gain, the EEC a somewhat smaller gain, while most other regions lose. The terms of trade effects are positive for the U.S., and small and negative for the EEC. The single most important factor determining the outcome in this particular case is the initial levels of protection between the U.S. and the EEC, particularly the substantially higher non-tariff barriers on agricultural products in the EEC. The terms of trade effects are explained primarily by the U.S. penetration of EEC markets as the EEC removes its agricultural NTBs against the U.S.[1] A comparable pattern occurs in the U.S.-Japanese case, where significant gains also occur for the U.S., with smaller gains to Japan and a small terms of trade improvement. Again, the asymmetries in initial levels of protection, particularly in the NTB's, are the dominant theme in determining the outcome.

In the U.S.-Canadian case, most of the gains go to Canada since Canada is a small region relative to the U.S. This accords with the intuition that the relative size of regions can also be a dominant factor in determining the division of gains from a free trade arrangement. The U.S. gains in this case because of the removal of non-tariff barriers in Canada; where tariffs alone are eliminated bilaterally the U.S. loses.

In the U.S.-Other Developed case, once again, asymmetries in the initial levels of protection are the dominant consideration in determining who gains and who loses. Other Developed includes the smaller GATT members (eg. Australia, New Zealand, Austria) who have higher levels of protection than larger countries such as the U.S. In the two final cases in Table 2, involving

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[1] In other results (not represented here) for a U.S.-EEC free trade area where only tariffs are removed and agricultural NTBs remain unchanged, the terms of trade effect for the EEC becomes positive.

free trade between the U.S. and NIC's and the U.S. and LDC's, the importance of these asymmetries in the initial levels of protection become even clearer. In these cases both the NICs and LDCs, which are sharply more protectionist than the U.S., have a significant terms of trade loss, and the U.S. a marked terms of trade gain.

In all these cases the U.S. experiences gains of varying size. However, rather than Vinerian trade creation/trade diversion effects being the important consideration, it is the initial levels of protection of the regions participating in a free trade arrangement and differences in relative sizes of regions which principally determine gains and losses.

In Table 3 further free trade areas are evaluated. In the EEC-Japanese case, where the initial levels of protection are more symmetric than in the U.S. cases, both the EEC and Japan gain, with a slightly larger terms of trade improvement for Japan.

Results for a Northern free trade area (Table 3, Column 2) provide some insight on the issue of whether or not countries gain more from multilateral rather than bilateral arrangements. In this case, of the five participants in the free trade arrangement only the Other Developed suffers a terms of trade deterioration, but still receive a welfare gain due to the consumption effects associated with the free trade area. The gains to all other participating regions are large. For the U.S., the $5 billion gain is dominated only by a free trade arrangement with the EEC. The $9.5 billion gain to the EEC compares to a $.7 billion gain from a free trade arrangement with the U.S. The Japanese gain of $2 billion compares to a $1.2 billion gain from free trade area with the U.S., and Canada also gains more than it would from a free trade arrangement with the U.S.

Table 3

Results of Further Free Trade Areas
(all protection removed within FTA)

A. Annual Welfare Impacts (EV's in $bill, 1977)

	EEC - Japan FTA	'Northern' FTA (EEC, US, J, C, Oth.Dev.)	'Southern' FTA (NIC, LDC)
EEC	.8	9.5	- .2
US	- .3	5.0	0
Japan	1.0	2.0	- .2
Canada	0.0	2.4	.1
Oth.Dev.	- .7	.3	- .1
OPEC	0.0	- .8	- .0
NIC	- .4	- 4.8	- .1
LDC	- .6	- 9.6	3.7

B. Terms of Trade Impacts (% change, +ve indicates improvement)

EEC	.3	2.8	- .1
US	- .2	1.4	- 0
Japan	.8	.1	- .2
Canada	- .1	2.5	.1
Oth.Dev.	- .3	- 1.6	- .1
OPEC	- .1	- .6	- .1
NIC	- .2	- 3.2	- 1.4
LDC	- .3	- 5.1	1.4

We interpret this column of Table 3 as suggesting that incentives for bilateral free trade areas among developed countries are relatively weak. In turn, these results suggest that a major effect of the GATT is an improvement in the terms of trade of developed countries with NICs and LDCs. GATT trade liberalization stimulates trade in manufactured products among developed countries, and developed countries improve their terms of trade with exporters of agricultural products and raw materials (LDC's).

The final column of Table 3 examines a Southern free trade area between NICs and LDCs. In this case, NICs participating in the free trade area suffer a welfare loss. A terms of trade loss also occurs for NICs, with an improvement for LDCs. The reason for this result is that NICs are a significant importer of raw materials and agricultural products from LDCs, while LDC imports from NICs are much smaller. LDC's thus penetrate NIC markets more than NICs increase their access to LDC markets. This result emphasizes how in a free trade area a third consideration, the pattern of trade between the participating regions, can also be crucial in determining results.

The same theme of the importance of factors beyond trade creation/trade diversion in determining regional gains or losses from GDA's is illustrated by results in Table 4, where we examine the U.S.-Canadian case in more detail. The first column reports the same U.S.-Canadian free trade arrangements as considered in Table 2 involving the abolition of all protection. The second column reports a similar case, but involving tariffs only. As already mentioned the U.S. receives both a terms of trade and welfare loss in this case. Subsequent columns investigate the impacts of alternative common levels of external protection in a GDA, and their impact in determining regional gains or losses.

Table 4

Further Investigation of U.S.-Canada Trade Arrangements

A. Annual Welfare Impacts (EV's in $bill, 1977)

	US - Canada FTA All Protection	US - Canada FTA Tariffs only	US - Canada CU - Tariffs - Common Tariff US Rates	US - Canada CU - All protection - Common protection US Rates	US - Canada CU - Tariffs Common Tariff Canadian Rates	US - Canada CU - All Protection - Common Protection Canadian Rates	US - Canada CU - All Protection - 10% Common External Protection	US - Canada CU - All Protection - 20% Common External Protection	US - Canada CU - All Protection - 30% Common External Protection
EEC	- .2	- .1	.0	.1	- 1.2	- 1.3	1.0	- 1.9	- 4.5
US	.6	- .6	- .7	.4	1.6	2.8	.0	8.2	14.9
Japan	- .1	- .1	- .0	- .1	- .8	- .9	- .2	- 1.9	- 3.3
Canada	1.3	1.1	1.0	1.1	1.1	1.3	1.1	1.9	2.4
Oth.Dev.	.0	.0	.1	.0	- .4	- .4	.4	- .2	- .7
OPEC	.0	.0	.0	.0	- .0	- .1	- 2.0	- 4.7	- 7.1
NIC	- .2	- .0	.0	.0	- .4	- .5	3.1	.8	- 1.2
LDC	- .1	.0	- .0	- .2	- .0	- .2	2.3	1.5	1.3

B. Terms of Trade Impacts (Zchange, +ve indicates improvement)

EEC	- .1	- .1	.0	.1	- .5	- .5	.4	- .8	- 1.9
US	.0	- .4	- .5	- .1	1.0	1.5	- .9	4.5	9.6
Japan	- .1	- .1	- .1	- .1	- .9	- .9	- .3	- 1.9	- 3.3
Canada	.7	1.8	1.4	- .1	1.8	.7	- .1	1.6	3.1
Oth.Dev.	.0	.0	.0	- .0	- .1	- .2	.1	- .1	- .3
OPEC	.1	.0	.0	.0	.1	.1	- 1.4	- 2.8	- 4.3
NIC	- .1	- .0	.0	.0	- .2	- .3	2.0	.5	- .9
LDC	.0	.0	.0	- .0	- .1	- .1	1.4	.9	.3

In the U.S.-Canada customs union case where only tariffs are eliminated and the common tariff is set at U.S. rates, welfare effects are comparable to the free trade arrangement with tariffs only. However, where the common protection is set at Canadian levels, a sharp gain accrues to the U.S. with a larger gain to Canada. These results occur because when U.S. protection is raised to Canadian levels, Canada (being the relatively smaller country) gains from the higher protection in the U.S., and further penetrates the U.S. market. In the all protection case, setting common external protection at either U.S. or Canadian levels also makes a major difference to the size of gains or losses. A terms of trade deterioration occurs for the U.S. with common protection at U.S. rates, compared to an improvement in their terms of trade with common protection at Canadian rates.

The final three columns further emphasize how the level of common external protection in a customs union can sharply affect the size of regional gains or losses. Varying common external protection between 10 and 30 percent increases the welfare gain to the U.S. from a customs union with Canada in the all protection case from $0 to $14 billion, with the latter case resulting in a terms of trade improvement of nearly 10 percent. The impact of the common external protection on the terms of trade for Canada also shows through in these cases.

We conclude from this table that the usual concerns in the customs union literature with trade creation and trade diversion not only neglect the important issue of the missing foreign tariff highlighted by Wonnacott and Wonnacott (1981), but also neglects the potential for terms of trade improvements through common external protection. This,

in turn, suggests that while the threat to multilateralism in the GATT from bilateral free trade arrangements may be small, the threat from groups of countries breaking away and forming customs unions who then exploit common external protection for a terms of trade gain may be more pronounced.

Table 5 reports impacts on trade flows for some of the bilateral changes considered earlier, and reveals some of the difficulties in separately identifying trade creation and trade diversion effects from GDA's. This table emphasizes the differences between general equilibrium calculations of the effects of GDA's in which all effects, including terms of trade changes, are captured, and the partial equilibrium analyses in theoretical literature which abstract from terms of trade effects. For example, in the U.S.-EEC free trade area case there is an increase in imports by the U.S. from the EEC of approximately $6 billion. However, because of trade balance condition, the import change column for the EEC is completed by a series of negatives, and the column for the U.S. by a series of positives. Because of the change in relative prices it becomes difficult to separately identify the trade creation and trade diversion effects from these numbers alone. Similar issues also arise in the U.S.-NIC and LDC-NIC cases.

An understandable concern with applied general equilibrium approach is that the particular numerical specification used in any model may be crucial for results. This issue is investigated in Table 6. In these sensitivity analyses, we focus on the U.S.-EEC free trade area case from Table 2, and vary elasticities from the values used in the central case specification of the model. Central case welfare and terms of trade results from Table 2 are given in the final column on the right hand side of the table.

Table 5

Impacts of Geographically Discriminatory Arrangements on Trade Flows
(Changes in trade flows in 1977 $bill)

A. EEC-US FTA (All Protection)

EXPORTING REGION \ IMPORTING REGION	EEC	US	JAPAN	CANADA	OTH.DEV.	OPEC	NIC	LDC
EEC	0.0	5.8	.1	.1	- .6	.3	.1	- .0
US	9.7	0.0	- .4	- .4	- .7	- .4	- .5	- .6
JAPAN	- .2	.6	0.0	.0	- .2	- .0	- .0	- .2
CANADA	- .5	.7	- .0	0.0	- .0	- .0	- .0	- .0
OTH.DEV.	- 2.1	.8	.3	.1	0.0	.2	.1	.1
OPEC	- .4	.8	- .0	.0	- .2	0.0	- .1	- .2
NIC	- .9	.7	.0	.0	- .1	.0	0.0	- .0
LDC	-1.2	.7	.2	.0	- .0	.2	.0	0.0

B. US-NIC FTA (All Protection)

EXPORTING REGION \ IMPORTING REGION	EEC	US	JAPAN	CANADA	OTH.DEV.	OPEC	NIC	LDC
EEC	0.0	1.3	- .0	.1	.2	.1	-1.7	.2
US	-1.1	0.0	- .5	- .4	- .6	- .6	13.2	- .5
JAPAN	.0	1.0	0.0	.1	.1	.1	- 1.3	.1
CANADA	- .1	.6	- .1	0.0	- .0	- .0	- .3	- .0
OTH.DEV.	- .0	.6	- .0	.0	0.0	.0	- .7	.0
OPEC	- .1	1.1	- .1	.0	- .0	0.0	- 1.1	.0
NIC	1.3	8.5	.5	.4	.6	.4	0.0	.1
LDC	- .1	.6	- .1	.0	- .1	- .1	- .4	0.0

C. LCD-NIC FTA (All Protection)

EXPORTING REGION \ IMPORTING REGION	EEC	US	JAPAN	CANADA	OTH.DEV.	OPEC	NIC	LDC
EEC	0.0	- .0	- .0	- .0	.0	- .0	- .3	.3
US	.1	0.0	.0	- .0	.0	.0	- .3	.2
JAPAN	.0	.0	0.0	.0	.0	.0	- .2	.2
CANADA	.0	- .0	.0	0.0	.0	.0	- .1	.0
OTH.DEV.	.0	- .0	.0	- .0	0.0	- .0	- .1	.1
OPEC	.0	- .0	- .0	- .0	.0	0.0	- .3	.3
NIC	.3	.4	.1	.1	.1	.1	0.0	1.6
LDC	- .5	- .3	- .2	- .0	- .3	- .2	3.2	0.0

Table 6

Sensitivity Analysis for U.S.-EEC FTA (All Protection)

	Elasticity of Substitution Between Import Types Set At 3.0 All Regions	Elasticity of Substitution Between Import Types Set At 5.0 All Regions	Elasticity of Substitution Between Domestic Products and Imports Set at 0.75 for All Regions	Elasticity of Substitution Between Domestic Products and Imports Set at 1.5 All Regions	Elasticity of Substitution Between Domestic Products and Imports Set At 3.0 All Regions	Import Income Elasticity = .9 for Regions 1-6, 1.1 for Regions 7,8	Import Income Elasticity = .75 Regions 1-6, 1.25 Regions 7,8	Import Income Elasticity 1.5 All Regions	Central Case
A. ANNUAL WELFARE IMPACTS (EV'S IN $BILL, 1977)									
EEC	2.6	3.3	- .2	- .8	- .5	.9	1.3	.4	.7
US	9.2	12.5	9.6	5.8	3.3	5.2	5.1	4.8	5.1
Japan	.1	.2	- .4	.0	.6	.2	.2	.1	.2
Canada	-1.4	- 2.1	- 1.7	- .4	.4	- .4	- .4	- .4	- .4
Oth.Dev.	-5.2	- 6.9	- 3.5	- 1.4	- .1	-2.7	-2.8	-2.3	-2.6
OPEC	- .4	- .8	.1	- .1	- .0	.1	.1	.1	.1
NIC	-2.7	- 4.2	- 2.3	- .7	1.0	- .8	- .7	- .7	- .9
LDC	-3.9	- 5.3	- 2.8	- 1.3	.6	-1.7	-1.6	-2.8	-1.8
TOTAL	-1.7	-3.2	- 1.3	1.2	5.3	.7	1.4	-1.0	1.0
B. TERMS OF TRADE EFFECTS (% CHANGE, +ve INDICATES IMPROVEMENT)									
EEC	.8	1.4	- .5	- 1.1	- 1.5	- .3	- .3	- .1	- .3
US	4.5	5.9	5.5	3.0	1.2	2.5	2.3	2.6	2.5
Japan	.1	.2	- .4	.1	.6	.3	.3	.1	.2
Canada	-3.0	- 4.3	- 3.5	- .8	.5	- .8	- .7	-1.0	- .8
Oth.Dev.	-2.3	- 2.9	- 1.6	- .6	.0	-1.1	-1.1	-1.3	-1.2
OPEC	- .2	- .6	.4	.3	.3	.2	.2	.2	.2
NIC	-1.7	- 2.5	- 1.7	- .4	.5	- .6	- .6	- .7	- .6
LDC	-2.2	- 3.0	- 1.8	- .7	.2	-1.0	-1.0	-1.0	-1.0

Varying elasticities of substitution for import types from the central case values (in the neighbourhood of 1) between 1.5 and 5 for all products in all regions sharply raises the welfare gains and terms of trade improvements which accrue to the EEC and the U.S. This occurs because the key margin of substitution in a free trade area case is that between the geographically subscripted products. The larger is this elasticity, the larger the substitution effect in favour of partners in the free trade arrangement.

On the other hand, varying the elasticity of substitution between composite imports and domestic products can change results the other way. If the elasticity substitution between domestic and imported products is set at 0.75, the terms of trade improvement for the EEC in the central case changes to a terms of trade deterioration. The terms of trade improvement for the U.S. is larger in this case because the import price elasticity in the U.S. is larger than that in the EEC in the central case, and the use of a common 0.75 value removes the effect of the relative difference across regions.

When the elasticity of substitution between domestic products and import composites is raised, the terms of trade effects become more negative for the EEC and smaller for the U.S. because of the change in the relative elasticities between composites of imports and domestic products, and import types. Under variations in import income elasticities, results are relatively unchanged, further confirming that key parameters affecting results in GDA's are those producing the substitution effects between products subscripted by region, rather than income effects.

While these results show sensitivity of numerical results to the specification of elasticity values, the main themes of results nonetheless remain. Broad themes from these calculations rather than precise estimates can therefore be emphasized with reasonable confidence.

Conclusion

In this paper an eight-region numerical general equilibrium model of global trade is used to investigate the impacts of various geographically discriminatory trade policy arrangements (GDA's) on regional trade and welfare. Our analysis is motivated both by the policy concern that pressures for regional fragmentation of existing multilateral trade arrangements are growing, and recent debates in the customs union literature as to the significance of various factors determining the outcome in any particular union.

Results suggest that the important factors determining gains and losses in any GDA are such issues as whether initial levels of protection are asymmetric, the relative sizes of participating regions, and the pattern of trade between participant and non-participant countries, rather than the trade creation/trade diversion issues usually emphasized in theoretical literature. Results also suggest that while the incentives to engage in bilateral free trade areas rather than to participate in multilateral negotiations (such as the GATT) may be small, use of common external protection by participants in a customs union may make participants better off compared to wider multilateral arrangements. Finally, results confirm the implication of the recent paper by Wonnacott and Wonnacott (1981) that the gain from reducing a partner's tarif is typically a much more important consideration in evaluating potential benefits from a customs union, than the traditional concerns of trade creation and trade diversion.

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