

REGIONAL ECONOMIC INTEGRATION AND WORLDWIDE FREE TRADE*

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This paper examines the forces of economic integration by analyzing the flow of international trade using the gravity model, a technique of analysis that explains trade flows by the sizes of the countries involved and the distances between them.

This paper also investigates the importance of location (same region or proximity) in the formation of regional trading blocs in the global economy. In previous analyses of economic integration, the role of transportation costs has been given limited study. Transportation costs are typically included in production costs rather than studied as an independent element. By neglecting the locational factor, past studies have tended to overlook the advantages of geographical proximity in explaining economic integration.

I. INTRODUCTION

The economic integration of independent nations into larger, supranational arrangements has found greater scrutiny in recent years in both news media and academic literature. This recent interest in trading blocs, free trade areas, and economic integration is largely the result of the North America Free Trade Agreement (NAFTA) among the United States, Canada, and Mexico and the formation of the European Union among European nations.

The most successful example of recent economic integration among independent nations is found in Europe. As a prominent example of economic integration, the European Economic Community (EEC) has attracted a great deal of attention from scholars and the media. The EEC first established a common market in the 1950s, with common external tariffs and the elimination of various ba-

* This paper is a summarized and revised version of my Ph. D. dissertation at Oklahoma State University in 1992.

** Senior Research Fellow, Research Department of Kwangju City Government. My deepest thanks go to my advisor Orley M. Amos Jr. for his encouragement and valuable comments. I am also grateful to other committee members and seminar participants at Oklahoma State Univ. and Korean Economic Association's anonymous referees who gave nice comments on this version. All remaining errors and ambiguities are mine alone.

riers that prevented the free flow of labor and capital among member countries. Changing its name to EC, and now EU, it recently moved beyond a common market to a higher level of economic integration, pursuing the ultimate goal (an economic union) and European Economic Area.

The impetus for the formation of integrated European Union is most likely the expansion of trade throughout the global economy in recent decades and the resulting competition, especially with the United States and Japan. The United States has responded to this competition in its own way through the NAFTA with Mexico and Canada. While economic integration in Asia is less formalized, Japan has extensive economic ties throughout the western half of the Pacific rim.

The consequence of this economic integration has been the emergence of three major regional trading blocs and several smaller, regional trading blocs. The three major blocs are North America, Asia, and Europe. The smaller blocs are primarily dispersed throughout Latin America and Africa.

Coincident with the formation of regional trading blocs have been the multi-lateral negotiations through the General Agreement on Tariffs and Trade (GATT). Since World War II, GATT has sought to encourage international trade flows by relaxing trade barriers among all nations. The irony is that increased trade encouraged by GATT has apparently motivated the formation of regional trading blocs which impose trade restrictions on non-bloc nations.

The objective of this study is to examine the factors underlying economic integration and the formation of regional trading blocs. The primary question is whether regional trading blocs are a stable method of engaging in international trade or merely a step along the path of an integrated global economy.

II. ECONOMIC INTEGRATION AND THE TRADING BLOCS

Economic integration arrangements take a variety of forms:¹⁾ (1) preferential tariff agreement between countries; (2) free trade areas that eliminate tariffs among the participating nations, but maintain their own tariff schedule against non-participating nations; (3) customs unions²⁾ that eliminate tariffs among the member nations, and establish a common tariff schedule (i.e. common external tariff—CET) against nonmember nations; (4) common markets that eliminate non-tariff restrictions on factor movements (i.e. labor) as well as the elimination of tariffs; (5) economic unions where national economic policies are integrated; and (6) total economic integration that assumes a unification of all economic policies such as fiscal, monetary and employment policy, and also assumes a setup

¹ Balassa, Bela, *The Theory of Economic Integration*. Homewood, Illinois: Richard D. Irwin, Inc., 1961, p. 2.

² By establishing the same level of tariff on trade with non-member countries, a customs union is a higher level of integration than a free trade area.

of supranational institutions which govern all member countries. These six forms of economic integration can be thought of as a hierarchical series of steps that progress from the level of cooperative independent nations to the level that creates a political entity just short of a formal nation.

Regional trading blocs are associations which develop among nations located in a particular region of the globe. Proximity is one of several basic characteristics of trading blocs.³⁾ For simplicity, a trading bloc can be defined as an association of countries that reduce intra-regional impediments to the free flow of commodities (and sometimes services, investment, and capital flows as well).⁴⁾ Trading blocs seek to "(1) generate welfare gains through income and efficiency effects and trade creation; (2) augment negotiating leverage with third countries; and (3) sometimes promote regional political cooperation."⁵⁾

A criterion of a trading bloc is that there exists a discriminatory application of some form of economic policy among members of the grouping. Another criterion is often the existence of a discriminatory policy against nonmember countries. Trading blocs are known to concentrate on discriminatory border restrictions, mainly tariffs. Correspondingly, trading blocs affect the quantity and prices of internationally exchanged commodities or factors of production.

Regional trading blocs can exhibit any of the levels of economic integration. The European Union moved from the common market described in level (4) to the economic union described in level (5) during 1992. The Japan/Asian trading bloc remains around levels (1) and (2) and NAFTA places North America near the (2) and (3) levels of economic integration.

III. THEORETICAL FRAMEWORK OF GRAVITY MODEL

Spatial interaction models are used to facilitate the explanation and forecast of social and economic interaction over geographical space. H.C. Carey defined the "gravity law" of spatial interaction by stating that "the degree of attraction varies directly with the mass, or concentration of persons or things, and inversely with distance."⁶⁾ This is adapted from Newton's law of universal gravitation which states that the force of attraction, F , between two objects i and j is proportional to their respective masses, m_i and m_j , and inversely related to the square of the distance, d_{ij} between masses. The gravity law, as one of the spatial mo-

³ Schott, Jeffrey J., "Trading Blocs and the World Trading System", *World Economy*, vol. 14, iss. 1, (Mar) 1991, pp. 2-3.

⁴ Ibid., p. 1.

⁵ Ibid., pp. 1-2.

⁶ Niedercorn, J. H. and Bechdolt, Jr. B. V., "An Economic Derivation of the 'Gravity Law' of Spatial Interaction,"

Journal of Regional Science, vol. 9, 1969, p. 273.

dels used in behavioral science, also describes "social phenomena in space, such as population migration, flow of goods, money, and information, traffic movement and tourist travel."⁷

Mathematically, the gravity law is expressed as follows:

$$F_{ij} = \frac{k m_i m_j}{d_{ij}^2} \quad \text{where } k \text{ is a constant.} \quad (1)$$

This formula is often slightly modified when applied to socioeconomic interactions. The exponent of the distance variable is not necessarily fixed as two and is often estimated for the specific interaction being studied.

A variety of gravity models exist which can be classified according to "(1) the type of data used, (2) the type of interaction being studied, and (3) the point of view from which the interaction is being studied" (Niedercorn and Bechdolt, 1969, 274). In empirical studies, the type of gravity model used is determined by the estimation technique and the type of interactions. This study uses a bidirectional trade flow model, because exports from country i to country j and exports j to i are combined to constitute a trade flow $_{ij}$.

IV. EMPIRICAL IMPLEMENTATION

1. Data and Variables

Treatment of Regions

The classical method of conceptualizing regions is based on three types: homogeneous regions, nodal(or polarized) regions, and planning(or programming) regions. The first type of region is an area of relative homogeneity.⁸ The second type, the nodal region, reflects a higher degree of interdependence within an area, since nodes are the areas where people are bound together by mutual interaction. Finally, the planning region is usually conceived as an area over which economic decisions and policies apply. Delineating an international region for this study relies largely on the first two definitions of regions.

The seven regions analyzed in this study are: North America; East Asia; Europe[15 EU countries, plus EFTA countries]; Southeastern Asia[5 original Association of Southeast Asian Nation(ASEAN) countries]; the Oceanian region; South America[10 member countries of Latin America Free Trade Association(LAFTA) or currently the 5 member Andean subregional group or both]; and Southeastern

⁷ Ibid., p. 273.

⁸ Russett, Bruce M., *International Regions and the International System: A Study in Political Ecology*. Chicago: Rand McNally & Company, 1967, p. 2.

Africa[South Africa, Mozambique and three former East African Common Market(EACM) countries]. These seven regions are separated geographically from one another. Therefore, each group has its own economic, political, and geographical characteristics that are often distinctive from the others. Since separateness is a criterion, a geographic factor was also taken into consideration.

[Table 1] International Regions and Their Countries

No	Region Name	Included Countries and the Number
1	North America	USA, Canada, Mexico(3)
2	East Asia	Japan, S. Korea, China, Taiwan, Hong Kong(5)
3	Europe	Germany, France, UK, Italy, Denmark, Netherlands, Belgium(Luxemburg), Switzerland, Sweden, Austria, Norway, Finland, Ireland, Portugal, Spain, Greece(16)
4	Southeastern Asia	Singapore, Malaysia, Thailand, Indonesia, Philippines(5)
5	Oceania	Australia, New Zealand(2)
6	South America	Brazil, Venezuela, Argentina, Chile, Colombia, Peru, Ecuador, Uruguay, Bolivia, Paraguay(10)
7	Southeastern Africa	S. Africa, Kenya, Tanzania, Mozambique, Uganda(5)

The 46 countries included in this study comprise all of the G-7 countries; 22 OECD countries excluding Iceland and Turkey; all 5 members of the ASEAN; all the South American Continental countries except for Guyana, Surinam and French Guiana; all the Oceanian countries; some major Southeastern African countries including South Africa; and finally all three major North American countries.

Treatment of the Trade Flows

In trade theory, conventional trade flow models deal with exports and imports separately. The method of dealing with exports and imports here is to combine the unidirectional interactions and use a bidirectional gravity model. The trade flow data used in this study are obtained by determining the amount of imports and exports between each pair of countries included in the sample, and then adding the imports and exports together.

From the standpoint of trade theory, the sum of exports and imports is equal to the volume of trade. Aside from the theoretical basis backed by trade theory and the gravity model, the bidirectional model has a number of advantages: (1) it indicates the overall interaction between any two countries that can not be captu-

red by exports and imports separately; (2) it reduces a considerable amount of missing data, which is inevitable in unidirectional models, without any deterioration of the theoretical essentials;⁹⁾ (3) it also reduces the computational work by applying a single equation of trade flows, unlike unidirectional models which have two equations; and (4) it has a smoothing function for the trade flow data, which by averaging exports and imports reduces fluctuations in less-developed countries that have lower trade volumes.

The 46 nations contain a total of 2070 potential trade flow observations between all pairs of two countries.¹⁰⁾ This number is reduced to 1035 by eliminating duplication of trade flows between each pair of two countries.¹¹⁾ For countries in which 1988 data¹²⁾ are unavailable, either three-year average values for 1987-1989 or, in rare cases, five-year averages from 1985-1989 were utilized. The minimum trade value reported in the Statistical Yearbook is 100,000 US dollars.¹³⁾

[Table 2] Countries with Zero Trade Volume and Their Counterpart Countries

Trade Ranking	Countries	Counterpart Countries and the Number
45	Uganda	Mexico, Venuzuela, Chile, Columbia, Peru, Ecuador, Bolivia, Paraguay, Uruguay, Mozambique(10)
44	Mozambique	Venezuela, Chile, Columbia, Ecuador, Bolivia, Paraguay(6)
43	Bovivia	Greece, Philippines, Kenya, Tanzania(4)
42	Tanzania	Mexico, Venezuela, Chile, Colombia, Ecuador, Paraguay(6)
40	Kenya	Venezuela, Chile, Peru, Ecuador, Paraguay, Uruguay(6)
25	S. Africa	China, Tanzania, Mozambique, Uganda(4)
14	China	S. Korea, Taiwan(2)

⁹ The trade flow data expressed as trade volume reduce missing data more than exports or imports data do, because one country's trade volume is the sum of its exports and imports.

¹⁰ The number of trade flows, 2,070 is easily calculated by 46×45 .

¹¹ The value of one country's exports(imports) are theoretically identical to the value of trading partner country's imports(exports). Thus double accounting leads to a drop of identical trade flows.

¹² Data from the "Direction of Trade Statistics" Yearbook published by the IMF for the year of 1988 are used for this research.

¹³ For larger countries, the unit of trade value is greater; millions of US dollars.

Zero trade flows usually occur in smaller countries whose trade statistics tend to be too small to be recorded, and also occur for other reasons¹⁴.

In total, only 38 of 1035 potential trade volume observations were not available either because of missing data or trade embargoes. Thus 997 international trade flows are used as the observations for the dependent variable in this study.

Starting with the largest country, in terms of trade volume, observations were collected in descending order. The largest country was utilized to collect 45 pairs of bidirectional trade flows, then the second largest country is used to collect 44 pairs, and so on until all pairwise collections have been made. This approach is taken, because the larger countries usually have more accurate, and reliable data.

Treatment of GNP

According to the gravity model, socioeconomic interactions between two regions are reflected by a gravitational force of attraction. Income, population, or output of two regions are often used to indicate the size of the masses. In this study mass is approximated by GNP. The proxy for international economic interactions—the force of interaction—is the trade volume between countries.

GNP is hypothesized to determine the size of trade flows. The GNP of a larger economy influences trade flows more than the GNP of a smaller economy. To test this hypothesis, the GNP data from the larger economy in each pair of countries is specified to be an origin GNP variable. If larger GNP observations are employed as the origin GNP, its magnitude is believed to be greater than the magnitude of the destination GNP variable.

GDP observations are alternatively used in five countries¹⁵ where GNP statistics were not available for 1988¹⁶.

Treatment of Land Area

Land area expressed in square kilometer(km²) is assumed to represent a proxy for the size of the market area of a country. This assumption implies that a larger land area may mean a larger domestic market area. A country with a larger domestic market area tends to be more self-sufficient, hence having a lower for-

¹⁴ One is politically-imposed trade embargoes. For example, no official trade flows existed between China and Taiwan, or between China and S. Korea by 1988 because of the decades-long ideological conflicts. Another is the zero trade value between China and S. Africa, because of the Apartheid policy.

¹⁵ Hong Kong, Bolivia, Mexico, Finland, and Argentina.

¹⁶ According to Linnemann's study covering 80 countries in the early 1960's, 27 out of 52 countries having both GNP and GDP statistics showed differences of less than one percent. Moreover, another 12 cases showed differences of less than two percent.

Linnemann, Hans, *An Economic Study of International Trade Flows*. Amsterdam: North-Holland Publishing Company, 1966, p. 68.

eign trade ratio out of GNP.

Another aspect of land area is based on natural resources. A country which possesses certain natural resources that are not available in other countries may have an important impact on the role of its foreign sector. A country specializing in an industry in which it has abundant resources will be conducive to an increase in its products. The increased production will be channelled into either reducing imports or expanding exports. This assumes that the possession of a variety of natural resources leads to more self-sufficiency. These two assumptions lead to the expectation that land area is a significant variable explaining the negative international trade flows. It is interesting to employ land area in the empirical analysis, because land area has not been used in the gravity model.¹⁷⁾

Treatment of Geographic Distance

Classical trade theory customarily excludes spatial dimensions. Some trade theorists tend to overlook the advantages of geographical proximity in judging the desirability of customs union.¹⁸⁾ Likewise, some public sector leaders do the same in judging the desirability of trading blocs.¹⁹⁾ Before introducing the spatial element into the framework of economic integration, the proximity of the countries involved in economic integration needs to be considered.

Proximity is conventionally assumed to be inversely related to transportation costs in the literature. Despite the importance of transportation costs in international trade, reliable data are not available. This is the main reason why distance, as a proxy for transportation cost, has been popularized in the related research. Therefore it is hypothesized that distance affects trade flows adversely.

On the practical level, the measurement of the shortest navigation distance between the major seaports of two countries has been obtained for each combination of trading partners from the publication, "Distances Between Ports."²⁰⁾ The distance between two countries is obtained by the summation of the sea distance and the overland distance from the major port to the economic center of gravity of the each nation. If a country has more than one major sea port, those seaports are used as well. For example, Pacific versus Atlantic ports are applied

¹⁷ The fact that land area has not been utilized is partly supported by the statement by Leamer and Stern saying that "To date, this has not been the procedure followed." Leamer, Edward E., and Stern, Robert M., *Quantitative International Economics*. Boston: Allyn & Bacon, Inc., 1970, p. 152. The above 'this' indicates that land area in addition to capital stock, expenditure on R & D, average temperature, and average rainfall.

¹⁸ Balassa, op. cit., p. 39.

¹⁹ See Thurow, Lester C., "GATT Is Dead", *Journal of Accountancy*, vol. 170, September 1990, p. 39. See also Schott, Jeffrey J., ed., *Free Trade and U.S. Trade Policy*. Washington: Institute for International Economics, 1989, p. 32.

²⁰ Defence Mapping Agency, Hydrographic/Topographic Center, *Distances Between Ports*. Washington D. C.: US Government, 1985.

to Mexico, Columbia, Canada and the USA. The other case is in Spain and France with Atlantic and Mediterranean ports. Though the overland transportation cost is considerably higher than that of sea transportation, the overland distance is directly added to the sea distance.

An ingredient of subjectivity in the selection of the locations inevitably leads to possible inaccuracies in the measurement of the overland distances. This study borrows Linnemann's calculation of overland distances where possible. For bordering countries, at least one of which has no seaport, the road distances between the economic centers are obtained from a road atlas in the case of Europe, and from approximations in the case of South America and Africa.²¹ In addition, for countries which have mainly overland communications especially in Europe, the road distances between two economic centers have been estimated.

Preferential Trade Factors

A number of preferential groups clearly exist in international trade flows and many can be delineated among the 46 countries in this study. The factors that contribute to the formation of these preferential groups is based on the concept of location in this study. This spatial approach to the preference relations excludes unnecessary non-spatial factors in order to pursue an analysis of spatial interactions in terms of geographical proximity.

1. A dummy variable for bordering countries. Adjacency is expected to positively influence trade volume between countries. Neighboring countries are likely to have more intense trade activities than those closely-located countries which are separated by sea or another nation. Common language or cultural heritage between adjacent nations tends to serve as a rationale for this trade-enhancing effect. The intensity of trading activities is also plausible partly due to the trade flows between domestic regions along the common border.

2. A dummy variable for countries of the same region (R_{ij}). Countries in the same international region are expected to have enhanced trade volume with countries in the region. In terms of transportation costs, the results for the regional variable are expected to provide more information on the impact of a region on the concentration of trade flows. Higher transportation costs are involved in intra-regional trade between countries without contiguous borders, than in trade across contiguous borders. Regions, as defined in this study, are expected to play a key role in explaining the formation of regional trading blocs, in addition to geographical proximity.

3. A dummy variable for the membership of both countries in the OECD or NIC. The OECD's role in international economic community impacts economic

²¹ This is applied to the following inland countries: Switzerland, Austria, Bolivia, Paraguay and Uganda.

cooperation and economic development programs. OECD membership and NIC status are expected to influence international trade flows through their higher level of development. Four NICs and 22 of 24 OECD member countries are included in this study.

4. A dummy variable for the membership of either country in the OECD or NIC. This variable addresses a more comprehensive hypothesis, because either country's membership is assumed to affect trade flows. But, this variable may be applied to distinguish the trade pattern between a developed country(DC) and a less-developed country(LDC) from the pattern between DCs. Therefore by comparing this variable with the previous one, the relationship between the two will be clarified.

5. A variable representing the interaction between the regional dummy variable(R_{ij}) and the origin(larger) country's GNP(GNP_i). This slope dummy variable is intended to measure the effect of the larger economy's GNP on the trade flows within a region in which the country belongs. If its coefficient is statistically significant, R_{ij} affects the coefficient of the GNP_i variable. As to the direction of the coefficient sign, we assume that the interaction variable for the same region reduces the effect of the GNP_i on the intra-regional trade flows. The slope dummy variable here tests the hypothesis that the greater the GNP_i , the smaller is country i 's power to augment intra-regional trade.

This variable will also shed light on the contentious debate on the effectiveness of the world trade system; that is, between multilateralism(globalism) and regionalism. Multilateralism stands for the advocacy of the GATT and WTO system in spite of some revealed structural problems in the global economy. Whereas regionalism is supported by the advocates of the current formation of trading blocs as a second best option²²⁾ to achieve world free trade in the long run.

6. A variable representing the interaction between the regional dummy variable(R_{ij}) and the destination(smaller) economy variable(GNP_j). This slope dummy variable is analogous to the previous variable.

2. Estimation

The multiplicative form of this model for the gravity hypothesis is postulated as follows :

$$T_{ij} = \alpha_0 G_i^{\alpha_1} G_j^{\alpha_2} L_i^{\gamma_1} L_j^{\gamma_2} D_{ij}^{\delta} B_{ij}^{\zeta} R_{ij}^{\omega} C1_{ij}^{\theta_1} C2_{ij}^{\theta_2} (R_{ij} * G_i)^{\phi_1} (R_{ij} * G_j)^{\phi_2} e_{ij}^u \quad (2)$$

²² Pomfret, Richard, "The Theory of Preferential Trading Arrangements", in the book of Jacquemin, Alexis and Sapir, Andre, ed., *The European Internal Market: Trade and Competition, Selected Readings*. Oxford, England: Oxford University Press, 1989, pp. 45, 65.

The transformed log-linear model of the regression is estimated for :

$$\log T_{ij} = \log \alpha_0 + \alpha_1 \log G_i + \alpha_2 \log G_j + \gamma_1 \log L_i + \gamma_2 \log L_j + \delta \log D_{ij} + \zeta \log B_{ij} \\ + \omega \log R_{ij} + \theta_1 \log C1_{ij} + \theta_2 \log C2_{ij} + \phi_1 \log R_{ij} * G_i + \phi_2 \log R_{ij} * G_j + u_{ij} \quad (3)$$

where

T_{ij} = trade flow between countries i and j in millions of US dollars

α_0 = constant

G_i = gross national product of country i in millions of US dollars

G_j = gross national product of country j in millions of US dollars

L_i = land area of country i in square kilometers

L_j = land area of country j in square kilometers

D_{ij} = distance between countries i and j in nautical miles

B_{ij} = dummy variable for adjacency. if trading partners are neighboring countries, then $e(\approx 2.718)$.²³ if not, 1

R_{ij} = dummy variable for same region. if trading partners are located in the same region, then e . if not, 1

$C1_{ij}$ = dummy variable for OECD or NIC. whether both trading partners are member countries of OECD or one of NICs

$C2_{ij}$ = dummy variable for OECD or NIC. whether one of partners is a member of OECD, or one of NICs

$R_{ij} * G_i$ = interaction variable. whether the same region preference affects the coefficient of GNP _{i}

$R_{ij} * G_j$ = interaction variable. whether the same region preference affects the coefficient of GNP _{j}

α_1, \dots, ϕ_2 = the coefficients of the explanatory variables

3. Empirical Results

The Cross-sectional Gravity Model

The OLS coefficient estimates of the trade flow model are obtained by using the gravity equation (3) and are summarized in Table 3, along with t-statistics and significance levels. The GNP parameters [$1.140(\alpha_1)$ and $0.814(\alpha_2)$] fall within

²³ The other frequently-used value in log-linear models is 2, and the natural logarithm of the number is 0.69315. The natural logarithmic value of e is 1, so slightly different from the above value, 0.69315. However, the other number which represents a different attribute(or class) is the same in both models, making the logarithmic value zero.

the range of previous estimations by other researchers. The reliability of the elasticities of trade flows with respect to GNP supports the gravity hypothesis that GNP determines trade flows. The elasticities on GNP are empirically tested to center around 1.

[Table 3] Ordinary Least Squares(OLS) Estimates of International Trade Flows in a Cross-sectional Study

	Name of Variable	Coefficient	Estimated Value	Standard Error	t Statistics	Significance Level
Constant		α_0	-1.682	0.900	-1.871	0.061
G_i	GNP_i	α_1	1.140	0.041	27.211	0.000
G_j	GNP_j	α_2	0.814	0.034	24.135	0.000
L_i	$Land_i$	γ_1	-0.195	0.025	-7.644	0.000
L_j	$Land_j$	γ_2	-0.204	0.025	-8.122	0.000
D_{ij}	$Distance_{ij}$	δ	-0.518	0.083	-6.275	0.000
B_{ij}	Adjacency	ζ	1.140	0.225	5.074	0.000
R_{ij}	Same Region	ω	6.960	0.939	7.409	0.000
$C1_{ij}$	Both OECD	θ_1	0.119	0.132	0.906	0.365
$C2_{ij}$	One OECD	θ_2	0.432	0.145	2.973	0.003
$R_{ij} * G_i$	Same Region * GNP_i	ϕ_1	-0.366	0.087	-4.220	0.000
$R_{ij} * G_j$	Same Region * GNP_j	ϕ_2	-0.180	0.099	-1.828	0.068

Adjusted $R^2 = 0.794$, $N = 997$, $F_{11, 985} = 350.724$

Note: $R^2 = 0.796$

The estimated coefficients and their signs for the land areas of country i (L_i) and country j (L_j) are $-0.195(\gamma_1)$ and $-0.204(\gamma_2)$. These conform to expectations and their t-ratios are significant at the one percent level. Though most studies have estimated the gravity equation using population as a factor affecting a bilateral trade flow, the land area variable, which is unique in this study, is much more significant at the 1 percent level. When population was employed here, one of population variables was not empirically significant in the estimation. The result for the land area is partly in contradiction to Linnemann, who concluded that the inclusion of a land area in the analysis of a country's potential foreign supply will contribute little or nothing to a systematic explanation of trade flows.

The coefficient for the distance variable (D_{ij}), $\delta = -0.518$ has the expected negative sign as a trade-suppressing factor. It is statistically significant at the 1 percent significance level. The value of falls well within the range of previous estimates. This result strongly implies that trading blocs are more likely to form among nations that are in close proximity.

The coefficient estimates on the dummy variables for adjacency(B_{ij}) and the same region(R_{ij}), $\zeta = 1.140$ and $\omega = 6.960$, respectively, have the expected signs, and their t-values are relatively large. Though both variables are significant at the 1 percent level, the value of the same region coefficient($\omega = 6.960$) is much larger than the value of the adjacency coefficient($\zeta = 1.140$). This is consistent with Lin-nemann who indicated that the adjacency effect is of minor importance.²⁴

As for the OECD membership or NIC status dummy variables ($C1_{ij}$, $C2_{ij}$), the coefficients on both variables have the expected signs, but are smaller than the previous two dummy variables. However, only the variable for either country's membership($C2_{ij}$) is significant at the 1 percent level. Thus $C2_{ij}$ clearly supports the hypothesis that either country's membership influences the trade flow pattern between the DCs and the LDCs. Notably, the coefficient value of $C1_{ij}$ is much less than the variable $C2_{ij}$. This indicates that the relationship affecting intra-DCs trade flows is not as strong as the one affecting trade flows between DCs and LDCs.

The coefficient measuring the effects of G_i and G_j on the trade augmenting power of a geographical cluster(same region), $\phi_1 (-0.366)$ and $\phi_2 (-0.180)$, have the expected signs, and are significant at the 1 and almost 5 percent level respectively.

Regional Trading Bloc Formation

Results obtained from this analysis indicate the process underlying regional trading bloc formation, as the global economy moves into the 21st century. The first indication of this process lies with the GNP coefficients [$G_i(\alpha_1=1.140)$ and $G_j(\alpha_2= 0.814)$].

First it is important to recall that all of the observations were arranged in descending order of GNP size. As such, G_i for the origin nation also represents the GNP of the larger of the two trading partners, with G_j of the destination nation measuring the GNP of the smaller partner. For example, since the USA's GNP ranks first, the GNP data of the USA were used as the origin GNP(the GNP of a larger economy) 45 times. For Japan(ranking second), its GNP data were used once as the destination GNP(smaller economy's GNP) when being paired with the USA data and 44 times as the origin GNP(the GNP of a larger economy) when being paired with countries having smaller GNP's. Results indicate that the larger economy's G_i reflects a stronger effect on the trade flows than the smaller economy's G_j . Therefore, a dollars worth of production from the larger trading partner exerts a relatively greater influence on trade than a dollars worth

²⁴ Geraci, Vincent J., and Prew, Wilfried, "Bilateral Trade Flows and Transport Costs", *Review of Economics and Statistics*, vol. 59, (Feb) 1977, p. 71.

of production in the smaller nation. This indicates that larger nations tend to dominate bilateral trade flows. Moreover, regional trading blocs would thus tend to form around the largest global economies; an empirical result supported by casual inspection of the three major trading blocs in North America, Asia, and Europe.

The 'same region' dummy variable(R_{ij}) is postulated to have a strong impact on intra-regional trade flows. The estimated regression gives an excellent fit with respect to the estimate of the variable($\omega=6.960$). Thus this variable reflecting cultural similarities, common interests and common language, etc. contributes to an increase in trade flows, even after GNP and other variables are adjusted for. This is the main reason why trading blocs have been forming based on the concept of region that implies geographical propinquity. The adjacency dummy variable(B_{ij} ; $\zeta=1.140$) that is closely related with the 'same region' variable can be interpreted the same way.

Let us now turn to the GNP interaction variables connected with the same-region dummy variables($R_{ij}*G_i$ and $R_{ij}*G_j$). These variables suggest the degree to which nations in the same geographic area affect trade flows one another after adjusting for other explanatory variables. As such, the GNP coefficients discussed above need reinterpretation in light of these interaction variables. The origin GNP coefficient, α_1 , indicates the relative influence of the larger nation on trade flows if both countries are in different regions. The destination GNP coefficient, α_2 , therefore indicates the relative influence of the smaller nation on trade flows if both countries are in different regions.

The interaction variables, when combined with the GNP coefficients are interpreted as the effect of GNP on trade flows, if both nations are in the same geographic region. The larger nation thus has a computed GNP impact on trade flows of $\alpha_1 - \phi_1 = 0.774(1.140 - 0.366)$. The smaller nation has a computed GNP impact on trade flows of $\alpha_2 - \phi_2 = 0.634(0.814 - 0.180)$. The critical conclusion is that the rate of change in trade flows is affected more by nations outside the local region than they are by nations within the region. This is seen by comparing the 1.140 with 0.774 and 0.814 with 0.634. The first number of each pair indicates the effect GNP has for nations outside the region and the second number indicates the effect of GNP for nations within the region. The interaction variables are believed to exhibit the greatest contributions to the explanation of the trade pattern.

The exceptionally important interpretation of this result is that two forces are acting on the formation of trading blocs. The same region dummy variable (ω) indicates that trade flows are stronger for nations that are close. This indicates that trading blocs can be expected to form among nations in spatially differentiated areas of the globe. Evidence clearly shows that these trading blocs are forming.

However, GNP coefficients, when adjusted for the interactive same-region dummy variable indicate that nations outside the region are exerting a counter-acting influence on trade flows. Nations outside a given countries region are shown to exert a larger influence, through GNP, than closer nations. As such, these distant trading partners are acting to break apart trading blocs even as they are currently forming. In other words, in spite of the current formation of trading blocs the possible concomitant breakdown of these blocs will follow the current major change in the world trading system. This prediction leads to a confirmation that most economists favor the proposition that a world with free trade is better off than with regional trading arrangements. In light of the world trading system, the implication supports most economists' agreement with the GATT and now WTO approach. In other words, the idea of free trade will keep prevailing as it has been supported by the mainstream trade theorists, in spite of the major rethinking of trade theory that has taken place over the last decade or so.²⁵⁾

Interestingly, this long-run prediction is in conformity with views of the leaders of the principal economies, especially G-7 countries, that "free trade is a powerful, important goal, and that lapsing back into a protectionist era would have tremendous dangers for us."²⁶⁾

World trade indicates that each country has a variety of market area sizes for different commodities, and an increase in a country's GNP causes an increase in world trade through an expansion of the country's market area beyond the international region as well as over the national boundary. The rise in world trade is divided into intra-regional trade and world trade outside the region. The $R_{ij} \cdot G$ coefficients indicate that as GNP gets greater, the same region dummy variable coefficient(ω) loses the power to augment intra-regional trade. This direction is consistent with Kemp and Wan's proposition regarding the formation of customs unions. Therefore, the existence of an incentive to pursue world free trade is confirmed empirically.²⁷⁾

There are several possible reasons for the validity of the above proposition. First, as intra-regional trade approaches a saturation point, an increase in GNP will affect outer-regional trade as an outlet for the increased output created by an

²⁵ Krugman, Paul R., "The Move Toward Free Trade Zones", *Economic Review* (Federal Reserve Bank of Kansas City), vol. 76, iss. 6, (Nov/Dec) 1991, pp. 6-7.

²⁶ Rappleye Jr., Willard C., interview, "Maurice F. Strong: Adaptations of the Blocs", *Financier*, vol. 13, iss. 4, April 4, 1989, p. 17.

²⁷ It is interesting to point out the similar position contended by a historian from the standpoint of current history. "The superblocs need to stimulate a new way of thinking about the purposes of foreign policy beyond the givens of promoting peace, prosperity and human rights. In the world of superblocs, the objective should be to promote outward-looking blocs in a framework of cooperative allied relations." Garter, Jeffrey E., "Trading Blocs and the Evolving World Economy", *Current History*, vol. 88, January 1989, p. 55.

improved scale economy. Second, as production costs fall, an economic market area is expanded, thus causing outer-regional trade to increase. Third, as GNP increases, more goods become necessary goods, thus leading to an increase in world trade via an increase in consumption. Fourth, an increase in production efficiency obtained through trade creation along with a rise in production will result in the specialization of production on the basis of comparative advantage. This causes the goods concerned to flow beyond the perimeter of an international region.

Thus, the two interaction variables lead to a conclusion that the current formation of regional trading blocs around the world involves the possible breakdown of the trading blocs as GNP increases for the participants. This is due to the mechanism inherent in international trade, production and space.

This conclusion interests us most with respect to the controversial second best choice of trading blocs in reaching free world trade. The best option to free trade is multilateralism represented by the WTO system. If the GATT system worked flawlessly, which is replaced by the WTO, there would be no need for regional economic arrangements. Critics of the regionalism believe that prospective trading blocs would not reinforce the WTO trade negotiations and might block free world trade. Therefore this could undermine the prospective multilateral trade negotiations such as GR, BR, TR, and CR following UR. For example they believe that the compelling interest of industrial countries in achieving a strengthened WTO will provide them with a major incentive to open less-tradable agricultural and service markets.

On the other hand, advocates of regionalism contend that bilateralism is clearly suboptimal or second best. They argue an essential strengthening of regional trading arrangements is a necessary step towards the development of a free trading global system. As the vehement debate goes on, whether the goal of global free trade can be better achieved by regionalism or via multilateral WTO talks is not self-evident. The controversy is not readily analyzed by economist's tools. However, the empirical results support the second best option to world free trade implying that regional trading blocs will continue to grow at least in this decade or so.

Finally, one policy implication is that in spite of an improvement in modern transportation and communications, trade is still regionally concentrated. This implies that higher stages of economic integration necessitates greater consideration of geographical proximity. For instance, a supranational state which excludes closer countries is less likely to be formed over separate geographical distances. Similar indication is that weigh-gaining commodities lose their merits in international trade.

From a macro-perspective, the objectives of economic integration, viewed as a process, is to more efficiently achieve a number of common goals within the group. These goals extend beyond the single consideration of allocative efficiency

in the analysis of trade creation vs trade diversion, and reach further to full employment, persistent economic growth, and international income distribution within the integrated areas.

V. SUMMARY AND CONCLUSIONS

International commodity flows are most affected by the four major factors in the study; GNP, land area, same region and geographic distance. The gravity model used in the study gives particular attention to the treatment of a distance variable, and two dummy variables which are conceptually similar to the distance variable, but qualitative in nature. The two dummy variables represent the effect of adjacency, and the effect of countries located in the same geographical region respectively.

As a proxy for transportation cost, the distance variable clearly shows a trade-resisting effect. The other two qualitative variables (OECD/NIC status) possess a significant trade-enhancing effect.

A multinational region, the delineation of which heavily relies on geographical aspects, is a key factor in explaining the ongoing formation of trading blocs in an international region. The close proximity of two countries in a region is likely to lead to a much greater possibility of trade between the two countries, *ceteris paribus*.

GNP is known to be a crucial factor determining international trade. It is also a major variable in the gravity equation. The GNP variable combined with a dummy variable for the same geographical location of nations is shown to be a key factor affecting the direction of an international trade flow and trading bloc formation. This is true, after adjusting for distance and other variables that explain trade patterns. Thus the attribute of same region as a qualitative variable helps to provide an overall explanation for regional economic integration. The economic rationale behind the same region effect is that within the same region a shorter distance reflects a lower transportation cost, an easier flow of information on external markets within the international region, and cultural or social similarities.

The factor of the same international region, or relatively closer geographical locations outside the region implies that trade flow distortions arising mainly from political conflicts such as ideological confrontation and disagreements of governments will be adjusted in the way that economic forces dominate. This prediction is based on the important contribution of geographical proximity to the attainment of postwar regional economic integration.

In concluding this study, two major findings concerning the issue of a trading bloc are stressed. First, spatial factors contribute to trade, even after taking GNP and other factors into account. This is why trading blocs have been forming on the basis of geographical proximity. As the empirical results show, the formation

of trading blocs is one type of spatial interaction over national borders. Geographical proximity, which is the basic factor in spatial interactions, is important to evaluate the issue of regional trading blocs formation. This factor plays a larger role in the process of forming trading blocs than has been recognized up to now. The degree of the role of propinquity varies considerably from region to region. Other factors affect the process of integration within a region. However, the role of geographical proximity is widely believed to be important in the long run in spite of modern technological innovations in transportation and communications.

Second, this study discovers that the same region interaction variable reduces the impact of geographical proximity on trade flows as GNP increases. This variable is seen to indicate that there still exists a strong power towards global free trade. However, because the effect of this variable is lower than the one of the same region dummy variable—representing relative geographical proximity—the trend of forming trading blocs will continue for the time being. The counteracting effect of the same region(R_{ij}) and GNP interaction variables($R_{ij} * G_i$ and $R_{ij} * G_j$) indicates that larger economies have a smaller effect on trade within the same region than on trade outside of that region. This leaves a possibility that worldwide free trade will be induced in the long run. This is likely to cause the breakup of trading blocs, even though they are currently being formed. This prediction is consistent with the advocates of regionalism in the context that trading blocs are a way of promoting world free trade through easier negotiations between the blocs in the long run.

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