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INTERCOUNTRY TRADE: THE EFFECTS OF BILATERALISM,
DEVELOPMENT, AND REGIONAL ADVANTAGE

by Gerardo P. ^{Asian}Sicat, 1935-

INTERCOUNTRY TRADE: THE EFFECTS OF BILATERALISM,
DEVELOPMENT, AND REGIONAL ADVANTAGE

Gerardo P. Sicat*

Recent empirical work concerning the international trade of different countries deals with the geographic and commodity concentration and fluctuations of trade.¹ Although this study is distantly related to the above work, it examines three factors that help to explain international trade among countries. These three factors under study are: (1) bilateral trade, (2) level of economic development, and

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¹See M. Michaely, "Concentration of Exports and Imports: An International Comparison," Economic Journal, vol. 68 (December, 1958), pp. 722-36; B.F. Massel, "Export Concentration and Fluctuations in Export Earnings: A Cross-Section Analysis," American Economic Review, vol. 54 (March, 1964), pp. 47-63; and J. Coppock, International Instability (New York, McGraw-Hill, 1962). An earlier study having some bearing on these studies is A.O. Hirschman, National Power and the Structure of Foreign Trade (Berkeley and Los Angeles, University of California Press, 1945).

(3) regional bias. In addition, a fourth factor -- the role played by special economic-political ties between "mother" and "daughter" country -- is studied in the case of two countries with contemporaneous colonial or semi-colonial ties with other countries.

Bilateral trade. Michaely has studied multilateral balancing of trade among different countries and trading blocs.² Indexes of multilateral balancing, were constructed for many countries for some periods. Such indexes gave indication of which countries are strongly bilateral in their trade and which multilateral. In a sense this study pursues a similar aim and provides an independent check of these findings for the countries studied here. But because it brings in a different approach and considers other possible determinants of a country's trade, this study goes somewhat farther.

Bilateral trade between countries A and B may mean that A's imports from B (M_{AB}) would be equal to A's exports to B (X_{AB}), or

$$M_{AB} = X_{AB}.$$

²M. Michaely, "Multilateral Balancing in International Trade," American Economic Review, vol. 52 (September, 1962), pp. 685-702.

A more realistic definition is to say that A's imports from B depend on A's exports to B, or

$$M_{AB} = f(X_{AB})$$

with $\frac{df}{dX_{AB}} > 0$; in the strictest bilateral sense,

$\frac{df}{dX_{AB}} = 1$. It is clear that the above can be treated symmetrically.³

A study of this type can best be executed in terms of a cross-sectional study. The behavior of trading partners over time is an interesting phenomenon for special reasons. If country i with m trading partners is studied in particular, it is necessary to examine m trade relationships. But we are not interested in the behavior of pairs of countries as much as we are in the net behavior of a country with all its trading partners. It may be that a country is completely bilateral in its relation with only three or five countries among its many trading partners. A measure of net behavior with respect to all trading partners can be done only on the basis of a country's cross-section of trade with all its trading partners.

For country i with m trading partners at any time t, a basic hypothesis regarding bilateralism is to say that i's

³Thus, if we were interested in B's imports from A we could write

$$M_{BA} = g(X_{BA}).$$

imports from j depends on i's exports to j. That is to say,

$$M_{ijt} = F(X_{ijt}),$$

where j is an index referring to any one of the m trading partners. An alternative, weaker hypothesis is to say that previous year's exports explain this year's imports from j. Thus,

$$M_{ijt} = G(X_{ijt-1}).$$

An in-between type of bilateralism includes current and lagged exports as determinants of i's imports, or

$$M_{ijt} = H(X_{ijt}, X_{ijt-1}).$$

To avoid getting misunderstood, the above relations should be understood in the light of the definition given regarding bilateral trade between countries. Whether a country consciously pursues a bilateral trade policy or not is another matter. Given the relation above, a country may be considered strongly bilateral, even if the government does not in fact engage in outward bilateral trade policies.⁴

Development level of trading partners. In the literature on economic development and in international trade, countries with higher levels of development -- judged, say,

⁴This is the same point made by Michaely, op. cit., (1962).

from their per capita GNP levels -- have larger volumes of trade among themselves. By volume, it is meant absolute monetary value.⁵ The common sense of this proposition is easily understood by this example. The U.S. trades more with Italy than with Ghana; Ghana trades more with Great Britain or the U.S. than with India.

Regional economic advantage. The theory of transport costs in international trade is built on the fact that distance affects the movement of goods. Given two countries exporting the same commodity, the country to which a third (importing) country is nearest, other things equal, will be able to sell the commodity. By the same token, countries in the same regional location are likely to trade more with each other than with countries far from the region. Thus, regional advantage is likely to favor more trade. We may say that a country has regional trade bias if it trades significantly more with its neighboring countries than with countries farther away.

Special politico-economic ties: colonial variable.

A country may have special ties in the form of preferential

⁵It is important to stress this so as not to confuse it with the so-called law of declining trade as a country experiences economic growth. See C.P. Kindleberger, International Economics (Homewood, Illinois: Richard D. Irwin, 1959) for a reference to this "law".

trade agreements with other countries. This may also take the form of a special customs union not based on regional groupings, such as the European Common Market. The special reason for these ties is largely historical in nature, for instance, country A was once a colony of B. The countries that would fall under this form of politico-economic confederations today are the members of the British Commonwealth of Nations or of the French Community. In this study, this variable has been introduced for two countries which are the respective "mothers" of the two politico-economic communities -- the United Kingdom and France. An interesting case for future studies would be to examine the "daughter" countries in terms of the influence of this variable on their trade patterns.

STATISTICAL MODEL

Only single equation models are used to explain the trade equations of the countries studied. Since we deal with cross-section data for country i , the general functional hypothesis may be stated as follows, deleting the subscript i ,

$$(1) \quad M_{jt} = H(X_{jt}, X_{jt-1}, Y_{jt}, Z_1)$$

where M_{jt} , X_{jt} , X_{jt-1} are as defined before. Y_{jt} stands for

the level of development of country j in the relative period under consideration, Z_1 is a dummy variable having a value "1" ^{if} country i is near to j and "0" if far.

An expanded version of (1) which includes a colonial tie-up variable, Z_2 , is given by

$$(2) \quad M_{jt} = H(X_{jt}, X_{jt-1}, Y_{jt}, Z_1, Z_2).$$

$Z_2 = 1$ if special relations exist, and 0 if they do not.

Two alternative statistical models are used to estimate the functional relations expressed in (1) and (2).

The first model written in the all inclusive form after (2), which is referred to subsequently as Model I, is a simple linear regression of the form

$$(3) \quad M_{jt} = \alpha_0 + \alpha_1 X_{jt} + \alpha_2 X_{jt-1} + \alpha_3 Y_{jt} + \alpha_4 Z_1 + \alpha_5 Z_2 + u_{jt}$$

where $\alpha_0, \alpha_1, \dots, \alpha_5$ are the regression coefficients to be estimated and u_{jt} represents a stochastic random term.

The second model, or Model II, is linear in logarithms for the key variables,

$$(4) \quad \ln M_{jt} = \beta_0 + \beta_1 \ln X_{jt} + \beta_2 \ln X_{jt-1} + \beta_3 \ln Y_{jt} + \beta_4 Z_1 \\ + \beta_5 Z_2 + v_{jt}$$

where $\beta_0, \beta_1, \dots, \beta_5$ are the coefficients to be estimated and v_{jt} is the corresponding random term. This regression is based on the mathematical function

$$M_{jt} = B X_{jt}^{\beta_1} X_{jt-1}^{\beta_2} Y_{jt}^{\beta_3} e^{v_{jt}}$$

where

$$B = e^{\beta_0} + e^{\beta_4 Z_1} + e^{\beta_5 Z_2}$$

$$= e^{\beta_0 + \beta_4 Z_1 + \beta_5 Z_2}$$

A priori restrictions. It is important to state here some a priori restrictions on the signs of the relationships one expects theoretically from the basic model. From equation (2), it is to be expected that the change of imports with respect to the first three independent variables would be in the same direction as the change in the value of the variables. With regards to the last two variables, the change in imports could be in any direction. In other words, for the first three variables, we require that

$$\frac{\partial M_{jt}}{\partial X_{jt}} > 0, \frac{\partial M_{jt}}{\partial X_{jt-1}} > 0, \frac{\partial M_{jt}}{\partial Y_{jt}} > 0,$$

and for the last two,

$$\frac{\partial M_{jt}}{\partial Z_1} \geq 0, \quad \text{and} \quad \frac{\partial M_{jt}}{\partial Z_2} \geq 0.$$

It is clear, therefore, that the signs of the parameter estimates will yield at once their economic plausibility. That an increase in exports (lagged or current) would lead to an increase in imports is a well-known proposition in economic theory. Thus, if country i's exports to j increased, i might buy more from j. Now this may not be true in every case, but it is a most likely possibility in many cases. It is also obvious that if trade were a function of development, trade would happen more between countries with high degrees of development. A poorly developed country may trade more with a richer country than with a poor country. These a priori restrictions on the value of the parameters for the first three arguments of equation (1) or (2) are already evident from the brief introductory discussions above regarding bilateral trade and levels of development of the trading partners.

Suppose that the two dummy variables yield estimates that are at all significant from a statistical viewpoint. A negative value of the estimated parameter implies a shift in the values of the parameters of the other variables. Thus, if this shift in parameter values did not affect the constant term, considering the a priori restrictions on the values of the other variables, this situation can only increase the parameter estimates for any of the first three variables. If the

variable concerned is Z_1 , we say that the country in question has regional bias in its foreign trade; and if Z_2 , the country's special ties help in increasing trade. If the parameter estimates for either the dummy variables are positive, then it may be said that in the case of the regional variable Z_1 , the country trades more with far-out countries and is not regionally biased; and in the case of the special ties variable, Z_2 , the country trades more with countries with which no special historical or colonial ties exist.⁶

COUNTRIES STUDIED

Thirteen different countries are included individually in this study. Although there was no systematic country selection, an attempt was made to include countries representative of different levels of development. The advanced economies considered in this study are:

United States

United Kingdom

Sweden

France

West Germany

⁶Based on the above discussion we may define regional trade bias simply as $-\frac{\partial M_{jt}}{\partial Z_1} > 0$, and lack of regional bias as $-\frac{\partial M_{jt}}{\partial Z_1} < 0$. Similar conclusions can be made about the role of variable Z_2 .

The medium range countries are:

Japan

Israel

Argentina

The underdeveloped countries are:

Brazil

Taiwan

Iran

Philippines

Thailand

This list is by no means comprehensive nor representative of the countries in the world. No communist bloc countries are included because they are not, in general, open economies. It is plain oversight at the time this study was planned to fail to include an African country.

As already mentioned, the effects of special political and economic relationships were studied for the United Kingdom and France because of their system of preferential trading with members of their own communities. All the other countries had only exports (current and lagged), development level, and regional orientation as variables studied.

An interesting limitation to the study is that no attempt was made to examine the effects of truly bilateral treaties

between different countries. The immensity of the research on country-to-country trade was not within the time and means provided to the writer.

DATA

The data were collected from the United Nations Year-book of International Trade Statistics of 1962. The data used are trade figures of the countries included in the study with all other countries for the years 1961 and 1962. All the figures of imports and exports are f.o.b. and expressed either in US dollars or in the currencies of the country whose trade data are examined. No attempt at reducing them to one currency has been made and was really not necessary.

These data represent limitations in the sense that invisibles trade are excluded. To the extent that nongoods trade is an important part of a country's balance of payments position, the result of using only commodity trade data becomes of limited value. On the other hand, it is a very difficult task to gather statistics of intercountry balance of payments transactions. The only data available readily are commodity trade statistics.

The proxy for the level of development was per capita GNP figures (in US Dollars) from Everett Hagen's "Facts About

Income Levels and Economic Growth," Review of Economics and Statistics, vol. 42 (February, 1960). The per capita GNP figures were not for individual countries. Hagen grouped certain countries in terms of their geographic locations and level of economic development. For each group of countries, only average per capita ^{GNP} were reported. Thus, the per capita GNP of countries with relatively similar economic situation had the same average per capita figures. For purposes of this study, the use of these figures seems sufficient. The alternative would have been to construct different per capita figures of about 100 different countries that entered into the picture because of trade by them with any one of the 13 countries studied in particular. There were a few cases when Hagen's figures did not include a particular country appearing in the trade data used in this study. In such an event, the country's level of development was represented by Hagen's report of average per capita GNP of the geographic region to which it belongs.

For data unit conformity, the per capita dollar GNP figures should be thought of as "rough indicators of the level of development," not in terms of any figures conforming with the basic money units pertinent for each country

(see discussion below). In other words, although these level of development indicators are in money terms, compatibility with the units used for exports and imports of the countries studied requires that the data be interpreted as if they were dummy numbers without monetary units attached to them..

The "regional advantage" dummy variable required some rough approximation of "nearness" and "farness". With the advent of modern transport, it is almost difficult to say whether one country is near or far from another. The rate structure of land and non-land transportation rates is also a further complication about which the author confesses he knows little. For another reason, an extremely large country, like the United States, would be near one set of countries from one continental end and far from the other. Now, suppose that the commodity traded between one "near" country and the U.S. happened to involve the geographic sections of the U.S. farthest away from the said country. Similar problems were present for all the other countries. Regional affinity as well as basic geography were used as the rules for deciding whether a country is far or near. The basic tool used in determining regional nearness or farness was common sense, aided by the Information Please Almanac, Atlas and Yearbook 1966, Dan Golenpaul Associates (Ed.)

(New York, Simon and Schuster, 1965), with its list of countries, relevant country information, and maps.

For France and the United Kingdom, the "noneconomic" variable expressing "colonial-type" trade relations were based on whether the countries concerned were, respectively, members of the French Community and of the British Commonwealth of Nations. In cases of trusteeships held by either nations, the assignment of a "colonial-type" dummy variable was also made.

It is now useful to review briefly the units used in the export and import trade data. As already mentioned, dollar figures were used whenever available. When not, the domestic currency was used. The monetary units used for the countries included in this study are as follows (the countries being arranged alphabetically):

Argentina	-	hundred thousand US Dollars
Brazil	-	ten thousand US Dollars
Taiwan	-	million New Taiwan Dollars
France	-	hundred thousand New Francs
West Germany	-	million US Dollars
Iran	-	hundred thousand Rials
Israel	-	ten thousand US Dollars

Japan	- million US Dollars
Philippines	- ten thousand US Dollars
Sweden	- hundred thousand Kronors
Thailand	- hundred thousand Bahts
United Kingdom	- million British Pounds
United States	- million Dollars

As can be seen, an attempt was made to vary the units. Less developed countries do smaller amounts of trading than the more industrialized ones. Thus, in order to get positive trade figures between certain countries to begin with, smaller monetary units had to be used.

RESULTS

The results of the trade studies for the thirteen countries in terms of the two regression models fitted are best summarized in Tables 1 and 2. Whenever possible the equations that gave the highest \bar{R}^2 (corrected for degrees of freedom) among the explanatory variables are included. The last column indicating Roman numbers shows the computational step (with the constant term included) of the regression reported. The second to the last column indicates the number of countries included in the regression.

Table 1: Model I Estimates

	α_0	α_1	α_2	α_3	α_4	α_5	\bar{R}^2	N	Step
Argentina	-268.749 ^c (140.485)		0.9571 ^a (0.2145)	0.3745 ^a (0.1316)	345.4333 ^c (180.4796)		0.4507	41	IV
Brazil	410.6745 (421.7375)		0.7833 ^a (0.0415)	0.0646 (0.5375)	1787.704 ^b (822.797)		0.9118	51	IV
Taiwan (China)	-1263.7631 (1384.9510)		1.9126 ^a (0.1552)	2.0229 ^c (1.1512)	-2369.8775 (1809.2342)		0.8479	31	IV
France	50.5097 (90.8951)	0.4298 ^a (0.1081)	0.5732 ^a (0.1103)	0.1600 ^b (0.0723)	-290.9811 ^a (97.1589)	-95.7353 (128.13159)	0.8802	62	VI
West Germany	9.0662 (29.3489)	1.0855 (0.6565)	-0.2336 (0.7339)	0.0685 ^c (0.0349)	-84.4503 ^b (40.7622)		0.8161	59	V
Iran	-70.7231 (678.1798)	0.9316 ^b (0.3734)	-0.2959 (0.3841)	0.7678 ^b (0.3686)	-320.1839 (622.9969)		0.5302	42	V
Israel	-599.6399 (437.8662)		3.3222 ^a (0.3132)	1.0694 (0.4810)	-888.6042 ^c (470.4297)		0.8144	44	IV
Japan	-312.9453 ^c (155.9329)	1.0300 ^a (0.3402)	0.1393 (0.4417)	0.6936 ^a (0.1749)	82.5842 (196.3332)		0.9110	62	V
Philippines	93.8867 (193.3557)		0.8267 ^a (0.0277)	0.5028 ^b (0.2325)			0.9756	31	III

^aSignificant at .01

^bSignificant at .05

^cSignificant at .10

Table 2. Model II Estimates

	β_0	β_1	β_2	β_3	β_4	β_5	\bar{R}^2	N	Step
Argentina	-3.2750 ^c (1.9481)		0.4399 ^b (0.1874)	0.8680 ^b (0.3280)	1.1014 ^c (0.5732)		0.3413	37	IV
Brazil	-0.0439 (1.9763)	-0.7328 (0.5396)	1.1125 ^b (0.4983)	0.6230 ^c (0.3756)	1.1410 ^c (0.6647)		0.3493	41	V
Taiwan	-1.2453 (1.5424)		0.4341 ^a (0.1294)	0.8571 ^a (0.2112)			0.4508	30	III
France	0.2760 (0.9884)		0.6345 ^a (0.1142)	0.3515 ^b (0.1509)	-0.7580 ^b (0.3164)	-0.0470 (0.4269)	0.3858	62	V
West Germany	0.9675 ^a (0.3161)		0.7880 ^a (0.0682)				0.6950	59	II
Iran	-0.0087 (1.6633)	0.3519 ^b (0.1511)		0.5912 ^b (0.2441)			0.2430	37	III
Israel	-0.4739 (1.4674)	0.6979 ^a (0.1503)		0.3014 ^b (0.2822)	0.6346 (0.4667)		0.5152	44	IV
Japan	0.0854 (0.9196)	0.2878 ^b (0.1061)		0.6570 ^a (0.1498)	0.9531 ^a (0.3253)		0.3701	62	IV
Philippines	-3.0419 (2.4985)		0.2942 ^b (0.1348)	1.1565 ^a (0.3830)	1.6643 ^c (0.8339)		0.4397	26	IV

^aSignificant at .01

^bSignificant at .05

^cSignificant at .10

Table 2: Model II Estimates

	β_0	β_1	β_2	β_3	β_4	β_5	\bar{R}^2	N	Step
Sweden	0.6582 (1.0528)		0.4285 ^a (0.1190)	0.3078 (0.2037)	0.3892 (0.3743)		0.4373	49	IV
Thailand	-5.0861 ^b (2.3341)	0.4586 ^a (0.1454)		1.3388 ^a (0.3620)	1.0748 (0.7746)		0.4447	37	IV
U.K.	1.0273 ^c (0.5642)		0.7263 ^a (0.0706)	0.2327 ^a (0.0769)			0.7424	60	III
U.S.	-0.5548 (0.7902)		0.8032 ^a (0.1016)	0.2065 (0.1299)	0.3171 (0.2727)		0.5795	59	IV

^aSignificant at .01^bSignificant at .05^cSignificant at .10

Based on the \bar{R}^2 statistic, the regressions using Model I yield better fit. Table 1 shows the results based on Model I. Except for Argentina, Iran and Thailand, the \bar{R}^2 was never below 0.75. But even for the three mentioned countries, the multiple correlation coefficient (R) implied is well above 0.65. In most cases, the constant term is not significant and could have been suppressed for all practical intents.

The best estimates that could be derived employing Model II are shown in Table 2. Because of their less satisfactory \bar{R}^2 , it appears appropriate to consider them a poorer specification of the import trade equations. An added reason for the poor specification is that in Model I it is possible to include a one-directional trade flow [e.g., country i does not buy (sell) to country j but sells/(buys' from) j] as observation points. In the logarithmic model, this situation is ruled out as an observation because any zero transaction will be undefined. However, only the less developed countries in this study suffer from this loss of observations. For Model II France, West Germany, Israel, Japan, the U.K., and the U.S. contain the same observations as Model I, and Sweden and Taiwan both had only one trading

partner less. Thus, for the countries under study, the logarithmic regression still provides an alternative model. But even when a case to case comparison is made of the parameter estimates and of the level of statistical significance that can be said about them, Model II still appears to have a better explanatory power although the superiority displayed by higher \bar{R}^2 values obtained from it becomes less reliable.

General Findings

The strongest influence by far is the "bilateralism" factor. Table 3 shows briefly the influence of "bilateralism", either defined as the dependence of imports from j on current or lagged exports to j . The table shows the estimate for the slope coefficient and the correlation coefficient derived from the best zero-order regressions on either current or lagged exports.

It is easily seen that eight or nine out of the thirteen countries studied had estimates of the slope coefficient of the zero-order regressions nearly equal to unity. Two countries have coefficients much higher and two others somewhat less than one. Also, 10 of the countries yielded estimates for the correlation coefficient greater than 0.8. The lowest,

Table 3

Zero-Order Regression Estimates of M_{jt} on
 X_{jt} or X_{jt-1}

Country	α	R
Argentina	1.0296*	0.5757*
Brazil	0.8112*	0.9532*
Taiwan	1.8962*	0.9003*
France	0.9548*	0.9041*
West Germany	0.8974	0.8943
Iran	0.6790	0.7075
Israel	3.2983	0.8898
Japan	1.2398	0.9447
Philippines	0.8468	0.9872
Sweden	1.0049*	0.8721*
Thailand	1.1051*	0.6727*
United Kingdom	1.1729	0.9005
United States	1.1011	0.8755

*Estimates based on zero-order regression of M_{jt} on X_{jt-1} .

that for Argentina is 0.58. All the slope estimates are statistically significant at the 1 per cent level!

In many cases, imports are better explained by lagged exports. When current exports are included in the regressions, the \bar{R}^2 falls in value. Only in the case of five countries (France, West Germany, Iran, Japan, and the United Kingdom) do current exports and lagged exports together result in a higher value of \bar{R}^2 , i.e., a better statistical fit. Even in this case, the improvement is not dramatic since, to begin with, the first order regression on exports already provide a high level of explained variation.

The effects of regional location on the distribution of trade is best seen from Table 4. Countries which do not show any regional bias are Argentina, Brazil. Those with regional trade bias are Taiwan, France, West Germany, and Israel. Although Iran, Japan, the Philippines, the United Kingdom have coefficients tending to show the same lack of regional trade bias, the estimated coefficients for the regional variable are not statistically significant. All the above are conclusions from Model I.

Model II estimates confirm the results for Argentina, Brazil, and France, but not for Taiwan, West Germany, and

Table 4

Regional Trade Bias*

Country	Model I	Model II
Argentina	(-)	(-)
Brazil	(-)	(-)
Taiwan	n*(+)	ns (-)
France	(+)	(+)
West Germany	(+)	ns (+)
Iran	ns (-)	ns (+)
Israel	(+)	ns (-)
Japan	ns (-)	(-)
Philippines	ns (-)	(-)
Sweden	ns (+)	n* (-)
Thailand	ns (+)	* (-)
United Kingdom	ns (-)	ns (+)
United States	ns (+)	(-)

n* = not statistically significant at 10% level, but coefficient estimate exceeds the coefficient standard error.

ns = not statistically significant at 10% level.

Note on signs:

(+) regional bias;

(-) no regional bias.

For the definition of regional bias, see footnote 6 above and the related discussion in the text.

Israel. The estimated coefficients due to the regional variable in these countries mentioned are not statistically significant. Still, in the case of Japan and the Philippines, regional location is not a strong determinant of trade.

The level of development variable has been helpful in adding explanation to the import equation. In 11 of the 13 cases studied, the coefficient estimated is statistically significant for Model I at least at the 10% level, although in Model II this is significant only in 9 cases.

Summing up, therefore, the extent of import trade of one country (in value terms) with its trading partners is related to its exports to them. Yet, in most of the cases, explanatory power is improved by the addition of a level of development variable and another period's export variable. In still others, the coefficient estimate for the dummy variable representing regional advantage shows that some countries have regional trade bias, others don't.

The effect of the "colonial" tie-up variable is discussed in the "Country Notes" in the Appendix section on France and United Kingdom. (However, it may be useful to report that the coefficient estimates derived were not significant in both cases.)

ELASTICITIES

From equations (1) or (2) we are able to define (1) the elasticity of imports of country i with its exports in the current year, (η_1) ; (2) the elasticity of imports with respect to exports of the past year, (η_2) ; and (3) the elasticity of imports with respect to the level of development (η_3) .⁷ Given the two models used, there are of course two possible sets of estimates for each elasticity concept.

Table 5 shows the elasticity measurements derived from the results shown from Tables 1 and 2. The estimates from Model I are measured from the mean. As is well-known, the slope coefficients in Model II, being based on a logarithmic

⁷Given a function $M_{jt} = F(X_{jt}, X_{jt-1}, Y_{jt})$, for country i , these elasticities are defined as

$$\eta_1 = \frac{\partial F}{\partial X_{jt}} \cdot \frac{X_{jt}}{M_{jt}}$$

$$\eta_2 = \frac{\partial F}{\partial X_{jt-1}} \cdot \frac{X_{jt-1}}{M_{jt}}$$

$$\eta_3 = \frac{\partial F}{\partial Y_{jt}} \cdot \frac{Y_{jt}}{M_{jt}}$$

model, are equivalent to the elasticity measures. No measures of elasticity are made from the dummy variables, since they have little meaning.

The elasticity with respect to level of development poses a problem. As mentioned earlier, the per capita GNP figures are more like unitless numbers assigning to each trading partner only a level of development. Given this, an elasticity measure attached to the development variable may be interpreted as a measure of the response of imports to the level of development of the country's trading partners.

Interpretation of elasticities. If either current or lagged exports explain better the import equation, then individual estimates of η_1 or η_2 , respectively, would be important. In this case, it can be said that a revised definition of bilateralism may be used. A country is a bilateral trader if either

$$\eta_1, \eta_2 = 1.$$

This means that increases in (current or lagged) exports of the country concerned would be followed by the same proportional increase in imports from the same trading partners. In most bilateral cases,

$$\eta_1, \eta_2 \approx 1.$$

When both current and lagged exports jointly help in explaining imports, a bilateral trader would have the sum of the two elasticities equal to unity, i.e.,

$$\eta_1 + \eta_2 = 1,$$

or in most bilateral cases

$$\eta_1 + \eta_2 \approx 1.$$

This would imply that insofar as the response of imports to changes in exports to trading partners is concerned, a trading country would have required a two-year export sequence to complete a bilateral trade pattern.

The estimates of η_3 can exceed unity, but it does not seem to be out of touch with economic reality to place an upper limit on its value. Perhaps, a reasonable upper limit is "2". Even such a high value would represent an unstable case, since a high η_3 value means that a slight change in the development pattern of the trade partner induces a very high import response. That η_3 can exceed unity and still be within the range of what we have called "reasonable" upper limit can be seen easily. Other things equal, a country may tend to import more (in absolute terms) from a highly developed country than from a poor country. In general, however, since other

forces would be determining imports, the value of this elasticity cannot be very large.

A similar argument can be made regarding the likely values of η_1 and η_2 , when bilateral trade does not appear strong, i.e., when $\eta_1, \eta_2 \neq 1$ or $\eta_1 + \eta_2 \neq 1$, as the case may be. On the one hand, in view of the restrictions imposed on the values of the coefficients earlier, the values of η_1 and η_2 would be non-negative and, therefore, in the range $0 \leq \eta_1, \eta_2 \leq +\infty$. But consider the possibility that any elasticity value is greater than 1. This implies that a rise in exports to country j leads to a more than proportionate increase in imports from j . As a long run phenomenon, this is not possible. Or else, a slight change in exports of the importing country will result in perennial balance of payments disequilibrium. The elasticity with ^{only} respect to any export concept can exceed unity/in the short run. Therefore, it may be asserted that in general countries with balance of payments equilibrium will have as the range for the values of the elasticities $\eta_1, \eta_2 \leq 1$ or $\eta_1 + \eta_2 \leq 1$, as the case may be. Going back to the well known expectations about the role of the other variables in the estimated equation -- that with respect to rates of change in the variables, especially that of income or development, the a priori reasonable parameter estimate would be a positive

value -- the elasticity limits mentioned over the long run appear reasonably established. Excepting the truly bilateral cases when the elasticities would be equal to unity, any deviation from bilateral patterns in the long run would yield elasticities less than unity.

Elasticity estimates. Table 5 summarizes the elasticity estimates. Because of the comments above, any negative elasticity estimates have to be rejected. These estimates appear in the case of three countries -- but as expected, they are derived from estimates from parameters which were not statistically significant to begin with.

It has been noted in the study of the derived equations that Model I is superior to Model II. Most of the estimates agree with the basic discussion set up above. In general, the elasticity estimates when only a single export variable is significant are less or close to unity. Using current exports alone as an index, no country seems to be very strongly bilateral since no estimates of η_1 seem very close to unity. But although Germany and Iran have greater than 1 values for η_1 , the inadmissible negative values of η_2 (which are shown here for illustration) show that if only the estimated equation did not include lagged exports, these estimates for η_1 will probably be less than unity.

Table 4. Comparison of Elasticities

Measured from best equation fitted; for absolute values, measurement of elasticities derived from the point of means

	Model I			Model II		
	X_{jt}	X_{jt-1}	Y_{jt}	$\ln X_{jt}$	$\ln X_{jt-1}$	$\ln Y_{jt}$
Argentina		0.6850	0.8362		0.4399	0.8680
Brazil		0.744	0.0143	*	1.1125	0.6230
Taiwan		1.2628	0.3550		0.4341	0.8571
France	0.4336	0.5690	0.1771		0.6345	0.3515
West Germany	1.1651	*	0.2004		0.7880	
Iran	1.1651	*	0.4915	0.3519		
Israel		1.3244	0.5240	0.6979		0.3014
Japan	0.8393	0.1003	0.3763	0.2878		0.6570
Philippines		0.7680	0.1807	0.2942		1.1565
Sweden		0.8117	0.2489		0.4285	0.3078
Thailand		0.9433	0.4438	0.4586		1.3388
United Kingdom	0.4914	0.1966	0.3662		0.7263	0.2327
United States		1.0213			0.8032	0.2065

*Estimate derived is negative.

With η_2 estimated alone, Israel and Taiwan lead all the others in the elasticity value. The U.S., Thailand, Sweden, the Philippines, Brazil, and Argentina follow. The U.S. comes closest to being most bilateral among the countries mentioned, even though this estimate is with respect to exports in the previous year.

In terms of the sum of η_1 and η_2 , France and Japan have the closest bilateral trade pattern, if we base this from their elasticity estimates. The United Kingdom does not appear to be highly influenced by a bilateral pattern.

Now on the estimates of elasticity with respect to the development level of the trading partners. The values are positive, but none seems to be near unity, at least in the estimates from Model I. Argentina has the highest development elasticity, with Israel following. Thailand, Taiwan, Japan, and the United Kingdom have elasticities in the range of 0.5 and 0.35. Countries with much lower development elasticities are France, the Philippines, West Germany, and Sweden, in ascending order of the elasticity values. The estimate for Brazil is not reliable since the level of development coefficient is not significant. In general, the elasticity values found in Model II are somewhat higher

than those derived from Model I, although in two cases the Model II values were lower. Very different values of η_3 for Model II estimates are true for the Philippines, Thailand, Brazil and Taiwan. However, basing the argument on the better-fit model, the estimates from Model I would be more acceptable. This is especially true for the less developed countries because in Model II, some observations are lost due to the presence of one-directional trade flows.

On Michaely's Multilateral Indexes. The results of the study may be compared with Michaely's findings on multilateral balancing among countries, which was mentioned earlier. Since the present study concentrates on cross section data of 1961 and 1962 and Michaely's work has covered several period cross sections, the latter's results which may be useful for possible comparison are those for 1954-1958. Michaely's multilateral balancing indexes⁸ are shown in Table 6

⁸For each country j , and using Michaely's notation, the multilateral index T_j was computed as follows:

$$T_j = 100 \left| \sum_s X_{sj} / X.j - M_{sj} / M.j \right| / 2$$

where X_{sj} meant exports of country j to s , $X.j$ country j 's total exports, M_{sj} for country j 's imports from s , and $M.j$ for j 's total imports all being in value terms. Michaely, op. Cit., p. 688.

Table 6

Bilateralism: Measures from Elasticities and
Michaely's Multilateral Indexes

Country	Michaely's Multilateral Indexes	Elasticity Measures
Argentina	29.3	0.685
Brazil	20.7	0.744
France	25.6	1.0026
Germany	20.3	0.788
Iran	39.7	0.3519
Japan	37.0	0.9396*
Philippines	22.2	0.7680
Sweden	22.2	0.8117
Thailand	35.1	0.9433
United Kingdom	18.9	0.688
United States	16.8	1.0213

*From Model II.

N.B. The two other countries studied in the paper but not in this table (Taiwan and Israel) did not have any Michaely index.

together with summarized elasticity estimates based on Table 5. These elasticity estimates represent either η_1 , η_2 , or $\eta_1 + \eta_2$, depending on which dependent export variables contributed to the explanation of imports.

In terms of Michaely's indexes, the higher the value of the multilateral index, the greater the level of multilateral trade for the country. In other words, a low multilateral index means a high degree of reliance on bilateral trade. None of the countries studied in this paper belongs to the group with very high degrees of multilateral trade dependence according to Michaely's results. But his indexes for Iran, Japan, and Thailand appear to be in the more multilateral group. According to Michaely, the typical multilateral country is "a small, underdeveloped, primary-exporting (and primary-goods producing) economy."⁹ The Philippines, France, Brazil, Germany had low multilateral indexes, but the United Kingdom and the United States, in accordance with Michaely's indexes had the lowest indexes among the countries studied here. (For no surprising reason, the Soviet bloc countries all had the lowest multilateral coefficients.)

⁹Op. cit., p.

What do the elasticities show? There appears to be no agreement between Michaely's and my findings. On the basis of the interpretation given to the meaning of elasticity measures in this paper, quite a few of the results do not match. An elasticity value close to 1 implies high bilateralistic predisposition. While the elasticity for the U.S. agrees with Michaely's finding that the U.S. is highly bilateral, the elasticity coefficients for the United Kingdom, which is also considered highly bilateral in that study, happened to have a low elasticity. A rank correlation analysis of the bilateralism intensity of each country on Michaely's and my study shows a statistically not significant Spearman's rank correlation coefficient ($\rho = 0.27$, $n = 11$), thus leaving us to reject the hypothesis that there is some relation between the Michaely results and mine.

This difference between these results is certainly due to a difference in emphasis. Michaely's construction of indexes differ in approach to the regression method of analysis applied here. By bringing to bear the effects of other factors in this paper, it becomes possible to "net" the influence of indexes explaining a country's trade with all its partners. Thus, it is somewhat interesting to note that where the elasticity measures found in this study is the opposite of what one

might expect from the bilateralism measure of Michaely (as in the case of the United Kingdom and Japan), other variables, such as the level of development of the trading partner, exert significant influence on the trade relations of a country with the rest of the world.

CONCLUDING REMARKS

A few remarks are in order to summarize the findings and limitations of this study.

For the thirteen countries studied, bilateral trade in the sense of dependence of imports from trading partners on the country's exports to these partners appears to be an important influence. The degree of dependence on bilateral trade varies depending on the country concerned. Bilateralism either took the form of dependence on current exports, previous year's exports, or on both. A more clearcut discussion of bilateralism is derived by referring to elasticity measures. In almost all cases, however, the addition of the level of development of the trading partner was helpful in explaining the country's imports. In a majority of cases, the addition of a regional advantage variable did not prove helpful. Of those with some significant regional trade coefficients in Model I, regional trade bias was peculiar

only to France, Israel, and West Germany. Those without regional trade bias -- i.e., those trading more significantly with far off countries are Japan, Argentina, and Brazil. The special ties or "colonial" variable did not prove significant for both the U.K. and France, implying that the trade creation aspect of this relationship for the mother countries at least is not significant at present.

There are two major limitations, which may be remedied by further research.

1. Limited number of countries studied in particular.

Only 13 countries were studied and there is no pretense to calling them "representative" countries despite the fact that the countries studied fall at least in three major categories of levels of development. The time limitations and computational load at the time the study was executed would not allow inclusion of more countries. In any case, it is more desirable to include more countries.

2. Only one cross-section. Considering that all countries undergo changes in their trade patterns, it will be more desirable to study the same countries in other periods. In this connection cross-section of the trade patterns of the same countries in the 1950's and in the 1930's would be desirable. Naturally the trading partners of the countries

under study would be different, not only due to the political changes of the post World War II decades but also to the geographic shifts in each country's trade. This is particularly one strong reason for examining the patterns of trade of a country with its trade partners.

APPENDIX: COUNTRY NOTES

In the following, a brief survey of the results per country will be made, grouping them together whenever desirable.

Argentina, Brazil

Argentina has a relatively poorer fit to Model I compared to Brazil and, in general, compared to other countries included in this study. Lagged exports, the level of development, and the regional variable have significant coefficients. In terms of regional trade, Argentina has a tendency to trade with far-off countries than with nearer (i.e., it has no regional trade bias).

In Brazil's case, lagged exports explain imports to a large degree. Brazil appears to have no regional trade bias as shown by a relatively significant coefficient. The development variable is not significant. The logarithmic equation yields a negative regression coefficient for current exports, a theoretically untenable result. This appears to strengthen the explanatory role of lagged exports for Brazil.

Taiwan, Philippines, Thailand

In terms of Model I, the three countries in Asia which belong to the same level of development provide an interesting

case. Taiwan shows regional trade bias while the other two countries do not show any significant response to regional advantage. Lagged exports work better compared to current exports. The size of the income coefficients appear biggest for Taiwan, and smallest for the Philippines. With Model II, the Philippines gets a low "bilateralism" coefficient, but the highest income coefficient. Moreover, a significant regional bias coefficient pulls down the values of the slope coefficients for the first two variables. But the \bar{R}^2 rule makes this an inferior empirical model.

The case of Thailand is interesting from the viewpoint of which model is a better one. Model I has a slightly higher \bar{R}^2 . But even this explains a little less than 50% of the total variation. Model II yields a significant regional bias coefficient and makes unlagged exports more important in explaining imports. This reverses somewhat the role of exports as an explanatory variable. The best fit excludes one or the other of current and lagged exports. In Model II, Thailand shows an interesting response to levels of development. The regional variable is not significant.

It is worth pointing out that these group of countries -- Argentina, Brazil, and Iran included -- are best described by

Model I. The loss of observations due to a one-directional trade flow has affected the regression results for all these. Perhaps, Taiwan, with only one loss of observation is least subject to this remark among the countries mentioned.

Iran

The trade economy of Iran is interesting because of its special position as an exporter of oil -- a highly essential industrial input. Its trade equation could perhaps be representative of some middle Eastern oil economies. The Model I best equation for Iran would exclude lagged exports. The income variable is significant, but the regional is not. The first order regression of imports of Iran on exports with countries of the world yields an estimate as follows:

$$M_{jt} = 166.792 + 0.6790 X_{jt} + u_{jt} \\ (0.1072)$$

with correlation coefficient, as shown in Table 3, of 0.7075. In comparison, Model II estimates include more variables in the best fit explanatory equation. It should be pointed out that Iran does not seem to behave well in accordance with both models studied. In Model I the explained variation (\bar{R}^2) is only a little above 50 per cent. The fit for Iran is the worst for all estimates using Model II.

Israel

Israel appears to have a strong "bilateralism" bias. Its best equation yields some significant response from the income variable. The countries in Europe were considered "near" countries, and from this viewpoint it is easy to see why the regional advantage variable has been in its favor. Virtually no recorded trade is made with the Arab countries surrounding Israel. Lagged exports in Model I help to explain Israel's imports better. The coefficient for unlagged exports is not significant when the latter are added to the equation, as shown below:

$$M_{jt} = -566.7337 + 0.6714 X_{jt} + 2.6172 X_{jt-1} \\ (454.1600) \quad (2.0561) \quad (2.1818) \\ + 1.0019 Y_{jt} + -905.4698 Z_1 + u_{jt} \quad \bar{R}^2 = 0.8101 \\ (0.5285) \quad (478.5678)$$

Japan

For Japan, the equation for Model I shown in Table 1 has regional advantage as a variable. But the coefficient derived is not significant as its standard error would convey. The income variable is significant. Aside from the effect of two-way trade, Japan's trade depends on the country's level of development. Moreover, current and past year's exports jointly help to explain Japan's imports. Japan has been of

recent years one of the most energetic world trading nations. It has extensive trade with Western countries while its trade with its neighboring countries in Asia is not negligible either.

West Germany, Sweden

The explanation provided by Model I for both countries is superior to that of Model II. West Germany, a member of the Common Market, shows some regional trade orientation. However, it appears that the effect of the income variable is not much. Its bilateralism coefficient is high and probably swamps most of the other variables. Specifically, current year's exports explains best. The equation shown in Table 1 shows that lagged exports has a negative coefficient. This is ruled out by a priori theoretical considerations. Sweden's best fit equation depends on lagged exports and on the income variable. The regional base does not yield additional explanation. When current exports and regional bias included the \bar{R}^2 falls to 0.7654, and both variables are statistically not significant. This equation is given as follows:

$$M_{jt} = 0.6688 + \frac{0.0872}{(0.0954)} X_{jt} + \frac{0.8870}{(0.1217)} X_{jt-1} \\ + \frac{0.0971}{(0.0523)} Y_{jt} - \frac{50.4018}{(65.7110)} Z_1 + u_{jt}$$

France and United Kingdom

These two countries provide an interesting contrast to all the others in the sample because of their position as the only two post World War II countries with special political and economic ties with their daughter countries.

Model I again seems to describe better the respective import trades of France and the U.K. Current and lagged exports are both significant for these two countries. Thus, the bilateralism involved consists of two-period exports determining imports. For both countries, the "special ties" variable are both not significant, thus appearing to indicate that special ties have contributed little, if not all, to increased trade. It should be added, again, that the regional variable does not work for the U.K., but it is significant for France, a Common Market country.

Going briefly to Model II, the equation that would work best excludes current exports and special ties. But the role of regional advantage appears strong. Although this confirms the relative strength of some of the variables, Model II is a poor explainer compared to Model I in the case of France.

For the U.K., Model II is best explained by the estimates shown in Table 2. Current income, regional bias, and

special relationships are all not statistically significant and their addition as variables into the equation only brings down the explained variation. The \bar{R}^2 when all these are included is 0.7290 compared to $\bar{R}^2 = 0.7424$ when the last three variables are excluded. It is, however, interesting to show that, although the estimates were not significant, the "special ties" and "regional bias" dummy variables had negative coefficients.

United States

Compare the first-order regressions of U.S. imports on current and on lagged imports:

$$M_{jt} = -11.4707 + \underset{(0.0723)}{0.9898} X_{jt} + u_{jt}$$

$$M_{jt} = -6.5252 + \underset{(0.0744)}{0.9932} X_{jt-1} + u_{jt}.$$

Both equations explain U.S. trade by roughly 75 per cent of the variations. No corresponding improvement in fit was derived through the inclusion of additional variables. The level of development of the trading partner did not contribute much to the explanation of U.S. imports. Neither is the regional advantage variable significant. The equation derived is shown below:

$$X_{jt} = 8.3350 + 0.9661 X_{jt} + 0.0454 X_{jt-1} \\ (0.6428) \quad (0.6452)$$

$$-0.0399 Y_{jt} - 19.1697 Z_1 + u_{jt} \\ (0.0818) \quad (96.8624)$$

where $\bar{R}^2 = 0.7506$.

The U.S. appears to be strongly "bilateral" in its international trade dealings on the basis of this result.

With Model II, the \bar{R}^2 of the best fit equation is smaller. But, as Table 2 shows, this includes significantly the response to levels of development of the trading countries. Moreover, the U.S. seems, using this model, somewhat more region-oriented as the positive value of the regional bias dummy variable would imply. Current exports, however, do not appear to be a good explainer of income. In Table 2, the only export variable used is lagged exports. Below is the full estimated equation when both export variables are included:

$$\ln M_{jt} = -0.8104 + 0.3894 \ln X_{jt} + 0.4237 \ln X_{jt-1} \\ (0.8508) \quad (0.4713) \quad (0.4704)$$

$$+ 0.2371 \ln Y_{jt} + 0.3260 Z_1 + u_{jt} \\ (0.1355) \quad (0.2737)$$

where $\bar{R} = 0.5770$, a little lower than \bar{R}^2 derived with current exports excluded among the independent variables.