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ABSTRACT

ADAPTING TURKISH TRANSPORT POLICY TO EXTERNAL ECONOMIC GOALS

By

Asil Gezen

Turkey has faced a chronic deficit in her balance of payments since the end of World War II. There are a number of measures in the national transport and commercial policy which, if adopted, can eliminate the deficit and create a surplus in the balance of payments.

An international trade flow model between 37 countries around Turkey has been developed and tested. The hypotheses that distance, preferential trade agreements, and war or political hostility have a significant

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effect on trade size are supported by empirical testing of the international trade model for 1959 and 1968. The two years have been selected because of expec ed differences in trade flows due to an open or closed Suez Canal.

It has been concluded that when Turkey adopts a number of transport policy related measures, she can effectively offer a transit service to third country trade flows and obtain gateway service benefits. The magnitude of these benefits is expected to exceed significantly the deficit in the balance of payments. Transit service through Turkey is also expected to increase regional trade.

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ADAPTING TURKISH TRANSPORT POLICY

TO EXTERNAL ECONOMIC GOALS

By

Asil Gezen

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Marketing and Transportation Administration

Dedicated

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Dedicated To

AYBERK GEZEN

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I wish to thank Dr. Ho
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CHAPTER 1: INTRODUCTION

1.1. <u>The Subject Matter of the Study</u>

This study evaluates Turkey's transport planning and policy making with respect to the (i) trade of Turkey with countries around it, and (ii) trade between the countries around Turkey. In this context we can define three types of trade flows which will be consistently used throughout the study:

(1) Domestic or Internal flows. These flows originate and terminate in Turkey.

(2) Primary external flows, which involve the flow of goods originating or terminating in Turkey to and from other nations. These flows involve the foreign trade portion -- imports and exports -- of Turkey, entering in the balance of payments.

(3) Secondary external flows or Third country flows that both originate and terminate in countries

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At first sight it may seem that the secondary flows are of lesser importance than the primary flows in shaping the national transport policy of Turkey. Even more important than the primary flows might be domestic flows which are not our main concern here. As a matter of fact, a great majority of studies which make up the core of national or regional transport planning and implementation efforts heavily emphasize domestic flows. Very few studies take into account primary external flows in addition to domestic flows. The former orientation -- embracing domestic flows only -- may be termed the Classical approach to transport planning, because it assumes a closed economic system entirely isolated from its external environment. The latter approach, embracing domestic and primary external flows may be termed the Modern approach to transport planning.

As opposed to the Classical and Modern approaches, the orientation advocated in this study can be termed the Systems approach to transport planning, for it takes the viewpoint that trade int

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viewpoint that trade interactions among the countries within the area of interest should also be relevant as the primary and domestic flows in shaping transport policy. In other words, the intra-, inter-, and extra-flows taken as a whole make up the complete system of interactions for transport planning. Appropriately enough, this approach is termed "through transport systems encompassing infra- and extra-structure."[1/]

As already stated, the domestic flows will not be emphasized in this study. This may be a focal point of criticism, for the absence of nodes and edges that make up the domestic subsystem of Turkey does not complete the description of the entire system of interactions. However, the railroad connectivity index for Turkey computed by K. J. Kansky[2/] shows a value a little greater than unity which is regarded as a complete simple connection sufficient

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1/ Hazard, J. L., MTA 841, unpublished lecture notes, E. Lansing: Graduate School of Business Administration, Michigan State University, Spring 1969.

2/ Kansky, K. J., Structure of Transportation Networks, Research Paper No. 84, Chicago: Department of Geography, University of Chicago, 1963, p. 42.

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1.2. Problem Statement

The 1961 Constitution provided for a Turkish development plan and by 1963 Turkey had entered an era of planned economic development. The First Development Plan embraced a five-year period from 1963 through 1967. The Second Five Year Development Plan's time perspective was the period 1968-1972. Both plans explicate economic and social objectives to be attained by implementing detailed annual programmes and projects.

The Second Five Year Development Plan states the general economic objectives of Turkey as follows:

> " . . . to achieve a rapid and sustained increase in per capita income, . . . to achieve a balanced development between various regions and income brackets, . . . and to attain an efficient and stable improvement in the . . . economic structure."[3/]

One of the targets set in the Second Plan in order to attain the above economic objectives is a 7% annual growth in GNP. In addition, the Plan calls for an expansion in the industrial sector, to make it the leading sector of the

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3/ State Planning Organization, Second Five Year Development Plan; 1968-1972, Ankara: Central Bank of the Republic of Turkey, 1969, p. 13.

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4/ Ibid., p. 75.
5/ Ibid., p. 4

economy.[4/]

The Plan identifies three structural obstacles -- problems -- which restrict the attainment of these targets.[5/] The first obstacle is insufficient domestic savings to meet increased investments necessary to support the chosen growth rate. The second obstacle is entitled "institutional impediments restricting development" and groups problems facing agricultural and industrial organization and efficiency. The third obstacle is import capacity as a means of providing an ample supply of raw materials, component parts, and equipment from foreign sources. When the second target, industrialization is considered the importance of this last obstacle can easily be appreciated: Import capacity must be increased to finance machinery, equipment, and raw material purchases from abroad, all of which are needed for the pursuit of industrialization. Import capacity falls within the general area of external economic imbalances within which foreign trade and balance of payments drains

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4/ Ibid., p. 75.
5/ Ibid., p. 46 ff.

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8/ Ibid., p. 47.

investment capital -- needed for purchases from abroad -- thus undermining industrialization and economic development.

In spite of the important role played by external trade and services in attaining the targets set, this area did not increase parallel to national income. "Hence, its effect was to restrict rather than to induce economic development."[6/] For example, between the years 1962-1966, GNP increased by 29.5%, whereas the volume of foreign trade increased by only 20.8%. As a result of this discrepancy foreign loans were necessary. However, since Turkey borrowed heavily in the past, 55% of loans secured from 1962 to 1966 were used for payment of the principal and interest on former debts. Therefore, aid in recent years has been insufficient to remove the third obstacle, or to put it differently, to provide the necessary funds to increase the import capacity.

With this brief introduction, a formal statement of the problem can now be made: The proposed research recognizes

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6/ Ibid., p. 47.

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the third structural impediment -- external economic imbalances -- which drains capital and restricts the development of the Turkish economy as the central problem to be mitigated by bringing external dimensions into transport planning and policy making. Figure 1.1 gives the conceptual framework within which transport and related commercial policies contribute to the attainment of equilibrium in external economic imbalances, hence mitigating the structural problem and easing the attainment of general economic objectives through meeting established targets. By bringing an external dimension to Turkey's total transport system a pioneering attempt will be made to strengthen Turkey's participation in regional trade.

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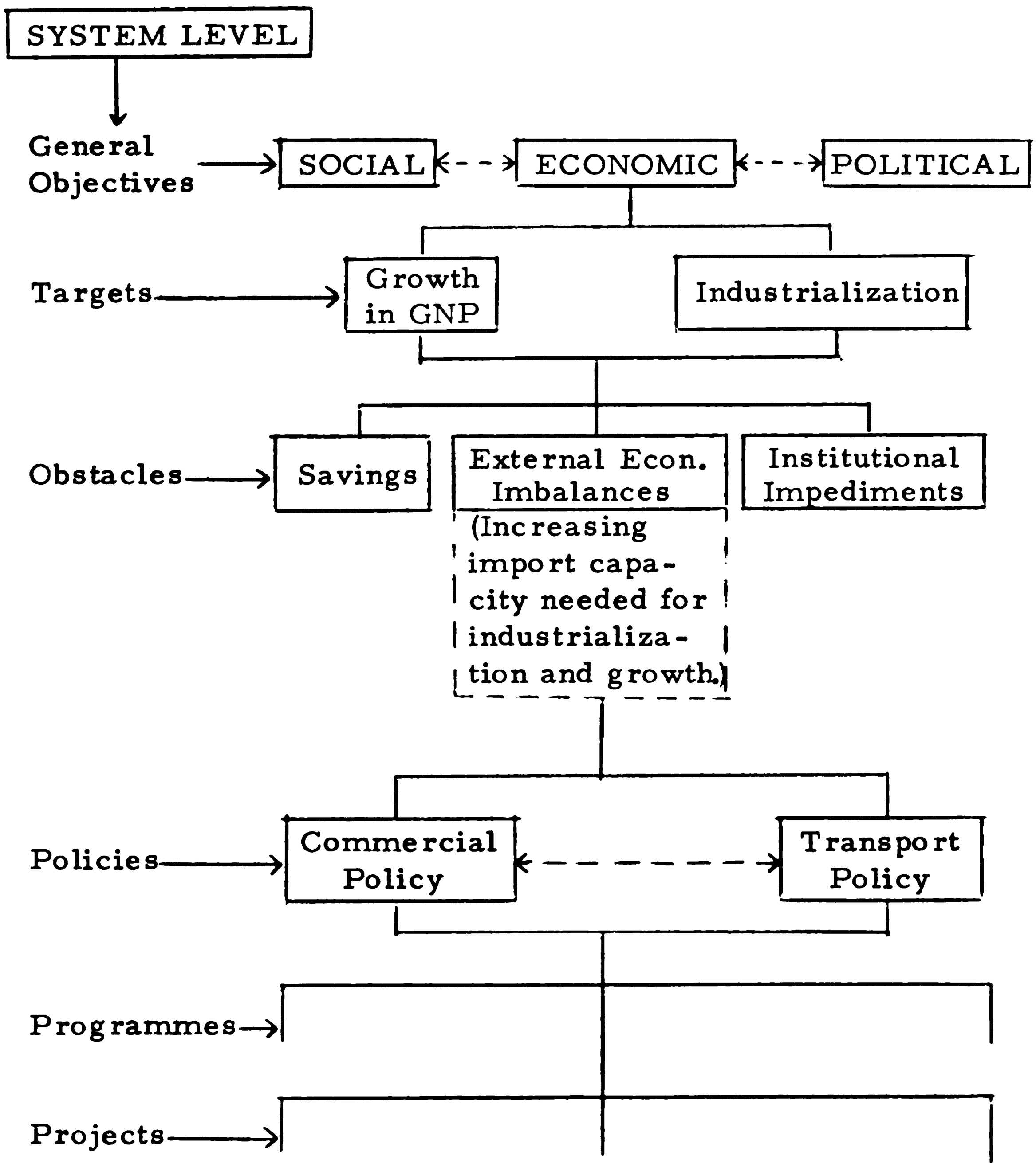
Figure 1.1

Relation of Commercial and Transport Policies and Turkey's Economic Objectives



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1.3. Transport Policy and Commercial Policy

"Transportation is not an end in itself."[7] A transportation network which does not facilitate economic, social, and political interaction between spatially distributed places and people is an expensive, unproductive investment in any national budget. Insofar as a network stimulates increased interaction, it is generally accepted that a benefit is derived from the investment. Taking cognizance of this important principle, the purpose of the study is to evaluate the transport system of Turkey not for the sake of achieving perfection in the system itself, but for its contribution to the attainment of other -- non-transport -- objectives. This study is concerned with the attainment of economic objectives. Other objectives, such as political, social, cultural, are important but are beyond the scope of this study.

In evaluating primary and secondary external flows, with respect to Turkish transport system implications,

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7/ Manheim, M. L., "Principles of Transport Systems Analysis," Papers of the Transportation Research Forum, 1966, reprinted in F.H. Mossmann, Transportation and Distribution Systems, mimeographed lecture notes for MTA 810, E. Lansing: Graduate School of Business, Michigan State University, undated, pp. 9 ff.

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this study does not attempt to consider transport policy in isolation. Closely related to transport policy issues are those topics which fall within the general framework of commercial policy. As clearly indicated in Figure 1.1 Transport and Commercial policy issues closely interact with each other in solving the problem defined in the preceding section.

The chronic deficit in the Turkish balance of payments can be cited as an important part of the general problem which offers a recent example to show the importance of commercial policy measures. One of the important areas of policy making in alleviating the problems in the balance of payments is commercial policy.

As explicitly stated in the official planning document of Turkey, the area of balance of payments is one of those areas which deserve serious consideration. "One of the most persistent and difficult problems confronting the Turkish government"[8/] in the post-World War II era has

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8/ Krueger, A.O., "Some Economic Costs of Exchange Control: The Turkish Case," The Journal of Political Economy, Vol. LXXIV, No. 5, Oct. 1966, p. 466.

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been a chronic deficit in the balance of payments. Table 1.1 gives the details of Turkey's balance of payments in the period 1950 to 1968.

When confronting a deficit balance of payments problem, governments have traditionally emphasized measures which are considered within the domain of trade policy. Such measures are especially centered around either expanding exports, or restricting imports, or both. Considering the importance of foreign trade in the balance of payments accounts, such traditional measures seem appropriate. Turkey does not constitute an exception to this tendency. A cursory review of Table 1.1 clearly shows the important role played by exports and imports in arriving at deficit balances. Therefore, it was, and still is, only natural for Turkish development planners to adopt a variety of measures to restrict imports and encourage exports. However, the net balance of invisible items, especially after mid-1960's show a significant gain in receipts which somewhat offsets the ever-increasing deficit balance of foreign trade. One item of interest under

Turkey's Balance of

Year	Receipts	
	Exports	Invisible Items
1950	263.4	18.9
1951	313.9	36.4
1952	362.9	42.5
1953	396.0	35.2
1954	334.7	30.2
1955	313.3	62.[illegible]
1956	335.0	104.[illegible]
1957	330.8	124.[illegible]
1958	249.2	[illegible]
1959	362.6	[illegible]
1960	335.9	1[illegible]
1961	365.3	[illegible]
1962	398.5	[illegible]
1963	395.4	[illegible]
1964	433.0	[illegible]
1965	479.0	[illegible]
1966	494.0	[illegible]
1967	533.0	[illegible]
1968	530.0	[illegible]

Source: 19[illegible]

Table 1.1

Turkey's Balance of Payments, 1950-1968, in Mil.$

Year	Receipts			Expenditures			Balance
	Exports	Invisible Items	Total	Imports	Invisible Items	Total	(+) Surplus (-) Deficit
1950	263.4	18.9	282.3	251.5	72.8	324.3	- 42.0
1951	313.9	36.4	350.3	353.9	80.6	434.5	- 84.2
1952	362.9	42.5	405.4	488.7	99.2	587.9	-182.5
1953	396.0	35.2	431.2	468.3	104.2	572.5	-141.3
1954	334.7	30.2	364.9	421.2	102.8	524.0	-159.1
1955	313.3	82.8	396.1	437.9	88.5	526.4	-130.3
1956	305.0	104.5	409.5	358.5	94.6	453.1	- 43.6
1957	330.8	124.6	455.4	345.8	140.3	486.1	- 30.7
1958	249.2	88.9	338.1	284.2	138.0	422.2	- 84.1
1959	362.6	84.7	447.3	433.1	141.3	574.4	-127.1
1960	335.9	103.5	439.4	426.7	134.5	561.2	-121.8
1961	365.3	119.4	484.7	448.2	159.5	607.7	-123.0
1962	398.5	120.9	519.4	566.9	187.6	754.5	-235.1
1963	395.4	127.3	522.7	588.5	189.7	778.2	-255.5
1964	433.0	143.0	576.9	475.0	190.0	665.0	- 89.0
1965	479.0	202.0	681.0	505.0	206.0	711.0	- 30.0
1966	494.0	262.0	756.0	639.0	226.0	865.0	-109.0
1967	530.0	235.0	765.0	608.0	244.0	852.0	- 87.0
1968	530.0	130.0	660.0	780.0	68.0	848.0	-188.0

Source: 1950-1967 data are taken from International Monetary Fund's Balance of Payments Yearbooks. 1968 data are taken from Turkey, State Planning Organization, Ikinci Bes Yillik Kalkinma Plani; 1968-1972, 1969 Yili Programi (Second Five Year Development Plan; 1968-1972, 1969 Annual Programme), Ankara: T.C. Merkez Bankasi (Central Bank of the Republic of Turkey), 1969, p. 40.

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invisible receipts is the foreign exchange transfers of thousands of Turkish workers employed in Europe. These transfers amounted to \$93 and \$110 million in 1967 and 1968, respectively. Undoubtedly, the measures taken by the Turkish government to encourage the transfer of labor savings is not a subject matter of trade policy, but more appropriately, it is a combination of labor policy and commercial policy. The lesson to be learned from this experience should be quite clear: Measures outside trade policy can be quite significant in mitigating balance of payments deficit.

Within the area of balance of payments, another invisible item which is of particular interest to our study is transportation. Transportation showed an average net deficit of \$48.4 million during the period 1961-1967. The average deficit of freight, travel, and other transportation, combined, during the same period is \$57.8 million. A review of the balance column in Table 1.1 for the period concerned will indicate the significance of transport deficit in Turkish balance of payments.

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1.4 National Respondent

Suggestions are of no practical value unless some authority takes the necessary steps to implement them. The only authority capable of successfully implementing the resulting suggestions of this study and properly coordinating the efforts is the Council of Ministers of the Republic of Turkey. This Council is headed by the Prime Minister and makes up the executive branch of the State. The conclusions reached will directly involve the Ministry of Transport. The newly established -- May 1971 -- Ministry of External Economic Relations along with the Ministries of Foreign Affairs, Customs and Monopolies, Finance, and Commerce will also be within the scope of conclusions and recommendations of this study.

1.5 The Region and

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As will be explained in the next section, this study is composed of two parts. For the first part of this research the region of interest includes those countries which meet the first and either the second or third of the following three criteria:

(1) Geographic distance between Ankara, approximate economic center of Turkey, and the border closest to Turkey is less than 2,500 miles, and

(2) Total trade flow between Turkey and the country in question is at least 3,000 metric tons, or both Turkish exports to and imports from the country are greater than 1,000 metric tons each, or

(3) The country in question trades extensively with region on opposite side of Turkey, so that Turkey constitutes an intermediate location and possible gateway.

The first criterion establishes a proximity constraint in order to account for the fact that trade facilitating measures will have a greater effect on accessible, rather than on distant "neighbors,

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on distant "neighbors," because of the greater expected volume of trade among accessible "neighbors." In order to include a reasonable and manageable number of countries in the trade flow model, the distance is limited by 2,500 miles.

The second criterion eliminates from the model those "neighbors" whose trade with Turkey is relatively small. The most recent export and import figures (1969) are used in applying this criterion.

Figure 1.2 shows the countries included in the region. The following countries met the first criterion, but are excluded because of their failure to meet the second or third criteria: Aden, Albania, Algeria, Cameroon, Chad, Ethiopia, Kuwait, Iceland, Luxemburg, Morocco, Muscat and Oman, Niger, Nigeria, Qatar, Somaliland, Sudan, Tunisia, and Yemen.

All countries in the region except Afghanistan meet the second criterion. Afghanistan is included in the region because it meets the third criterion.

In 1969 Turkish imports from the region amounted to

Figure 1.2:

LIST OF COUNTRIES:
1. Afganistan
2. Austria
3. Belgium
4. Bulgaria
5. Cyprus
6. Czechoslovakia
7. Denmark
8. Eastern Germany
9. Federal Germany
10. Finland
11. France
12. Greece

Figure 1.2: Map of Region

LIST OF COUNTRIES:

1. Afganistan
2. Austria
3. Belgium
4. Bulgaria
5. Cyprus
6. Czechoslovakia
7. Denmark
8. Eastern Germany
9. Federal Germany
10. Finland
11. France
12. Greece
13. Hungary
14. Iran
15. Iraq
16. Ireland
17. Israel
18. Italy
19. Jordan
20. Lebanon
21. Libya
22. Netherlands
23. Norway
24. Pakistan
25. Poland
26. Portugal
27. Romania
28. Saudi Arabia
29. Spain
30. Sweden
31. Switzerland
32. Syria
33. Turkey
34. UAR (Egypt only)
35. U.K.
36. U.S.S.R.
37. Yugoslavia

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90.2% of total Turkish imports, and exports from Turkey to the region amounted to 91.4% of total Turkish exports. These percentages are on the basis of weight. Value figures are comparable.

Two years are selected for constructing the trade flow model: 1959 and 1968. This is done in order to examine major shifts over time and the effects of the closed Suez Canal on the pattern and magnitude of trade.

Table 1.2 gives the basic economic factors of the region, both in magnitude and in relation to the world in 1959 and in 1968. The study will establish an econometric model of the trade flows between the 37 countries for these two time periods.

The years 1959 and 1968 are selected in order to examine major shifts over time and of the closed Suez Canal on the pattern and magnitude of trade. The year 1959 is selected as a year appropriately displaying an active trade route through the Suez. Another reason for selecting 1959 is because it is generally considered a

Table 1.2

Basic Economic Factors of the Region

Country	1959					1968				
	Population	Area	GNP (10^6 US $)		Real GNP per capita($)	Population	Area	GDP	GNP at market prices	GNP per capita($)
	(10^6)	(10^3 Km^2)	Nominal	Real		(10^6)	(10^3 Km^2)	(10^6 US $)		
Afghanistan	12.60	650.0	720	1,440	114	16.10	647.5	1,040 5/	1,203 5/	80 5/
Austria	7.05	83.8	5,500	7,870	1,116	7.40	83.8	8,423	11,350	1,544
Belgium	9.42	30.5	11,500	14,150	1,502	9.60	30.5	18,106	20,156	2,154
Cyprus	.57	9.3	270	380	667	.60	9.3	387	438	704
Denmark	4.55	43.1	5,500	7,320	1,609	4.90	43.1	11,979	12,394	2,545
Fed. Germany	54.90	248.0	59,000	84,370	1,537	58.00	248.0	116,025	132,700	2,206
Finland	4.39	337.0	3,900	5,620	1,280	4.70	337.0	7,103	8,009	1,708
France	45.10	551.2	53,000	63,600	1,410	49.90	547.0	109,786	126,623	2,537
Greece	8.26	132.6	3,030	4,850	587	8.80	131.9	5,960 6/	7,155 6/	813 6/
Iran	19.70	1,648.0	2,350	3,530	179	27.30	1,648.0	8,059	7,960	295
Iraq	6.95	444.4	1,060	1,480	213	8.60	434.9	2,403 6/	2,171 6/	257 6/
Ireland	2.85	70.3	1,740	2,260	793	2.90	70.3	2,496	2,981	1,024
Israel	2.06	20.7	1,580	2,210	1,073	2.70	20.7	3,598	4,005	1,459
Italy	49.10	301.2	29,000	41,760	849	52.80	301.2	66,299	74,786	1,418
Jordan	1.64	96.6	200	300	183	2.10	97.7	495 6/	575 6/	282 6/
Lebanon	1.61	10.4	500	750	466	2.60	10.4	1,196	1,336	518
Libya	1.17	1,759.0	90	140	120	1.80	1,759.6	2,133 6/	1,865 6/	1,073 6/
Netherlands	11.30	32.5	10,200	15,810	1,399	12.70	33.6	22,472	25,229	1,980
Norway	3.56	323.9	4,150	5,350	1,503	3.80	324.2	8,192	9,021	2,362
Pakistan	91.00	944.8	5,200	10,400	114	109.50	946.7	14,203	15,287	140
Portugal	9.00	92.1	2,170	3,470	386	9.50	92.1	4,535	5,009	529
Saudi Arabia	6.04	2,149.7	1,155	1,732	287	7.66 5/	2,149.7	1,339 5/	2,014 5/	263 5/
Spain	29.90	503.5	9,400	15,040	503	32.60	504.8	23,466	25,200	773
Sweden	7.45	449.8	11,200	14,560	1,954	7.90	449.8	23,003	26,250	3,315
Switzerland	5.26	42.3	7,900	9,880	1,878	6.10	42.3	15,566	16,931	2,754
Syria	4.54	184.5	770	1,160	256	5.70	185.2	1,242	1,425	248
Turkey	27.00	780.6	5,900	9,880	328	33.50	780.6	11,347	12,750	380
U.S.S.R. 1/	300.09 2/	6,560.6	209,971 2/	251,965 2/	840	281.10	6,560.6	370,179 3/	444,213 3/	1,580 3/
U.A.R. (Egypt only)	25.30	1,000.0	3,700	5,550	215	31.70	1,001.5	4,989 6/	5,736 6/	18[illegible] 6/
U.K.	52.00	244.0	67,000	87,100	1,675	55.30	244.0	86,971	102,875	1,861
Yugoslavia	18.20	255.8	5,300	8,480	466	20.20	255.8	9,031 4/	14,450 4/	715 4/
Total Region	737.56	20,000.8	522,956	181,277	930	862.20	19,991.8	---	---	---
Total World	2,905.00	135,391.0	1,223,800	1,484,205	511	3,483.00	135,767.0	---	---	---
% of Region to World	25.2	14.8	42.6	45.9	---	24.7	14.7	---	---	---

Source: 1959 population and GNP figures, except USSR, are taken from H. Linnemann, An Econometric Study of International Trade Flows, Amsterdam; North-Holland Publishing Co., 1966, pp. 220-222. 1959 population and GNP figures for USSR are estimated from P.N. Rosenstein-Rodan, "International Aid for Underdeveloped Countries," The Review of Economics and Statistics, Vol. XLIII, May 1961, pp. 107 ff. See note 2/ below for details of this estimation. 1959 area and the entire 1968 data, except GNP figures for USSR and Yugoslavia, are taken from United Nations, Statistical Yearbook, 1960, and 1969, respectively. USSR and Yugoslavia figures for 1968 are estimated from corresponding data for 1959. For details, see note 3/ for USSR and note 4/ for Yugoslavia.

Notes: 1/ Including Bulgaria, Czechoslovakia, E. Germany, Hungary, Poland, and Romania.

2/ 1959 USSR population figure is derived by applying a 2% rate of population growth to 1961 population figure given in Rosenstein-Rodan, op. cit., p. 118. Nominal GNP estimates, figures for Albania are excluded. Real GNP is found by using a conversion factor of 1.20 given by Rosenstein-Rodan.

3/ USSR 1968 GDP and GNP at market prices figures are derived by applying a weighted average growth rate to 1958 GNP figures. Average annual rates of growth of real net material product for 1960-1968 (r_i) reported in United Nations, Statistical Yearbook, 1969 for European USSR and the six Communist countries in Europe are multiplied by each country's GNP (Y_i) and the average annual growth rate is computed by

$$w = \frac{\sum_{i=1}^{7} r_i Y_i}{\sum_{1}^{7} Y_i}$$

The value of w for 1960-1968 turned out to be 6.5%. 1959 Nominal and real GNP figures (Y_o) are then used to arrive at 1968 figures (Y_1)

$$Y_1 = Y_o(1+w)^n$$

where n = 9.

4/ For Yugoslavia the value of w reported by U.N. is 6.1%. The same method of estimation described in note 3/ above is used in estimating 1968 GDP and GNP at market prices figures for Yugoslavia.

5/ For 1965.

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12/ Pulliainen, K
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13/ Cheng, H.S.,
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"normal" year.[9/] Also, there are a number of econometric studies already published analyzing the trade data of 1959. Notably, J. Tinbergen,[10/] H. Linnemann,[11/] and K. Pullia-ninen's[12/] econometric studies of world trade and H.S. Cheng's[13/] study of elasticities and propensities in inter-national trade use 1959 data. Therefore, the results of this study can be compared with any of the above in order to gain further insight as to the effects of the explanatory variables on the magnitude of trade between a pair of coun-tries. However, the following differences must be kept in mind when a comparison is done between this study and the above econometric studies:

9/ Linnemann, H., An Econometric Study of International Trade Flows, Amsterdam: North-Holland Publishing Co., 1966, p. 57.

10/ Tinbergen, J., Shaping the World Economy: Suggestions for an International Economic Policy, New York: The Twentieth Century Fund, 1962.

11/ Linnemann, op. cit.

12/ Pullianinen, K., "A World Trade Study: An Econometric Model of the Pattern of Commodity Flows in International Trade in 1948-1960," Ekonomiska Samfundets Tidskrift, 1963, No. 2, pp. 78 ff.

13/ Cheng, H.S., "A Collection of Statistical Estimates of Elasticities and Propensities in International Trade," Staff Papers, Vol. 7.

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(1) Some of the studies above, especially the one by K. Pulliainen, examine the trade flows over a number of years, thus establishing a long-run dynamic perspective which is lacking in our study.

(2) The area covered by each is different.

(3) There are differences in the variables selected in each study. For example, the locational index developed and used in this study is not used in any.

(4) The analytic methodology followed in the first part of this study is not the same as those followed by the above studies.

(5) This study is mainly concerned with transport planning and policy, whereas the others are generally exercises of predicting trade magnitudes by a set of independent variables.

The year 1968 is selected mainly for the following two reasons:

(1) It appropriately depicts the shape of the trade without the Suez Canal effect on routing and trade composition.

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(2) It is the most current year for which reasonably accurate trade data exist.

(3) It provides a sufficient span of time to reveal trends.

In addition to the economic dimensions given in Table 1.2, the region made up by the 37 countries is of interest in other respects. First, the region contains one of the most backward countries in the world, Afghanistan, which is located in one of the most isolated areas. The Pamir Knot which extends inside the Afghan borders is known as the world's "quintessential" natural barrier to trade.14/

Secondly, "The Cockpit of Europe," the area of Low Countries toward which trade flows heavily concentrate, is also within the region of this study. It is not surprising to note that the level of economic development in the "Cockpit" is one of the highest in the world.

Third, as can be seen in Figure 1.3, the region selected, although made up of countries displaying large economic differences, let alone political, social, and cultural gaps,

14/ Wolfe, R.I., Transportation and Politics, Princeton: D. Van Nostrand Co., 1963, p. 15.

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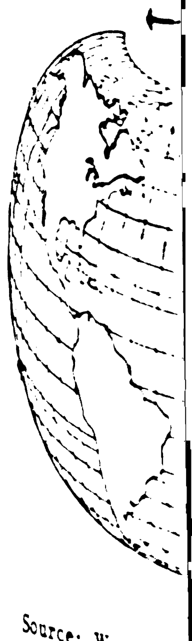

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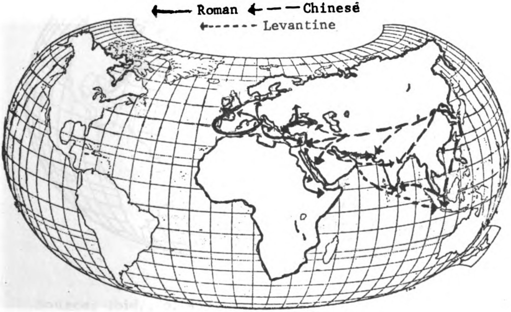
Figure 1.2

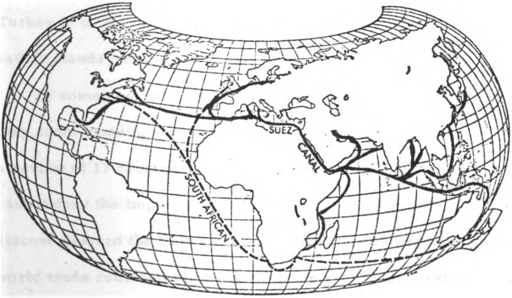
Main Trade Routes in the Third Century A.D.



Source: Woytinsky, W.S. and Woytinsky, E.S., World Commerce and Governments: Trends and Outlook, New York: The Twentieth Century Fund, 1955, p. 6.

Figure 1.3

Suez Canal and South African Routes in the Twentieth Century



Source: Ibid., p. 437.

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contains a heavy element of trade in its ancient ancestry. Turkey, being the approximate geographic center of the region, had been an important transit depot where Chinese, Roman, and Levantine traders met and bargained. In contrast to the historical grandeur Turkey enjoyed in the world trade, a brief review of Figure 1.3 reveals that Turkey is no more in the center of East-West trade, but rather stands outside of the major East-West trade routes.

To some, comparison of Figure 1.2 with Figure 1.3 may seem meaningless, since such an approach involves a review of 17 centuries of world history. However, one cannot deny the impact of two phenomena, namely, the discoveries and the Suez Canal on shifting the center of world trade considerably away from the geographic center of the region. The important point that should be raised here is that a diversion in the trade center has occurred due to a shift from over-land to deep-sea trade routes. As far as the Turkish transport system is concerned, the implications of this diversion is quite clear: Now that the Suez Canal is closed for six years and the chances for its continuous reopenin

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continuous reopening are slim, can Turkey pull some secondary external flows through her transport infrastructure by offering over-land connection between East and West? If the answer to this question is in affirmative, then what are the transport and commercial policy implications to realize this active role?

1.6 General Outline

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1.6 General Outline of the Study

This study is made up of two main parts:

(1) An analytic part will attempt to formulate a general trade flow model -- in terms of a set of explanatory variables -- among the group of countries that make up the region in which Turkey is strategically located and a potential transit point. Then, by the use of a probabilistic approach developed by Savage and Deutsch[15] "size effects" will be eliminated in order to assess the effects of trade obstacles -- such as, distance, location, and preferential trade arrangements -- on the size of trade flow. The main purposes of this part are (i) to determine the responsiveness of inter-regional trade size to changes in obstacles, and (ii) to evaluate potentials for transport economies and possible route diversions and the impact on Turkish income and balance of payments outlook.

15/ Savage, R.I., and Deutsch, K.W., "A Statistical Model for the Gross Analysis of Transaction Flows," Econometrica, Vol. 28, No. 3, July 1960, pp. 551 ff.

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(2) The second part of the study takes the results of the first part and evaluates Turkish transport and commercial policies in a pragmatic manner. Secondary external flows in the region and their trade elasticities are analyzed in terms of their transport policy implications. Specifically, commercial and transport policy issues are defined, alternatives are evaluated, and patterns of implementation are suggested. Finally, an attempt is made to assess the contribution of proposed measures to Turkey's role in the regional trade.

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1.7 Related Research

It is clear that the approach outlined above is one of using external trade flows in order to shape Turkey's total transport system and strengthen its participation in regional trade.

The theme and objectives of this study is similar to Michigan's Commerce and Commercial Policy Study.[16/] The only difference is the methodology followed in the first part of this study. A study of Michigan's commerce -- interstate, as well as international -- encounters inescapable difficulties due to lack of accurate statistical data, especially in interstate commerce. Consequently, J. L. Hazard's main effort has been on finding a proper empirical approach to obtain an accurate estimate of interstate commerce. In this study, however, "accurate" published data are available from several sources. Therefore, the emphasis in the first part of this research is not on methods of gathering new data and assuring an acceptable

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16/ Hazard, J. L., Michigan's Commerce and Commercial Policy Study, E. Lansing: Division of Research, Graduate School of Business Administration, Michigan State University, 1965.

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level of accuracy, but rather on trying to explain to what extent trade could be increased by reducing obstacles and how Turkey might shape its transport and commercial policy to cutting trade costs or improving quality of service. The similarity between the two studies stems from bringing the external dimension in shaping the transport and commercial policies. Another similar study is Transshipment Hawaii, Steps Toward an East-West Distribution and Processing Center[17/] in which primary and secondary flows were emphasized as a basis for policy making.

To the writer's knowledge no other research attempts the synthesis of the above-mentioned studies. Numerous studies have examined interregional trade patterns and elasticities, and others, the planning of transport infrastructure, but none have used external commerce to shape internal and flow-through planning.

However, if the two parts of this study are taken individually, many similar studies can be cited in relation

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17/ Hazard, J. L., Transshipment Hawaii, Steps Toward an East-West Distribution and Processing Center, University of Hawaii, College of Business Administration, Bureau of Business Research, Honolulu: 1963.

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The first part of this study is, obviously, the subject matter of international trade and has been extensively studied by economists.

To cite a few examples of studies related to the first part, international trade studies made by J. Tinbergen,[18/] H. Linnemann, P. Pöyhönen,[19/] K. Pulliainen[20/] cover trade flows among a number of countries which make up a more comprehensive region of the world than this study. Some studies, such as F. Hildegerdt,[21/] P.L. Yates,[22/] and A. Maizels[23/] use a general descriptive approach rather than going into details of country-to-country flows. In contrast, the studies made by J.J. Polak,[24/] H. Neisner

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18/ Tinbergen, op. cit.

19/ Pöyhönen, P., "A Tentative Model for the Volume of Trade Between Countries," Weltwirtschaftliches Archiv, Vol. 90, No. 1, 1963, pp. 93 ff.

20/ Pulliainen, op. cit.

21/ Hildegerdt, F., The Network of World Trade, Geneva: League of Nations, 1942.

22/ Yates, P.L., Forty Years of Foreign Trade, London: Allen and Unwin, Ltd., 1959.

23/ Maizels, A., Industrial Growth and World Trade, New York: Cambridge University Press, 1963.

24/ Polak, J.J., An International Economic System, Chicago: University of Chicago Press, 1953.

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25/ Neisner, H., [illegible]
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Press, 1953. [illegible]

26/ Beckerman, [illegible]
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1956, pp. 23[illegible]

27/ Coppock, J.[illegible]
New York: M[illegible]

28/ Kuznets, S., [illegible]
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29/ Prais, S.J. [illegible]
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pp. 560-57[illegible]

30/ Argentina, [illegible]
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and F. Modigliani,25/ W. Beckerman,26/ J. D. Coppock,27/ and S. Kuznets28/ are purely analytical studies of international trade. For a review of econometric research in international trade the reader is referred to S. J. Prais' article.29/

The second part of this study is the subject matter of national transport systems. Many country surveys have been made with resulting national transport policy implications. Some of these studies are National Transport Group's study resulting in a transportation plan for Argentina,30/

25/ Neisner, H., and Modigliani, F., National Incomes and International Trade, Urbana: University of Illinois Press, 1953.

26/ Beckerman, W., "The World Trade Multiplier and the Stability of World Trade," Econometrica, Vol. 24, No. 2, 1956, pp. 239 ff.

27/ Coppock, J.D., International Economic Instability, New York: McGraw-Hill, 1962.

28/ Kuznets, S., "Quantitative Aspects of the Economic Growth of Nations: IX. Level and Structure of Foreign Trade: Comparisons for Recent Years," Economic Development and Cultural Change, Vol. 13, No. 1, Part II, 1963, pp. 1 ff.

29/ Prais, S.J., "Econometric Research in International Trade: A Review," Kyklos, Vol. 15, No. 3, 1962, pp. 560-579.

30/ Argentina, Republic of, Transportation Planning Group, A Long Range Transportation Plan for Argentina, Buenos Aires: 1962.

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H. Hunter's survey of Soviet transport policy,31/ a study made by Parsons, et al. on Colombia's transport system,32/ W. Owen's survey of transport in Pakistan33/ and West Pakistan,34/ Stanford Research Institute's transport study of Nigeria,35/ and Transportation Consultants, Inc.'s study of transport in Thailand.36/ Also, International Bank for Reconstruction and Development and United Nations have attempted studies on transport infrastructure and on planning the external sector, respectively.

The important difference between the above surveys and this study is the external orientation of the latter. This

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31/ Hunter, H., Soviet Transportation Policy, Cambridge: Harvard University Press, 1957

32/ Colombia, Republic of, Ministry of Public Works, Plan for Improvements in National Transportation, (Report prepared by Parsons, Brinckerhoff, Quade, and Douglas.) Bogota: 1961.

33/ Owen, W., Transport in Pakistan, Karachi: Government of Pakistan Press, 1959.

34/ Owen, W., Transport Survey of West Pakistan, Karachi: Government of Pakistan Press, 1960.

35/ Stanford Research Institute, The Economic Coordination of Transport Development in Nigeria, Menlo Park: 1961.

36/ Transportation Consultants, Inc., A Comprehensive Evaluation of Thailand's Transportation System Requirements, Washington, D.C., 1959.

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study attempts to design a national Transport policy for Turkey, not only on the basis of Turkey's trade with other nations, but also on the basis of Third country trade flows. One recent study conducted by U.S. Federal Maritime Commission's Bureau of Domestic Regulation on Puerto Rican-Virgin Islands trade heavily leans toward the transportation system in shaping the commercial policy of Puerto Rico and Virgin Islands.[37] There is greater similarity between the FMC study and this study than the other studies mentioned, for both studies emphasize primary and secondary flows.

37/ U.S. Federal Maritime Commission, Puerto Rican-Virgin Islands Trade Study: A Regulatory Staff Analysis, Washington, D.C.; U.S. Government Printing Office, April 1970.

CHAPTER 2: A
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CHAPTER 2: A MATHEMATICAL FORMULATION OF THE TRADE FLOW MODEL

2.1. Factors Affecting the Size of Foreign Trade

An attempt to explain the magnitude of trade from one country to another during any time period must, necessarily, include the following explanatory factors:

(1) Potential supply of the exporting country or propensity to export .

(2) Potential demand of the importing country or propensity to import.

(3) Other factors which can be classified under "resistance," a term, borrowed from physics, which is equally appropriate in economic analysis. However, the term should not be interpreted in a literal sense. It not only includes those factors which reduce trade such as distance, war or political hostility, but also encompasses factors which help to stimulate trade such as preferential

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$$a_{ij} = \gamma_0 \frac{(S_i^p)^{\gamma_1} (D_j^p \ldots}{(R_{ij})^{\gamma_3} \ldots}$$

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trade arrangements, good location, and favorable commodity composition of exports in relation to the demand of an importing country.

Some have used an analogy between pressure, gravity, and combination systems in mechanics and economic phenomena.[1/] The analogy can be applied to the above three explanatory factors as:

$$a_{ij} = \alpha_o \frac{(S_i^p)^{\alpha_1}(D_j^p)^{\alpha_2}}{(R_{ij})^{\alpha_3}} \quad \ldots\ldots\ldots\ldots \quad (2\text{-}1)$$

a_{ij}	denotes the flow from country i to country j.
S_i^p	is the potential supply of country i.
D_j^p	is the potential demand of country j.
R_{ij}	is the resistance to trade along the interface from country i to country j.
α_o	is the gravitational constant.
α_1, α_2, α_3	are elasticity parameters.

(2-1) depicts a general model of interaction between

1/ Hazard J. L., MTA 890, unpublished lecture notes, E. Lansing, Graduate School of Business Administration, Michigan State University, Spring 1970.

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two places, commonly known as the gravity model which is borrowed from Newtonian physics. Omitting W. Isard's[2] probabilistic approach to the derivation of a model of interaction, this gravity model simply asserts that the interaction between i and j is the product of the masses of the two places divided by the resistance between them. Although it is claimed that the model can "determine the optimum interaction between places,"[3] our aim here is to simply point out that (2-1) assumes the importance of resistance to trade which is contrary to the pure theory of international trade. In the absence of resistance factors every country would actually realize its potential supply and potential demand. However, resistance factors do exist, and their influence upon a specific trade flow differs significantly from the influence they exert on other trade flows. Without going into details as to what constitutes resistance, let us compare

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2/ Isard, W., *et al.*, *Methods of Regional Analysis*, New York, John Wiley and Sons, Inc., 1960, pp. 493 ff.

3/ Weber, A., *Uber den Standorf der Industrien*, Tubingen: 1909. English Translation by C.J. Friedrich, *Alfred Weber's Theory of the Location of Industries*, Chicago: University of Chicago Press, 1929, p. 22.

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the "Cockpit of Europe" with the Pamir Knot, both within the region of this study. Obviously, the former offers the least natural resistance to trade; whereas the latter, being surrounded by insurmountable mountains, constitutes a serious barrier to the movement of goods and people. Other things being equal, one should expect a greater portion of potential demand and potential supply to be realized by the countries in and around the "Cockpit of Europe" than by Afghanistan, because the resistance in the former area is much smaller than in the latter.

The system of interaction represented by (2-1) implies a constant value of S_i^p for an exporting country. On the other hand, the value of R_{ij} is not constant for an exporting country: Its value must be determined for each country-to-country flow. The same argument is also true for D_j^p of an importing country. This point can be represented by a system graph as shown in Figure 2.1.

Figure 2.1:

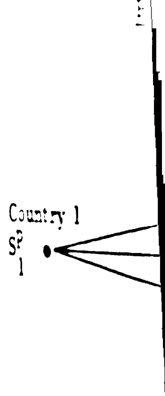

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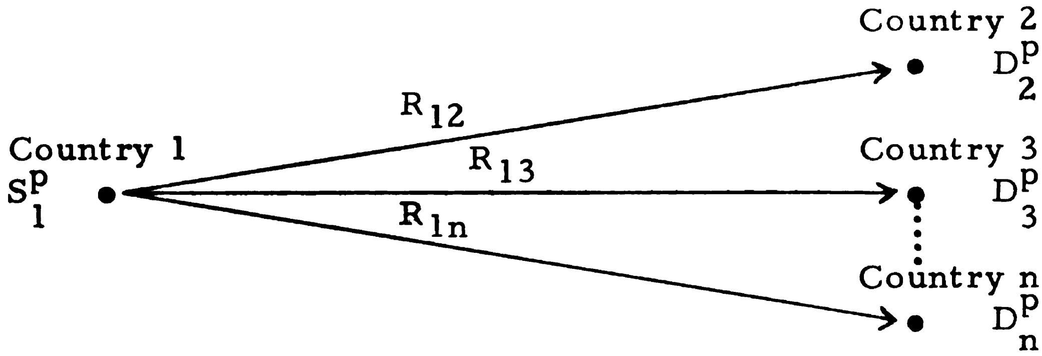
Figure 2.1: A General Graph of Interaction Represented by (2-1)



In the export system for country 1 depicted in Figure 2.1, only one value of potential supply is sufficient to explain the "readiness" or capability of country 1 to offer goods for trade. Experiencing different levels of resistance (R_{12}, R_{13}, . . ., R_{1n}) from different importing countries (2 through n) determines the size of individual trade flows (a_{12}, a_{13}, . . ., a_{1n}). Thus, the potential supply of any country with respect to its primary outgoing flows -- exports -- is a uniform distribution which is distorted by resistance factors. Similarly, the potential demand of any country with respect to its incoming primary flows -- imports -- is a uniform distribution whose constancy is distorted by resistance factors.

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So far, we have offered a general description of individual trade flows. In the next section we will attempt to operationalize the general description by determining specific factors that make up potential supply, potential demand, and resistance factors.

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4/ Linnemann,
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2.2. Specific Factors Determining the Size of Foreign Trade

2.2.1. Potential Supply

In trying to define the potential supply of a country we must assume that all countries' outgoing primary flows are subject to exactly the same trade resistance. This assumption is necessary because our model attempts to isolate the effects of resistance factors from "size" effects. Along the line of thought developed by H. Linnemann,[4] we resubmit that a country's potential supply depends on its national output (Y_i) and on the ratio between production for the domestic market and production for foreign demand (r_i). In other words,

$$S_i^p = f(Y_i, r_i) \quad \ldots\ldots\ldots\ldots \quad (2\text{-}2)$$

It has been argued that, under conditions of equal trade resistance for all countries, population size, rather than

4/ Linnemann, H., An Econometric Study of International Trade Flows, Amsterdam: North Holland Publishing Co., 1966, pp. 11 ff.

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5/ Ibid., p. 1
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10/ Kuznets,
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per capita income, significantly explains r_i.5/6/7/ The important assumptions underlying this argument are economies of scale and the diversification of demand at higher levels of per capita income, which somewhat offset each other as per capita income increases while the population size is held constant. The arguments are, by no means, entirely theoretical. A supportive empirical evidence is a study made by H.B. Chenery8/ which showed, for 62 countries during 1952-1954, that per capita imports are not related to per capita income, but related to population size. Similar results were obtained by K. Deutsch, C.I. Bliss, and A. Eckstein,9/ S. Kuznets,10/ and A.M.

5/ Ibid., p. 13

6/ Kuznets, S., Six Lectures on Economic Growth, Glencoe Ill.: The Free Press, 1959, p. 94.

7/ Michaely, M., Concentration in International Trade, Amsterdam: North-Holland Publishing Co., 1962, p. 111.

8/ Chenery, H.B., "Patterns of Industrial Growth," American Economic Review, Vol. L, 1960, pp. 624 ff.

9/ Deutsch, K., Bliss, C.I., and Eckstein, A., "Population, Sovereignty, and the Share of Foreign Trade," Economic Development and Cultural Change, Vol. X, 1962, pp. 353 ff.

10/ Kuznets, S., "Economic Growth of Small Nations," in Economic Consequences of the Size of Nations, (ed. E.A.G. Robinson), London: Macmillan, 1960, pp. 19 ff.

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Using the standard notation, N_i, to denote population size of country i, instead of the domestic market-foreign market production ratio, r_i, (2-2) can be written as:

$$\hat{S}_i^p = \hat{f}(Y_i, N_i) \; . \; . \; . \; . \; . \; . \; . \; . \; . \; . \; . \quad (2\text{-}3)$$

11/ Strout, A.M., "Savings, Imports, and Capital Productivity in Developing Countries," Paper presented to the First World Congress of the Econometric Society, Sept. 1965 (mimeographed).

2.2.2. Potential

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country j, $\hat{D}^p_j$,

population N_j:

$$\hat{D}^p_j = \hat{g}(Y_j, N_j$$

2.2.2. Potential Demand

The reasoning developed so far in determining those factors which explain potential supply is equally applicable to potential demand. In short, the potential demand of country j, $\hat{D}_j^p$, is related to its national output, Y_j and population N_j:

$$\hat{D}_j^p = \hat{g}(Y_j, N_j) \quad \ldots\ldots\ldots\ldots \quad (2\text{-}4)$$

2.2.3. Resistance

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2.2.3. Resistance Factors

In this section we will move away from the earlier assumption made regarding equality of trade resistance for all countries. In fact, incorporating resistance factors into any model of interaction implies that resistance between terminals is not equal from one edge to the next.

We can distinguish between two types of resistance factors: natural and artificial.

Natural Barriers to Trade. An important natural barrier to trade is transportation costs. Determining the true transportation cost of shipping an item from one place to another is a complicated matter. According to C. P. Kindleberger, the following factors play a role in determining shipping costs:[12/] weight, bulkiness, value, physical characteristics, distance to be traversed, the mode and speed of transport, character of the route, and possibility of backhauls. To make the matter worse, we can add density, palletization and containerization, possibilities of

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12/ Kindleberger, C.P., Foreign Trade and the National Economy, New Haven: Yale University Press, 1962, p.11.

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damage and/or pilferage, number of transshipments, availability and loading capacity of transport vehicles, etc., to the above list of factors. Undoubtedly, it is impossible to devise a single or composite index which can accurately weigh all relevant factors that define transportation costs.

Another important natural barrier to trade, closely related to transportation costs, is the time element involved in transportation. True, transportation contributes to the creation of two kinds of utility to goods: place and time,[13/] but it is also true that time spent in connecting two terminals constitutes an obstacle to trade because it increases irregularities in supply. "The longer the time of transportation for a certain commodity, the greater the necessary stocks of it in the importing country and the greater also the risk of losing profitable opportunities."[14/]

A third natural barrier to trade is what C.P. Kindleberger calls "economic horizons," or "psychic distance" as referred

13/ Hay, W.W., An Introduction to Transportation Engineering, New York: John Wiley and Sons, Inc., 1961, p. 38.
14/ Linnemann, op. cit., p. 27.

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by W. Beckerman.[15] Beckerman's example that to an Italian importer, Switzerland is closer than Turkey in a psychic sense, although economic cost of shipment from the latter country to Italy may be lower than from the former country -- due to differences in transport modes -- signifies the importance of not only cultural and historical ties reflecting itself in habitual trade relationships, but also the presence or absence of effective communication links in the establishment and maintenance of trade between two countries.

Unfortunately, there are no indices developed which can accurately represent the interaction between the above three natural barriers: cost, time, and psychic distance. Our attempt here is not to develop such an index. For the present moment, we will assume that the geographic distance between country i and country j (D_{ij}) represents the above three factors. Let us state, at the outset, that this assumption is a very crude one. It is made mainly because there

15/ Beckerman, W., "Distance and the Pattern of Intra-European Trade," The Review of Economics and Statistics, Vol. 28, Nov. 1956, p. 38.

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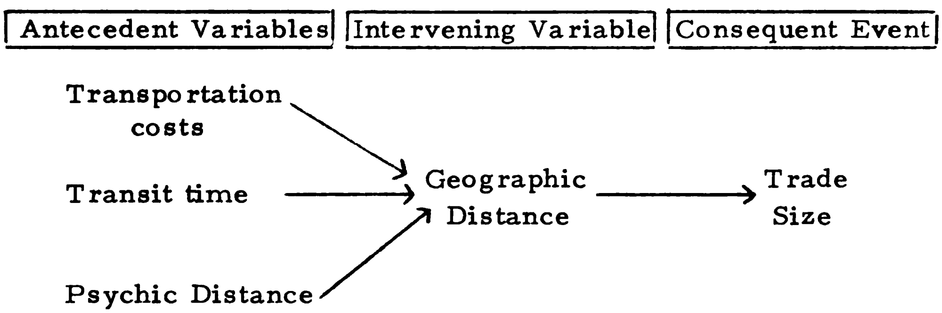
is no other variable which is better than distance in explaining the joint effect of transportation costs, time, and psychic distance on the size of trade. Nevertheless, as crude as it may seem, the assumption is not very far from general reality. To test the validity of this assertion, let us observe the interaction presented in Figure 2.2.

Figure 2.2: Interaction between Transportation Costs, Time, and Psychic Distance and Trade Size



The first proposition of Figure 2.2, namely, cost-distance interaction, has been the center of debate, especially among location economists, since the dawn of this century when A. Weber's work[16] was first published.

16/ Weber, A., *op. cit.*

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We do not advocate here that cost and distance are linearly related. However, we assume that, in general, there is a relationship between transportation costs and distance. In international trade most trade flows are restricted to a very narrow modal choice. Except some intra-continental overland moves and a small, but increasing air traffic, a great portion of commodities traded in the world are sea-borne traffic. When we limit ourselves to one mode, the general relationship between cost and distance becomes more apparent.

The pragmatic side of the second proposition: Time-distance relationship can, again, be established by limiting modal choice to water. In spite of a great variety of vessels serving sea-borne inter-continental traffic, speed per time unit does not vary extensively. Therefore, there is a close positive relationship between transit time and distance.

The third proposition asserts that if two countries are geographically close to each other, it is more likely that they will have historical and cultural ties, as well as better communication linkages, all of which bring the two closer to each other in a psychic sense. It may be argued that there are as

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that there are as many exceptions to this as cases which support it; for example, Israel and the Arab League of Nations, USSR and Turkey, and Turkey and Greece, may appear to be important exceptions. However, all of these cases are due to political reasons which are artificial rather than natural trade barriers. The interaction depicted in Figure 2.2 groups only natural barriers; and artificial barriers will be dealt with shortly. Therefore, political cases which may seem to constitute exceptions to Figure 2.2 are not valid exceptions. On the other hand, the case of U.K. and New Zealand is a valid exception to the proposition. When artificial barriers are excluded from Figure 2.2, however, it will be realized that the number of exceptions will shrink to a negligible size, thus making our proposition difficult to refute.

Now that we have established the general relationship between transportation costs, transit time, and psychic distance and geographic distance, we can formally introduce the distance variable (D_{ij}) to our model:

$$\hat{R}_{ij} = \hat{h}(D_{ij}) \quad . \; . \; . \; . \; . \; . \; . \; . \; . \; . \quad (2\text{-}5)$$

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Distance alone is far from representing the entire array of natural trade barriers. As a case of discussion let us consider Afghanistan. This country is close to Pakistan; in other words, a highly favorable D_{ij} value. Also, in a purely locational sense, Afghanistan is in an unfavorable position, because it is surrounded by low income countries. This means that the gravitational pull of the countries around Afghanistan is low. Naturally, this is another barrier for Afghan exports, since it stems from the unfavorableness of Afghanistan's location. We will term this combination of terrain and isolation, locational factor, because this combination significantly affects a country's export potential.

Let us consider Belgium as a case in the other extreme. The internal transport system of Belgium is highly developed, thus giving a highly favorable connectivity. Also it is surrounded by high income countries, meaning a favorable isolation for Belgium. The favorableness of these two factors: connectivity of transport system, and isolation deriving from the location of Belgium, must enable this country to realiz

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17/ Yeates,
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country to realize a higher trade potential, ceteris paribus.

As should be clear from the preceding discussion, transport connectivity and isolation are two forces which affect the size of trade flow in a composite manner. In the following paragraphs a composite index will be developed to account for these two forces. The composite index is termined location index.

A measure of transport connectivity is known as the beta index. "The β index expresses in numerical form the ratio between the number of edges (e) or routes in a [transport] system and the number of vertices (v) or nodes in that system,"17/ or

$$\beta = \frac{e}{v} \dots\dots\dots\dots \quad (2\text{-}6)$$

In our model (2-6) can be refined as follows inorder to reflect the connectivity index for country i:

$$\beta_i = \frac{e_i}{v_i} \dots\dots\dots\dots \quad (2\text{-}7)$$

17/ Yeates, M.H., An Introduction to Quantitative Analysis in Economic Geography, New York: McGraw-Hill, 1968, p. 114.

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Computing the connectivity index by (2-7) for each country in our model is a voluminous task in itself. On the other hand, published data on this index are quite limited. One well-known survey is made by K. J. Kansky 18/ for the railroad connectivity of only 18 countries (nine of which are included in our region) for 1957. Therefore, in the absence of published data and facing the impossibility of computing connectivity indices for 31 countries by the use of (2-7), an attempt to obtain an approximation of β_i will be made here.

In developing connectivity indices for the countries in our region, we will make use of the following two propositions:

(1) Connectivity is a function of transport system mileage per capita (m_i) or

$$\beta_i = k(m_i) \quad . \ . \ . \ . \ . \ . \ . \ . \ . \ . \quad (2\text{-}8)$$

(2) Connectivity is a function of transport system mileage per unit area (a_i) or

18/ Kansky, K. J., Structure of Transportation Networks, Research Paper No. 84, Chicago: Department of Geography, University of Chicago, 1963.

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Other things being equal, the greater the value of m_i the more advanced is the transport connectivity of that country. A country's connectivity expressed only in terms of m_i may be higher when compared to another country, but connectivity expressed in terms of a_i may reverse the conclusion. As a case of discussion let us compare Greece and Iraq whose 1968 populations were about equal, 8.8 and 8.6 million, respectively. If the total transport system mileage of these countries were equal, then the values of m_i would be equal, meaning the same level of connectivity. However, the area of Iraq is more than three times the area of Greece -- 434.9 versus 131.9 thousand square kilometers. Therefore, equal total transport mileages and populations -- thus, equal m_i values -- would be misleading, because connectivity does not only involve interaction among people but interaction among spatially distributed people. In short, if population in Greece and Iraq are equal to each other, to speak of the same connectivity level in both countries, the tr

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countries, the transport system mileage in Iraq must be more than that of Greece to account for the difference in area.

The reverse argument is also true: Connectivity expressed in terms of a_i only is not sufficient, because it does not take into account differences in population. An example of this case is Finland and Italy whose areas are approximately equal (337.0 and 301.2 thousand square kilometers, respectively) but populations are not (4.7 and 52.8 million in 1968). In order to eliminate the weakness of using m_i or a_i individually, we will use the following connectivity index developed by N. Ginsburg:19/

$$\hat{\beta}_i = \frac{m_i}{d_i} \quad . \; . \; . \; . \; . \; . \; . \; . \; . \; . \; . \quad (2\text{-}10)$$

where d_i is the "population distance" and is equal to the square root of the reciprocal of population density, or

$$d_i = \left(\frac{1}{D_i}\right)^{1/2} \quad . \; . \; . \; . \; . \; . \; . \; . \; . \; . \quad (2\text{-}11)$$

19/ Ginsburg, N., Atlas of Economic Development, Chicago: University of Chicago Press, 1961.

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In order to develop an index of isolation to show the extent to which a country's location is favorable to realize its potential trade, we will make use of an extension of general gravity models.

From the general description of gravity models given in Section 2.1 the following simple formula can be established:

$$I_{ij} = \frac{m_i m_j}{(D_{ij})^{\beta^1}} \quad \ldots\ldots\ldots\ldots \quad (2\text{-}12)$$

where, I_{ij} is the gravitational interaction between spatially distributed two countries (i and j); m_i and m_j mean the mass between country i and country j, respectively; D_{ij} is the distance between country i and country j; and β^1 is the exponent of distance parameter. Since our emphasis here is the favorableness of the location of country i relative to the income levels of countries around it, m_i and m_j in (2-12) can, specifically, be interpreted as per capita income levels of country i and country j, respectively.

In order to show the isolation index (I_i) at country i, (2-12) can be extended as:

$I_i = I_{i1} + I_{i2} + \ldots$

or

$I_i = \frac{m_i m_1}{(D_{i1})} + \frac{m_{\cdot}}{(D}$

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$I_i = m_i \sum_{j=1}^{n} \frac{m_j}{(D_{ij})}$

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$$I_i = I_{i1} + I_{i2} + \ldots + I_{ij} = \sum_{j=1}^{n} I_{ij} \quad (i \neq j) \ldots\ldots\ldots \text{(2-13)}$$

or

$$I_i = \frac{m_i m_1}{(D_{i1})^{\beta 1}} + \frac{m_i m_2}{(D_{i2})^{\beta 2}} + \ldots + \frac{m_i m_j}{(D_{ij})^{\beta 1}} = \sum_{j=1}^{n} \frac{m_i m_j}{(D_{ij})^{\beta 1}}$$

$$(i \neq j) \ldots\ldots\ldots\ldots \text{(2-14)}$$

In (2-14) m_i appears as a common term. Therefore, simplifying (2-14) will yield the isolation index of country i.

$$I_i = m_i \sum_{j=1}^{n} \frac{m_j}{(D_{ij})^{\beta 1}} \quad (i \neq j) \ldots\ldots\ldots\ldots \text{(2-15)}$$

(2-15) does not take into account the effect of domestic flows in country i. The effectofdomestic flows (2-15) can be refined as

$$I_i = m_i \sum_{j=1}^{n} \frac{m_j}{(D_{ij})^{\beta 1}} + \frac{m_i}{.5(D_{ik})^{\beta 1}} \quad (i \neq j) \ldots\ldots\ldots \text{(2-16)}$$

In 2-16, D_{ik} denotes distance from country i to the nearest country k. The value of .5 is a convention applied so as not to give undue weight to the country itself.[20]

20/ Yeates, op. cit., p. 25.

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(2-16) implies that a country located near high per capita income countries will have a high isolation index value -- The greater the index value, the more favorable is the isolation of a country.

We have now developed two indices: (2-10) gives an index of transport connectivity, and (2-16) gives an index of isolation. Using (2-10) and (2-16) we can now develop our composite location index (C_i).

$$C_i = \hat{\beta}_i I_i \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \ . \quad (2\text{-}17)$$

or

$$C_i = \frac{m_i}{d_i} [m_i \sum_{j=1}^{n} \frac{m_j}{(D_{ij})^{\beta 1}} + \frac{m_i}{.5(D_{ik})^{\beta 1}}] \quad (i \neq j) \ . \ . \ . \ . \ . \quad (2\text{-}18)$$

(2-18) states that a country's ability to export is the product of its connectivity index -- showing how far the country has advanced its transportation network -- and its isolation -- showing how favorable the country's location is in relation to the gravitational pull of high income countries.

Incorporating the composite location index to (2-5) will provide us a modified version of natural resistance factors.

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$$\hat{R}_{ij} = \hat{h}(D_{ij}, C_i) \quad . \; . \; . \; . \; . \; . \; . \; . \; . \; . \; . \quad (2\text{-}19)$$

This completes our discussion of natural barriers to trade. In the last part of this section we will deal with artificial barriers to trade.

Artificial Barriers to Trade. The complexity of quantifying government controlled artificial trade impediments and incorporating them into our model as a measurable explanatory variable must be readily admitted. The complexity stems mainly from the heterogeneity and diversity of artificial barriers. These obstacles "may take the form of tariffs, quantitative restrictions, exchange controls, or a combination of these."21/ Although the existence of artificial barriers and their trade-reducing effects cannot be denied, there is no agreement among international economists as to how these obstacles should be quantified.

In our general trade flow model we will develop the concept of artificial barriers as distortions from a uniform distribution of trade resistance. In other words, we will

21/ Linnemann, *op. cit.*, p. 30.

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start with the assumption that all countries in the region have established equal artificial barriers to their imports and develop the model by adding distorting variables to this assumption. The reality of this assumption is supported by the fact that among GATT members discriminating artificial trade barriers are not generally permitted.

Starting with this assumption we can distinguish between two opposite forces:

(1) Trade-reducing artificial forces. The most important reduction in trade -- a negative distortion from the uniform distribution of artificial trade resistance -- is the presence of war or political hostility between two countries. In case of war there is a complete embargo to trade between enemies. A partial embargo to trade also exists between countries engaged in cold war. In short, it is hypothesized that existence of war between country i and country j (W_{ij}) significantly reduces the trade between them. Incorporating this factor to (2-19) our resistance function is further

refined

$\hat{R}_{ij} = \hat{r}$

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22/ Snider,
5th Ed.
pp. 222

refined as

$$\hat{R}_{ij} = \hat{h}(D_{ij}, C_i, W_{ij}) \quad \ldots\ldots\ldots\ldots \quad (2\text{-}20)$$

(2) Trade-stimulating artificial forces. A positive distortion from the uniform distribution of artificial trade resistance occurs when trade partners are members of a regional economic integration. Snider presents the following three forms of economic integration:[22/]

(i) The Free-Trade Area, such as the European Free Trade Association, is the least intensive regional integration. All artificial restrictions on trade among member countries are removed, but members may develop their own artificial restrictions on trade with nonmember countries.

(ii) The Customs Union, such as the Benelux,

22/ Snider, D.A., Introduction to International Economics, 5th Ed., Homewood: Richard D. Irwin Inc., 1971, pp. 222 ff.

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23/ Ibid., p.

is "one degree further along the scale of economic integration than a free-trade area."[23/] Members of the union use a common external tariff for their imports from nonmember countries and eliminate all artificial barriers to trade within the union.

(iii) The Common Market, such as the European Economic Community, represents the highest degree of economic integration. In addition to the trade-stimulating forces established by the customs union, the common market also permits free movement of labor and capital among member countries.

In our model the entire array of regional integration between countries will be treated as one explanatory variable. Denoting the degree of integration between country i and country j by S_{ij} and incorporating this

23/ Ibid., p. 222.

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Therefore,

$S_i^P = Y_i^{\lambda_1}$

(2-4) can be

$D_j^P = Y_j^{\lambda_3}$

(2-21) can

$R_{ij} = D_{ij}^{\lambda_5}$

variable to (2-20):

$$\hat{R}_{ij} = \hat{h}(D_{ij}, C_i, W_{ij}, S_{ij}) \quad \text{. . . . .} \quad (2\text{-}21)$$

2.3 The General Trade Flow Model

At this juncture, it would be worthwhile to summarize briefly the arguments presented so far in this Chapter. In Section 2.1 the general model of interaction is presented by Equation (2-1). Section 2.2 presented specific factors detailing explanatory variables for potential supply -- Equation (2-3); potential demand -- Equation (2-4); and resistance factors -- Equation (2-21).

In this study the effect of explanatory variables is assumed to be multiplicative rather than being additive. Therefore, (2-3) can be written as

$$S_i^P = Y_i^{\delta_1} N_i^{\delta_2} \quad \text{. . . . .} \quad (2\text{-}22)$$

(2-4) can be written as

$$D_j^P = Y_j^{\delta_3} N_j^{\delta_4} \quad \text{. . . . .} \quad (2\text{-}23)$$

(2-21) can be written as

$$R_{ij} = D_{ij}^{\delta_5} C_i^{\delta_6} W_{ij}^{\delta_7} S_{ij}^{\delta_8} \quad \text{. . . . .} \quad (2\text{-}24)$$

Now we have

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$$a_{ij} = \delta_0 \frac{Y_i^{\delta_1} X_j}{D_{ij}^{\delta_5} C}$$

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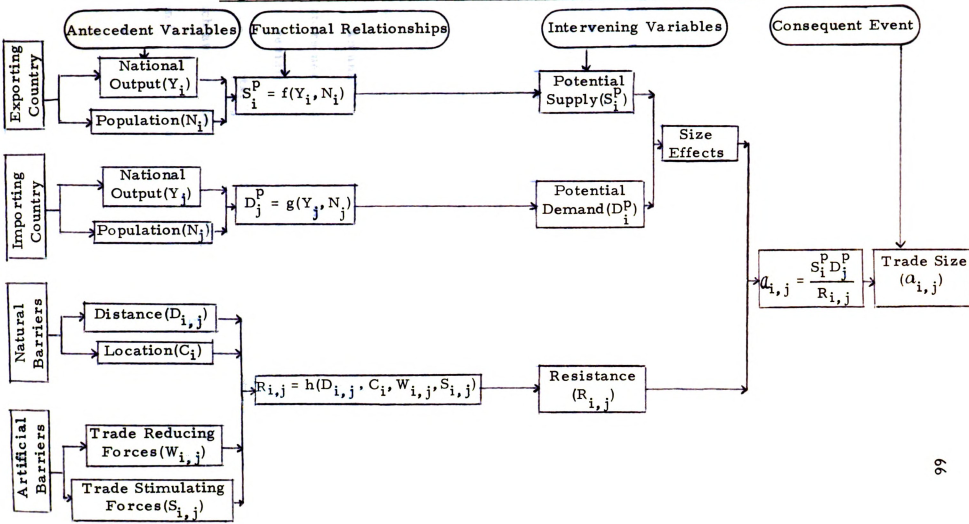
Now we have the general format of interaction given by Equation (2-1) and specific interactions among explanatory variables as shown by Equations (2-22), (2-23), and (2-24). By substituting (2-22) for S_i^P, (2-23) for D_j^P, and (2-24) for R_{ij} we can rewrite (2-1) as follows:

$$a_{ij} = \delta_o \frac{Y_i^{\delta_1} N_i^{\delta_2} Y_j^{\delta_3} N_j^{\delta_4}}{D_{ij}^{\delta_5} C_i^{\delta_6} W_{ij}^{\delta_7} S_{ij}^{\delta_8}} \quad \ldots\ldots\ldots\ldots \quad (2\text{-}25)$$

(2-25) offers a general model of interaction between explanatory variables which determine the size of trade flow. In the next chapter this general model will be modified so that the "size effects" are eliminated. The analysis will then center around the effects of resistance factors on trade size. However, before proceeding further on the methodology, a schematic review of this Chapter is presented in Figure 2.3. The general interaction model given by Equation (2-1) is operationalized by selecting a number of relationships between these variables and intervening variables. Trade size then is assumed to be a function of intervening variables which are in turn functions of antecedent variables.

Figure 2.3: Summary Interaction of Variables in the Trade Model

Figure 2.3: Summary Interaction of Variables in the Trade Model



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CHAPTER 3: METHODOLOGY

3.1 Introduction

In Chapter 2 a general model of interaction is presented by Equation (2-25). The general model offers a good starting point for an econometric analysis of the effects of explanatory variables on a_{ij}. However, the purpose of this study is not to seek empirical validation for international trade theory, but to determine the role played by resistance factors in the trade size. Specifically, how significant are the effects of natural -- distance and location -- and artificial trade barriers upon the trade size?

An analytical interest centered around resistance factors necessitates a modification of (2-25) in such a way that resistance factors are isolated from the so-called "size effects." In this Chapter a methodology which allows such an isolation will be developed. In (2-25) "size effects" can be identified as those explanatory variables appearing in the numera

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in the numerator. If the effects of these variables are eliminated from the matrix of trade flow data, the differences can further be analyzed in terms of resistance factors.

The methodology followed in this study was first developed by R.I. Savage and K.W. Deutsch.[1/] Somewhat similar methodologies and analogies were used earlier by R. Frisch,[2/] J.J. Polak,[3/] G.V. Glass[4/] and I. Blumen, et al.[5/] H.R. Alker, Jr.,[6/] developed a computer program of Savage and Deutsch's analysis for an IBM 709 computer with 32K storage and up to 150 actors. Later on, L.A. Goodman simplified the computational routine considerably[7/]

1/ Savage, R.I., and Deutsch, K.W., "A Statistical Model of the Gross Analysis of Transaction Flows," Econometrica, Vol. 28, No. 3, July 1960, pp. 551 ff.

2/ Frisch, R., "On the Need for Forecasting a Multilateral Balance of Payments," The American Economic Review, Vol. 37, 1947, pp. 535 ff.

3/ Polak, J.J., An International Economic System, Chicago: The University of Chicago Press, 1953, pp. 54 ff.

4/ Glass, G.V. (Ed.) Social Mobility in Britain, London: 1954.

5/ Goodman, L.A., "Statistical Methods for the Mover-Stayer Model," Journal of American Statistical Association, Vol. 56, 1961, pp. 841 ff.

6/ Alker, H.R., Jr., "An IBM 709 Program for the Gross Analysis of Transaction Flows," Behavioral Science, Vol. 7, No. 4, Oct. 1962, pp. 498-499.

7/ Goodman, L.A., "A Short Computer Program for the Analysis of Transaction Flows," Behavioral Science, Vol. 9, Apr. 1964, pp. 176 ff.

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and broadened the applicability of the analysis by modifying the methodology.[8/][9/] H. Linnemann[10/] used the analysis to isolate "size effects" and determine the effect of only the distance variable on the size of trade flows among 80 countries for 1959.

In Section 3.2 a summary of notations will be given which is followed by the underlying assumptions and identities in Section 3.3. Section 3.4 develops the statistical model of solution. Section 3.5 gives the solution detail.

8/ Goodman, L.A., "Statistical Methods for the Mover-Stayer Model," *op. cit.*

9/ Goodman, L.A., "Statistical Methods for the Preliminary Analysis of Transaction Flows," *Econometrica*, Vol. 31, No. 1-2, Jan-Apr. 1963, pp. 197 ff.

10/ Linnemann, H., *An Econometric Study of International Trade Flows*, Amsterdam: North-Holland Publishing Co. 1966, pp. 180 ff.

3.2 Summary o

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(4) m, k

(5) a_{ij}

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3.2 Summary of Notations

In developing the methodology, the following notations and definitions will be used.

(1) K Number of countries involved, including the "rest of the world."

(2) i An index used for an exporting country.

(3) j An index used for an importing country.

(4) m, k Dummy indices used for summation.

(5) a_{ij} Observed -- actual -- exports of country i to country j.

(6) A Square matrix of trade flows among K number of countries, i.e.,

$$A = (a_{ij}) = \begin{Vmatrix} a_{11} & a_{12} \cdots & a_{1j} \cdots & a_{1k} \\ a_{21} & a_{22} \cdots & a_{2j} \cdots & a_{2k} \\ \vdots & & & \\ a_{i1} & a_{i2} \cdots & a_{ij} \cdots & a_{kk} \end{Vmatrix} \quad \ldots (3\text{-}1)$$

(7) X_i Total exports of country i. Note that each row summation in (3-1) gives the value of X_i. In other words,

Y

(8) I_j

(9) T

$$X_i = \sum_{j=1}^{K} a_{ij} \quad (i \neq j) \ldots\ldots\ldots\ldots (3\text{-}2)$$

The side constraint $(i \neq j)$ eliminates the possibility of a country exporting to itself.

(8) I_j Total imports of country j. In (3-1) column totals provide values of I_j.

$$I_j = \sum_{i=1}^{K} a_{ij} \quad (i \neq j) \ldots\ldots\ldots\ldots (3\text{-}3)$$

$(i \neq j)$ eliminates the possibility of a country importing from itself.

(9) T Total world trade, i.e.,

$$T = \sum_{i=1}^{K} X_i \quad \text{or} \ldots\ldots\ldots\ldots (3\text{-}4)$$

$$T = \sum_{j=1}^{K} I_j \ldots\ldots\ldots\ldots (3\text{-}5)$$

Note that X_i in (3-4) can be substituted by (3-2), thus giving

$$T = \sum_{i=1}^{K} \sum_{j=1}^{K} a_{ij} \quad (i \neq j) \ldots\ldots\ldots\ldots (3\text{-}6)$$

Similarly, substituting (3-3) for I_j in (3-5)

(10) P_{ij}

(11) S_i

(12) D_j

(13) S

(14) A

(15) P

the same definition as (3-6) can be obtained. ($i \neq j$) eliminates domestic trades from the definition of total world trade.

(10) P_{ij} Probability of a consignment going from country i to country j.

(11) S_i Hypothetical potential supply probability of country i. (ith. country's theoretical tendency to export.)

(12) D_j Hypothetical potential demand probability of country j. (jth. country's theoretical tendency to import).

(13) S A correction factor in order to exclude "exports" of country i to itself, whose value is

$$S = (1 - \sum_{k=1}^{K} S_k D_k)^{-1} \quad \ldots\ldots\ldots\ldots \quad (3\text{-}7)$$

(14) A_{ij} Expected (theoretical) exports from country i to country j.

(15) p_i Proportion of world trade originated in country i.

$$p_i = \frac{X_i}{T} \quad \ldots\ldots\ldots\ldots \quad (3\text{-}8)$$

(16) q_i

(17) RA

(18) n

(19) r

(20)

(21)

(16) q_j Proportion of world trade imported by country j.

$$q_j = \frac{I_j}{T} \quad \ldots\ldots\ldots\ldots \quad (3\text{-}9)$$

(17) RA_{ij} Relative acceptance of exports from country i to country j, which is

$$RA_{ij} = (\alpha_{ij}/A_{ij}) \quad \ldots\ldots\ldots\ldots \quad (3\text{-}10)$$

(18) n_{ij} Number of consignments from country i to country j.

(19) n_i Total number of consignments origination from country i.

$$n_i = \sum_{j=1}^{K} n_{ij} \quad (i \neq j) \quad \ldots\ldots\ldots\ldots \quad (3\text{-}11)$$

(20) n_j Total number of consignments terminating in country j.

$$n_j = \sum_{i=1}^{K} n_{ij} \quad (i \neq j) \quad \ldots\ldots\ldots\ldots \quad (3\text{-}12)$$

(21) N Total number of consignments in the world's trade during a year.

(22) B c

(23) β

(24) σ^{2}

$$N = \sum_{i=1}^{K} n_i = \sum_{j=1}^{K} n_j \quad \ldots\ldots\ldots\ldots \quad (3\text{-}13)$$

Note that substituting either (3-11) or (3-12) in (3-13) will define N as

$$N = \sum_{i=1}^{K} \sum_{j=1}^{K} n_{ij} \quad (i \neq j) \quad \ldots\ldots\ldots\ldots \quad (3\text{-}14)$$

By $(i \neq j)$ all domestic flows are excluded from the definition of N.

(22) B or B_i Size of each consignment.

(23) β Mean consignment size.

(24) σ^2 Variance of consignment size.

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3.3 Assumptions and Identities

(1) A country cannot export (import) to (from) itself, or

$\alpha_{ii} \equiv \alpha_{jj} \equiv 0$ . . . . (3-15)

(2) The kth country in A is an artificial country called "rest of the world." $\alpha_{kk} \equiv 0$ implies that trade between two countries neither being in the region -- subset -- of interest is neglected.

(3) Trade between a pair of countries may not be balanced, i.e.,

$\alpha_{ij} \neq \alpha_{ji}$ . . . . (3-16)

(4) The trade of each country may not be balanced, i.e.,

$X_i \neq I_i$ . . . . (3-17)

(5) Total world exports is equal to total world imports.

$T \equiv \sum_{i=1}^{K} X_i \equiv \sum_{j=1}^{K} I_j$ . . . . (3-18)

This assumption eliminates the necessity of considering prices in the general model given by

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Equation (2-25).

(6) Independence Assumptions

(i) Independence of consignment size. World trade is made up of consignments of size $B_1, B_2, \ldots, B_n$. The probability that a consignment goes from country i to country j (P_{ij}) is independent of consignment size B. This assumption implies that world trade is made up of many decisions by many independent producers and buyers. Each decision is small in relation to T, i.e.,

$$\lim_{N \to \infty} \frac{B_n}{T} = 0 \quad \ldots\ldots\ldots\ldots \quad (3\text{-}19)$$

$B_1, B_2, \ldots, B_n$ can be thought of as random samples from the population of N possible consignments where the value of N is large. $B_1, B_2, \ldots, B_n$ are statistically independent of each other with a finite mean:

$$\beta = \left(\sum_{i=1}^{N} B_i\right)(N)^{-1} \quad \ldots\ldots\ldots\ldots \quad (3\text{-}20)$$

and a finite variance:

$$\sigma^2 = [\sum_{i=1}^{N} (B_i - \beta)^2](N)^{-1} \quad \ldots\ldots\ldots\ldots \quad (3\text{-}21)$$

(ii) Independence of origins and destinations. The mth consignment from country i to country j (x_{ijm}) is independent of other consignments, i.e., x_{ijm} (i=1, 2, ... , k; j=1, 2, ... , k; m = 1, 2, ... , n) are mutually independently distributed. The expected value of x_{ijm} is equal to P_{ij}. Using above assumptions we can now state the Savage-Deutsch statistical model: The probability of a consignment moving from country i to country j (P_{ij}) is:

$$\begin{aligned} P_{ij} &= S S_i D_j \quad \text{for} \quad i \neq j \\ P_{ij} &= 0 \quad\quad\;\; \text{for} \quad i = j \end{aligned} \quad \ldots\ldots\ldots \quad (3\text{-}22)$$

where

$S_i \geqslant 0$

$D_j \geqslant 0$ and

$$\sum_{i=1}^{K} S_i = \sum_{j=1}^{K} D_j = 1$$

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Using (3-7) in (3-22):

$$P_{ij} = S_i D_j \left(1 - \sum_{k=1}^{K} S_k D_k\right)^{-1} \text{ for } i \neq j \text{ . . . . . . } (3\text{-}23)$$

In (3-23) as the value of $\sum_{k=1}^{K} S_k D_k$ is increased the value of P_{ij} is also increased. Also, note that:

(a) $S = \infty$ **iff** $\sum_{k=1}^{K} S_k D_k = 1$ which is possible iff $S_k = D_k = 1$. (b) $S_{min} = 1$ iff $\sum_{k=1}^{K} S_k D_k = 0$ which can occur iff $S_k D_k = 0$ for all k. That is, S=1 iff an exporting country is never importing or vice versa which is impossible. (c) The value of $\sum_{k=1}^{K} S_k D_k$ is maximized iff $X_i = I_i$, i.e., if all countries perfectly balance their trade which violates (3-17).

(3-7) and (3-22) imply that the event of a consignment coming from a country i does not affect the probability of it being imported to country j. This is known as the assumption of origin-destination independence.

(7) $S_i = 0$ ($D_j = 0$) implies that country i (j) does not export (import). $S_i = D_i = 1$ is impossible.

(8) For each country i

$$X_i + I_i \leqslant T$$

$$E(X_i) + E(I_i) \leqslant E(T)$$

$$p_i + q_i \leqslant 1$$

$$\overline{p}_i + \overline{q}_i \leqslant 1$$

$$S(S_i + D_i - 2S_iD_i) \leqslant 1$$

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$$\frac{X_i}{T} = \hat{S}\hat{S}_i(\ldots$$

$$\frac{I_j}{T} = \hat{S}\hat{D}_j \ldots$$

$$\sum_{i=1}^{K} \hat{S}_i = 1 \ldots$$

$$\hat{S}_i \geq 0 \ ; \ldots$$

$$\hat{S} = (1 - \ldots$$

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3.4 Model of Solution

The model described by (3-22) can be applied to KXK tables where only the diagonal cells are a priori zero and non-diagonal cell entries denote frequencies. A matrix of this kind is commonly known as a "KXK cross-classification table" or a "KXK contingency table."[11/] In this case, the following system of equations and constraints when solved for $\hat{S}_i$ and $\hat{D}_j$ will provide estimates of the parameters S_i and D_j in (3-22).

$$\left.\begin{aligned}
&\frac{X_i}{T} = \hat{S}\hat{S}_i(1-\hat{D}_i) \qquad (i=1, 2, \ldots, k) \\
&\frac{I_j}{T} = \hat{S}\hat{D}_j(1-\hat{S}_j) \qquad (j=1, 2, \ldots, k) \qquad \text{where} \\
&\sum_{i=1}^{K} \hat{S}_i = 1 \; ; \; \sum_{j=1}^{K} D_j = 1 \\
&\hat{S}_i > 0 \; ; \; \hat{D}_j > 0 \\
&\hat{S} = (1 - \sum_{i=1}^{K} \hat{S}_i\hat{D}_i)^{-1}
\end{aligned}\right] \quad \ldots (3\text{-}25)$$

Depending on the assumption made for the values of $B_1, B_2, \ldots, B_n$ two derivation methods can be used to solve (3-25) for $\hat{S}_i$ and $\hat{D}_j$:

11/ Goodman, L.A., "A Short Computer Program for the Analysis of Transaction Flows," op. cit., p. 176.

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(1) If it is assumed that consignment sizes are equal to each other ($B_1 = B_2 = \ldots = B_n$) then the estimates obtained ($\hat{S}_i$ and $\hat{D}_j$)are the maximum likelihood estimates of S_i and D_j.

(2) When it is assumed that $B_1 \neq B_2 \neq \ldots \neq B_n$, then the derivation of estimates must be based upon the method of moments.

The system of equations given by (3-25) is based on independence assumptions (Assumption #6) of Section 3.2. Independence assumptions are necessary in order to apply (3-22) to a situation where the diagonal cells are a priori blank (zero) and non-diagonal cell entries are not frequencies.

In this study, since non-diagonal cells denote import-export data (which are not frequencies) independence assumptions must be used to arrive at (3-25). However, the import-export data in this study will not only give a matrix in which all diagonal cell entries are a priori zero, but also some non-diagonal cells are a priori zero.

For example, the existence of war between Israel and the Arab League will give a priori zero values to the corresponding nc

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sponding non-diagonal cells in the import-export matrix. In addition to war, unavailability of data for a country will also lead to a priori blank values in some non-diagonal cells of the matrix.

In short, the matrix A we are dealing with in this study is characterized by:

(1) A priori zero entries in all diagonal cells ($a_{ij} = 0 \quad i=j$).

(2) A priori blank entries in some non-diagonal cells ($a_{ij} = 0 \quad i \neq j$).

(3) Magnitudes (not frequencies) in the remaining non-diagonal cells.

The system of Equations (3-25) contain 2K+1 unknowns and 2K equations. Therefore, a direct solution technique cannot be used to solve the system simultaneously. Instead a recursive solution technique must be employed. The Savage-Deutsch recursive method[12/] does not converge on an appropriate estimate of $\hat{S}_i$ and $\hat{D}_j$ values. Goodman[13/]

12/ Savage, R.I., and Deutsch, K.W., *op. cit.*, p. 558.
13/ Goodman, L.A., "Statistical Methods for the Preliminary Analysis of Transaction Flows," *op. cit.*, p. 201.

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provides a correct version of the recursive solution which is similar to the one developed by Alker.[14/] The Goodman-Alker procedure will be used in this study to solve the system of Equations (3-25).

14/ Alker, H.R., Jr., *op. cit.*, p. 498.

3.5 Goodman

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3.5 Goodman-Alker Procedure

Let the first approximations for $\hat{S}_i$ and $\hat{D}_j$ be

$$\hat{S}_i^o = X_i/T \text{ and} \qquad \hat{D}_i^o = I_i/T \qquad \ldots\ldots\ldots\ldots (3\text{-}26)$$

In system of Equations (3-25) let

$$\pi_i^1 = \hat{S}\hat{S}_i \text{ and} \qquad \Delta_i^1 = \hat{S}\hat{D}_i \qquad \ldots\ldots\ldots\ldots (3\text{-}27)$$

As the first step, substituting (3-27) in (3-25) we get

$$\pi_i^1 = \hat{S}_i^o/(1-\hat{D}_i^o) \text{ and} \qquad \Delta_i^1 = \hat{D}_i^o/(1-\hat{S}_i^o) \qquad \ldots\ldots\ldots (3\text{-}28)$$

Since $\sum_{i=1}^{K} \pi_i^1$ and $\sum_{i=1}^{K} \Delta_i^1$ may not be equal to 1, (3-28) must be normalized to get

$$\hat{S}_i^1 = \pi_i^1 / \sum_{k=1}^{K} \pi_k^1 \text{ and} \qquad \hat{D}_i^1 = \Delta_i^1 / \sum_{k=1}^{K} \Delta_k^1 \qquad \ldots\ldots\ldots\ldots (3\text{-}29)$$

In the second iteration, solve system of Equations (3-25) for $\pi_i^2 = \hat{S}\hat{S}_i$ and $\Delta_i^2 = \hat{S}\hat{D}_i$ by using the new estimates

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$\hat{S}_i^1$ and $\hat{D}_i^1$. In other words,

$$\pi_i^2 = \hat{S}_i^o(1-\hat{D}_i^1) \quad \text{and}$$
$$\Delta_i^2 = \hat{D}_i^o(1-\hat{S}_i^1) \quad \ldots\ldots\ldots\ldots \text{(3-30)}$$

Normalizing (3-30) will give us new estimates of $\hat{S}_i$ and $\hat{D}_i$ as a result of the second iteration:

$$\hat{S}_i^2 = \pi_i^2 / \sum_{k=1}^{K} \pi_k^2 \quad \text{and}$$
$$\hat{D}_i^2 = \Delta_i^2 / \sum_{k=1}^{K} \Delta_k^2 \quad \ldots\ldots\ldots\ldots \text{(3-31)}$$

In the third iteration, again solve (3-25) for π_i^3, and Δ_i^3 by using $\hat{S}_i^2$ and $\hat{D}_i^2$, etc. The number of iterations should be continued until the desired accuracy is obtained.

The value of $\hat{S}$ need not be computed at the end of each iteration. Its value can be computed at the final iteration by using (3-7)

Once the values of $\hat{S}_i$, $\hat{D}_i$, and $\hat{S}$ are determined, the theoretical size of trade from country i to country j which is denoted by A_{ij} can be found from:

$$A_{ij} = \hat{S}\hat{S}_i\hat{D}_jT \quad \ldots\ldots\ldots\ldots \text{(3-32)}$$

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The ratio of the observed trade size (a_{ij}) to the theoretical trade size (A_{ij}) is given by (3-10) as the relative acceptance (RA_{ij}) of exports from country i to country j. Theoretically speaking, the values of RA_{ij} can range from 0 to $+\infty$.

When $RA_{ij} = 1$ in a non-diagonal cell, it should be interpreted that artificial and natural trade barriers have no effect on the size of trade, for, $RA_{ij} = 1$ iff the actual trade size is equal to the theoretical trade size determined by the size effects -- national incomes and populations of trading countries only. In other words, size effects explain 100% of the actual trade, leaving no "residual" affected by trade barriers.

The greater the value of RA_{ij}, the greater "indication [there is] that important factors [artificial and natural barriers] other than the size of trade of the originating and receiving [countries] have an influence on the observed amount of trade."15/

There are numerous ways to analyze the behavior of

15/ Savage, R.I., and Deutsch, K.W., *op. cit.*, p. 566.

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RA_{ij} values. In this study, a multiple regression model will be formed in order to test the following hypotheses:

(1) Geographic distance between two countries has a significant inverse effect on the flow size.

(2) Preferential trade arrangements between two countries have a significant positive effect on the flow size.

(3) The more favorable a country's (i) location with respect to its trading partners, and (ii) its internal transport connectivity, the greater its trade.

(4) Political hostility between two countries has a significant inverse effect on the flow size.

In Chapter 2 the effects of transportation costs, transit time, and psychic distance were combined under geographic distance. Therefore, the first hypothesis above implicitly involves cost, time, and psychic distance interaction represented in Figure 2.2.

The multiple regression model given by (2-25) is modified as follows in order to incorporate the above hypotheses:

$RA_{ij} = A_0 D_{ij}$

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$$RA_{ij} = \lambda_o D_{ij}^{-\lambda_1} S_{ij}^{\lambda_2} C_i^{-\lambda_3} W_{ij}^{-\lambda_4} \quad \ldots\ldots\ldots\ldots \quad (3\text{-}33)$$

When the RA_{ij} values are computed by applying the Goodman-Alker Procedure, the multiple regression model given by (3-33) will indicate the importance (or lack of it) of the four resistance factors in determining the size of trade flows.

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CHAPTER 4: FIRST STAGE ANALYSIS: ELIMINATION OF SIZE EFFECTS

4.1 Introduction

As should be clear from the presentation of Chapter 3, the analytic part of this study contains two distinct stages. The first stage involves the use of Goodman-Alker procedure to eliminate size effects from the actual trade flow (a_{ij}) from country i to country j. The result of this stage is a KXK matrix showing the relative acceptance values (RA_{ij}) which was defined as the ratio of the actual flow to the theoretical flow.

The second stage involves a multiple regression analysis as an attempt to explain the degree of causal relationship between RA_{ij} as the dependent variable and D_{ij}, S_{ij}, C_i, and W_{ij} as the independent variables.

In this chapter we shall present the first stage of the analysis. Chapter 5 will cover the multiple regression stage.

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4.2 Data Bank

Probably the first surprise to an analyst of international transport is learning that the flow data expressed in physical units are either entirely lacking or exist in very minute detail. There is no international body which publishes total annual trade flow data between countries expressed in metric tons or any other physical unit. Item-by-item tonnage data are available, however, for the many sections, divisions, subdivisions, groups, and basic positions of SITC (Revised) in the publications of international organizations such as OECD and UN. Undoubtedly, the problem of finding a common physical unit to aggregate commodity flows from one country to the other precludes any international organization volunteering for this venture. However, a number of countries report total tonnage outflows and inflows on a yearly basis in their annual publications. When individual country publications are consulted, the language and differences in definitions appear as insurmountable problems. A survey made at the New York Public Library, one of the UN Documents Centers, revealed that only eight c

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only eight countries among the 37 in our region have published country-to-country tonnage data for 1959 in their annual statistical papers. The remaining 29 countries either do not report total tonnage data by country, or report it by commodity groups -- by countries -- thus creating a problem of converting various physical units to their metric ton equivalents. On the other hand, when trade size is expressed in monetary units, there is an abundance of sources. This difficulty has led to an expression of a_{ij} values in U.S. dollars. When individual commodity flows will be analyzed -- in the second part of this study -- with respect to their transport policy implications, then commodity flows will be expressed in metric tons.

Tables 4.1 and 4.2 give the initial a_{ij} values for 1959 and 1968, respectively.

SOURCE: UNITED NATIONS, DIRECTION OF INTERNATIONAL TRADE, SERIES T, VOL. XI, NO. 9, NEW YORK, 1960.

Table 4.1

ACTUAL TRADE FLOWS, 1959 (MILLION U.S.$).

	AFGH	AUST	BELG	BULG	CYPR	CZEC	DENM	EGER	FEDG	FINL	FRAN	GREE	HUNG	IRAN
AFGH	0.0	.4	0.0	0.0	0.0	0.0	0.0	0.0	11.2	0.0	1.3	0.0	0.0	.1
AUST	.1	0.0	17.7	10.0	1.4	18.2	9.3	15.5	256.6	4.8	16.7	9.7	26.0	5.5
BELG	.1	25.9	0.0	4.9	2.9	14.2	54.7	8.4	442.1	21.5	294.4	20.3	7.7	14.1
BULG	0.0	6.3	1.0	0.0	0.0	44.3	.1	0.0	15.4	.7	2.8	2.1	10.1	.2
CYPR	0.0	.2	.6	0.0	0.0	.9	.7	0.0	13.5	0.0	1.3	.6	.1	0.0
CZEC	0.0	22.6	12.1	53.5	0.0	0.0	0.0	178.1	61.0	10.7	10.4	0.0	86.1	0.0
DENM	.2	6.6	17.8	.7	1.6	7.1	0.0	15.0	278.6	19.0	33.1	4.3	2.8	3.8
EGER	0.0	15.6	12.9	0.0	.1	175.0	14.9	0.0	0.0	14.3	7.1	2.8	90.6	1.6
FEDG	3.4	467.3	593.1	40.7	10.3	59.9	337.5	0.0	0.0	145.5	788.1	96.6	36.0	122.9
FINL	0.0	1.9	30.7	.3	0.0	6.1	26.9	10.6	91.2	0.0	39.5	8.2	3.3	1.5
FRAN	.6	44.6	375.9	7.6	5.1	15.4	54.9	8.3	736.3	38.3	0.0	20.6	13.6	36.5
GREE	0.0	3.5	2.4	2.0	2.4	8.2	.3	2.2	41.8	3.3	14.9	0.0	3.4	0.0
HUNG	0.0	27.7	5.6	14.2	0.0	87.8	3.0	88.2	48.7	3.9	9.7	0.0	0.0	3.6
IRAN	0.0	2.0	54.3	0.0	.2	0.0	1.5	0.0	97.7	5.3	52.3	24.5	1.8	0.0
IRAQ	0.0	0.0	23.5	0.0	0.0	.5	.5	.3	57.1	0.0	129.6	0.0	.2	2.2
IREL	0.0	.2	2.5	0.0	.1	.5	.5	.2	9.8	.2	3.4	.2	0.0	0.0
ISRA	0.0	.9	9.3	1.1	2.2	.1	2.4	.2	17.7	3.0	4.2	1.9	.6	1.3
ITAL	.5	81.6	73.4	16.8	6.7	10.4	27.1	6.3	470.5	12.5	172.6	38.3	16.3	20.8
JORD	0.0	0.0	0.0	0.0	0.0	.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LEBA	0.0	.1	.3	0.0	1.0	.2	0.0	.2	.9	0.0	1.0	.9	0.0	1.6
LIBY	0.0	0.0	.1	0.0	0.0	.1	0.0	0.0	.5	0.0	.1	.1	0.0	0.0
NETH	.4	38.5	528.7	5.3	4.1	8.3	90.8	11.4	780.2	33.7	191.1	17.2	4.6	16.7
NORW	0.0	4.5	17.0	.8	.3	5.8	53.1	6.7	119.3	13.7	25.4	2.9	1.0	1.0
PAKI	3.2	.7	13.6	0.0	.2	1.8	1.6	0.0	19.0	.4	13.6	.9	1.2	1.8
POLA	0.0	27.2	7.2	17.0	0.0	80.6	14.9	136.9	78.0	17.9	15.8	4.5	37.1	5.2
PORT	0.0	1.8	9.5	0.0	1.5	2.2	3.4	.5	24.0	.6	12.3	1.9	.2	.3
ROMA	0.0	6.6	.9	6.6	1.1	35.1	.2	35.5	24.0	1.9	14.0	4.4	22.8	0.0
SAUD	0.0	0.0	9.7	0.0	.1	0.0	0.0	0.0	110.4	0.0	68.3	3.8	0.0	0.0
SPAI	0.0	5.8	14.0	.6	.2	6.0	7.3	0.0	64.1	4.5	26.1	.7	2.2	.7
SWED	0.0	12.6	84.1	1.8	1.9	10.8	142.6	20.7	333.3	73.2	84.2	11.2	4.8	7.8
SWIT	.5	51.5	64.1	2.3	2.1	15.7	27.9	6.0	290.0	19.1	116.6	11.2	7.7	9.4
SYRI	0.0	0.0	1.2	1.3	0.0	3.4	.4	.4	2.5	0.0	16.1	0.0	.6	.7
TURK	0.0	5.3	7.5	1.2	.4	11.7	4.4	8.7	79.6	7.8	16.5	3.1	6.5	0.0
UARE	0.0	7.8	4.1	3.9	.1	46.6	1.2	30.2	21.9	.8	9.1	3.1	7.2	.2
U.K.	1.4	48.4	182.1	6.3	38.2	22.6	250.2	11.7	444.1	107.7	240.7	48.0	11.8	107.8
USSR	28.4	39.8	27.3	289.9	0.0	603.0	26.6	1030.1	89.3	144.5	87.8	16.0	259.8	18.0
YUGO	0.0	21.0	4.7	8.0	.7	16.4	1.3	26.7	44.8	.3	11.6	14.4	13.1	1.0
REST	20.5	165.7	1232.9	7.9	30.2	283.0	440.9	21.5	3356.9	124.6	2556.5	190.3	110.4	140.5
TOTL	59.3	1144.6	3441.8	504.7	115.1	1602.5	1601.1	1680.5	8532.0	833.7	5088.2	564.7	789.6	526.8

SOURCE, UNITED NATIONS, DIRECTION OF INTERNATIONAL TRADE, SERIES T, VOL. XI, NO. 9, NEW YORK, 1960.

121.1	159.0	221.9	1124.3	111.1	1103.9	113.6	1265.8	1316.1	353.0	1419.6	471.5	[illegible]
325.9	595.1	[illegible]	1140.7		1193.3		1919.4					

Table 4.1 (Continued)

IRAQ	IREL	ISRA	ITAL	JORD	LEBA	LIBY	NETH	NORW	PAKI	POLA	PORT	ROMA	SAUD
0.0	0.0	0.0	.2	0.0	0.0	0.0	.1	0.0	9.3	0.0	0.0	0.0	0.0
2.1	1.2	2.3	159.2	.8	3.2	.6	26.6	7.7	2.1	20.0	3.7	5.2	.7
11.6	11.9	9.9	86.3	2.2	9.3	.7	700.2	34.7	8.8	14.2	31.2	3.0	3.1
.7	0.0	1.5	7.1	0.0	0.0	0.0	1.6	.2	0.0	22.1	0.0	5.0	0.0
.1	.2	.4	2.2	.2	.7	.1	5.2	.4	0.0	0.0	0.0	.2	0.0
0.0	0.0	0.0	16.5	0.0	0.0	0.0	17.4	0.0	0.0	114.9	0.0	60.6	0.0
1.9	4.3	2.4	59.4	.7	3.0	.7	29.5	63.2	.8	13.8	2.4	.6	1.4
1.5	1.3	0.0	5.9	2.2	1.3	0.0	15.5	8.3	0.0	187.3	.3	44.8	0.0
30.6	28.5	45.7	524.5	11.9	28.6	11.3	825.4	246.8	46.7	70.0	81.7	16.4	16.2
0.0	7.3	8.0	14.7	0.0	0.0	0.0	42.0	5.9	.2	17.8	.6	2.1	0.0
1.9	8.1	26.4	267.3	2.3	28.5	7.3	144.5	39.1	10.6	14.3	38.8	8.9	3.1
1.3	.4	1.0	15.1	.1	.6	.5	6.5	.9	0.0	4.2	1.0	1.9	.3
0.0	0.0	0.0	17.9	0.0	0.0	0.0	10.2	0.0	0.0	39.0	0.0	18.1	0.0
1.9	.3	.3	31.7	0.0	1.1	0.0	16.6	1.0	22.1	1.0	3.4	0.0	0.0
0.0	2.0	0.0	79.0	0.0	5.7	.3	27.5	0.0	.2	.3	15.6	.1	1.7
0.0	0.0	.1	2.2	0.0	.1	.3	3.1	.1	.4	0.0	.5	0.0	0.0
0.0	.1	0.0	4.5	0.0	0.0	0.0	7.9	2.3	0.0	1.2	0.0	1.9	0.0
2.5	3.5	12.9	0.0	7.9	18.8	21.4	76.0	21.5	9.7	16.5	18.4	8.1	6.8
.5	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	.4	0.0	0.0	1.0
3.1	0.0	0.0	1.4	3.8	0.0	0.0	.3	0.0	0.0	.1	0.0	0.0	5.5
0.0	0.0	0.0	3.2	0.0	0.0	0.0	.6	0.0	0.0	0.0	0.0	0.0	0.0
8.5	16.9	19.0	97.4	3.4	7.1	3.7	0.0	79.2	6.9	14.3	16.0	2.5	9.2
.9	.9	2.0	22.8	.1	.6	0.0	26.4	0.0	1.5	4.5	3.2	2.8	.3
4.1	2.0	0.0	9.6	0.0	.4	.1	7.5	.1	0.0	3.7	2.6	0.0	.8
0.0	0.0	.9	20.6	0.0	0.0	0.0	10.1	4.2	1.0	0.0	1.4	17.7	0.0
.7	.9	1.9	11.5	.2	1.5	.2	8.5	2.8	.2	1.1	0.0	.5	0.0
.4	0.0	1.9	9.4	.5	1.9	0.0	2.1	2.4	0.0	22.0	0.0	0.0	0.0
0.0	3.6	0.0	110.0	1.5	15.4	0.0	21.2	0.0	4.0	0.0	0.0	0.0	0.0
.6	1.7	0.0	16.7	.3	1.5	.2	19.4	10.5	.1	5.7	7.3	.3	.2
5.6	7.6	5.2	73.7	1.2	4.7	.1	107.8	219.1	1.8	20.7	10.2	1.1	1.3
4.3	2.1	6.7	138.1	.7	5.3	.4	66.6	19.4	4.0	13.1	18.0	7.4	3.5
3.3	0.0	0.0	5.8	6.6	14.7	0.0	.3	0.0	0.0	0.0	0.0	.8	5.7
2.6	.4	8.9	29.4	1.6	13.7	.4	6.8	.5	0.0	7.5	0.0	.5	0.0
.3	.1	0.0	21.0	1.4	7.1	1.2	8.9	.5	0.0	16.5	1.1	8.3	7.5
89.3	320.8	45.9	216.4	16.2	27.3	23.5	338.5	168.5	97.0	46.4	63.2	6.6	19.5
23.3	0.0	0.0	78.0	0.0	3.3	0.0	66.7	17.7	1.0	486.4	1.3	232.4	0.0
1.1	0.0	3.4	57.7	.8	2.2	.7	6.1	5.5	1.1	33.9	0.0	1.8	.3
121.1	169.0	221.9	1124.3	44.5	110.6	39.9	1285.8	353.6	123.5	206.7	151.6	42.4	98.7
325.9	595.1	428.6	3340.7	111.1	319.3	113.6	3939.4	1316.1	353.0	1419.6	473.5	502.0	186.8

Table 4.1 (Continued)

SPAI	SWED	SWIT	SYRI	TURK	UARE	U.K.	USSR	YUGO	REST	TOTL
0.0	.3	1.0	0.0	0.0	0.0	7.0	15.6	0.0	28.5	75.0
8.1	22.4	43.9	2.5	9.9	4.5	24.9	33.6	27.2	163.8	967.7
25.9	90.9	91.2	6.2	11.0	7.5	194.9	7.5	8.0	1013.7	3295.1
.2	.7	.9	.9	.7	3.6	4.4	260.8	4.7	3.9	402.0
0.0	.6	.1	.1	.3	.1	18.0	0.0	.2	6.2	53.2
0.0	0.0	36.1	0.0	17.1	25.8	35.6	587.4	21.9	359.4	1727.2
7.2	101.4	19.2	1.1	3.3	1.9	364.7	14.9	2.3	305.8	1396.5
0.0	13.6	5.2	1.9	11.1	25.5	12.9	889.5	28.9	38.8	1630.8
103.2	544.5	573.8	23.8	113.2	77.7	395.7	91.1	99.3	3101.7	9809.6
1.6	22.7	3.3	.9	1.6	3.3	188.6	140.0	1.2	153.1	835.1
60.1	99.4	229.8	13.4	27.9	17.8	250.7	90.1	12.9	2854.1	5615.0
.2	2.1	2.2	.4	.5	1.9	19.0	11.8	10.4	37.6	204.3
0.0	5.6	21.9	0.0	5.4	12.8	12.8	204.4	31.5	94.1	766.1
26.9	23.8	4.7	1.0	3.0	.3	160.2	18.7	0.0	369.4	927.0
21.8	0.0	0.0	1.6	0.0	.4	107.0	2.5	2.2	124.7	606.5
1.2	2.7	.4	.1	0.0	.1	267.3	.1	0.0	67.0	363.3
.3	4.1	9.7	0.0	9.0	0.0	33.8	.1	5.4	54.1	179.3
21.8	68.1	209.9	11.3	39.9	27.1	217.0	43.6	65.8	1012.7	2895.0
0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	1.8	1.3	8.7
0.0	0.0	.7	6.6	.2	.7	1.4	2.1	.3	11.7	44.1
0.0	0.0	0.0	0.0	0.0	4.7	1.1	.4	.1	.5	11.5
20.3	151.0	85.1	7.2	13.3	8.6	387.0	12.0	12.5	894.9	3607.0
11.0	77.7	11.0	.3	1.4	1.1	165.4	16.2	1.4	207.2	810.2
4.0	2.2	.2	0.0	.8	.9	59.0	3.5	1.7	158.9	320.1
5.0	20.1	11.7	0.0	5.9	6.0	86.7	313.0	20.7	177.8	1145.1
2.9	6.4	3.4	.5	.7	.4	32.7	1.6	0.0	153.3	290.1
0.0	.7	4.2	0.0	1.3	12.2	8.6	250.2	4.1	46.8	521.8
65.1	12.3	0.0	1.5	9.1	16.9	15.0	0.0	0.0	365.0	832.9
0.0	10.1	16.1	.5	1.5	18.8	78.9	4.2	2.8	173.2	502.8
13.9	0.0	27.5	3.6	10.2	5.5	331.2	39.2	7.9	517.7	2205.8
29.0	46.8	0.0	4.1	8.8	14.6	96.4	4.4	13.5	561.7	1693.0
0.0	0.0	0.0	0.0	0.0	0.0	4.3	4.3	.5	26.7	99.6
2.6	1.1	8.7	4.4	0.0	1.6	34.0	4.8	3.6	69.3	355.1
5.7	.8	10.9	0.0	.5	0.0	12.1	81.4	10.2	111.3	443.0
69.0	323.4	151.1	18.7	45.0	38.9	0.0	97.6	32.0	5901.0	9676.8
2.9	44.4	4.5	15.2	5.6	88.0	165.7	0.0	46.3	1497.6	5440.8
.9	3.8	10.1	0.0	1.9	14.6	34.0	47.2	0.0	85.5	476.6
283.8	701.4	325.5	48.3	82.5	172.0	7344.3	1779.5	205.8	0.0	23718.5
794.6	2405.1	1924.0	178.1	442.6	615.8	11172.3	5073.3	687.1	20750.0	83952.2

Table 4.2

ACTUAL TRADE FLOWS, 1968 (MILLION U.S.$).

	AFGH	AUST	BELG	BULG	CYPR	CZEC	DENM	EGER	FEDG	FINL	FRAN	GREE	HUNG	IRAN
GH	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.4	0.0	.9	0.0	0.0	.7
ST	.2	0.0	24.8	25.1	1.5	46.4	36.5	25.8	465.1	16.7	45.1	19.7	52.0	12.3
LG	0.0	47.6	0.0	8.7	3.3	20.8	79.2	14.8	1709.5	30.1	1515.2	44.2	11.4	23.6
LG	0.0	10.8	2.8	0.0	1.2	77.0	2.0	132.0	47.8	1.1	11.0	17.6	32.0	2.4
PP	0.0	.4	1.0	.8	0.0	.9	.6	1.1	16.7	.5	2.5	1.8	0.0	0.0
EC	0.0	41.8	13.5	92.0	1.9	0.0	16.5	319.0	103.7	9.4	26.7	12.4	152.0	13.9
NM	0.0	36.6	45.1	3.8	3.0	9.9	0.0	20.6	319.4	52.6	70.4	7.7	6.0	11.9
ER	0.0	20.7	26.4	125.0	.9	317.0	17.4	0.0	0.0	13.2	32.4	9.2	184.0	2.0
DG	6.5	1106.2	1864.0	75.9	11.4	176.8	605.1	0.0	0.0	237.8	3062.5	251.7	84.6	283.1
NL	0.0	9.1	40.5	3.2	1.3	8.9	59.5	11.3	172.1	0.0	65.5	15.3	6.3	6.7
AN	2.7	90.6	1289.0	45.3	7.9	38.3	121.8	26.3	2357.3	57.8	0.0	96.1	30.8	84.0
EE	0.0	5.8	15.3	10.9	4.5	8.7	1.0	8.0	91.7	1.4	33.7	0.0	7.8	.5
NG	0.0	36.5	10.9	31.0	0.0	153.0	6.0	164.0	70.0	4.9	22.0	7.9	0.0	8.4
AN	4.1	.9	13.9	1.2	0.0	5.7	7.5	2.5	42.4	8.3	37.5	5.8	4.7	0.0
AQ	0.0	0.0	45.5	.2	0.0	.6	0.0	.1	35.4	.1	218.9	22.8	0.0	2.7
EL	0.0	.8	12.4	0.0	0.0	.5	1.4	.2	19.5	.5	23.9	0.0	0.0	.2
RA	0.0	6.7	40.1	.9	3.5	.1	4.6	0.0	57.9	4.7	30.5	8.8	7.6	16.6
AL	1.4	174.0	422.7	48.7	14.5	55.4	104.8	23.3	1901.6	34.2	1280.0	146.6	60.4	76.1
RD	0.0	0.0	0.0	0.0	0.0	.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BA	0.0	1.4	25.3	0.0	1.7	0.0	2.4	0.0	6.7	.2	3.3	1.1	0.0	4.7
HY	0.0	0.0	60.4	0.0	0.0	0.0	18.4	0.0	396.5	0.0	197.1	.2	0.0	0.0
TH	1.4	85.4	1192.9	10.2	4.7	29.6	116.6	27.4	2318.2	44.7	877.7	45.4	13.5	37.8
RW	0.0	10.4	32.8	.4	3.5	7.3	136.8	10.1	254.3	34.6	47.8	50.7	3.9	3.4
KI	8.7	1.0	26.1	3.8	0.0	7.4	1.3	.3	28.9	.1	20.8	1.5	2.8	5.3
LA	0.0	36.8	17.1	51.0	.6	203.0	37.6	176.0	108.0	23.4	39.4	15.4	113.0	12.4
RT	0.0	10.9	14.1	.3	1.8	1.9	18.6	.5	42.8	7.3	33.2	2.9	0.0	.8
MA	0.0	19.8	6.7	21.0	1.4	87.0	1.5	70.0	93.7	3.6	40.0	13.7	38.0	15.4
UD	0.0	0.0	55.7	0.0	0.0	0.0	13.9	0.0	207.0	0.0	68.8	29.3	0.0	0.0
AI	0.0	4.7	28.0	7.4	.6	9.9	20.0	6.1	164.3	5.2	139.2	4.8	7.8	2.2
ED	0.0	55.1	151.3	9.1	4.2	20.8	467.7	41.2	575.1	232.1	229.9	26.3	13.1	17.8
IT	2.7	196.0	97.4	11.8	1.3	25.9	85.4	16.3	573.2	39.2	348.2	26.7	19.3	26.5
RI	0.0	0.0	.8	0.0	0.0	1.6	1.2	1.0	5.6	0.0	8.8	0.0	1.8	.1
RK	0.0	6.2	16.5	5.5	0.0	13.7	6.6	11.7	86.4	.4	21.8	3.7	12.3	7.3
RE	0.0	3.8	4.4	6.9	0.0	32.7	1.4	22.6	24.3	2.6	12.5	7.7	6.6	0.0
K.	2.5	127.1	582.5	9.7	55.7	44.8	392.3	30.0	870.2	191.7	607.0	97.7	30.5	146.4
SR	0.0	52.6	59.5	1841.0	3.6	2028.0	26.3	3112.0	264.7	236.6	164.6	24.4	1344.0	38.8
GO	0.0	44.6	10.5	27.9	1.4	54.9	4.5	54.5	121.4	.5	29.3	34.7	28.9	7.7
ST	47.2	252.5	2082.3	113.4	34.8	202.7	806.9	177.1	6732.4	296.9	4617.4	339.5	39.0	522.3
TL	77.4	2496.8	8332.2	2592.1	170.2	3691.6	3223.3	4505.8	20295.2	1592.4	13985.5	1393.3	2314.1	1394.0

Table 4.2 (Continued)

IRAQ	IREL	ISPA	ITAL	JORD	LEBA	LIBY	NETH	NORW	PAKI	POLA	PORT	ROMA	SAUD
0.0	0.0	0.0	.6	0.0	0.0	0.0	.2	0.0	25.2	0.0	0.0	0.0	0.0
4.5	2.5	6.2	205.0	.8	6.8	4.0	61.6	21.4	1.6	39.0	14.3	37.2	4.1
12.5	16.5	42.4	309.1	2.8	13.0	12.7	1718.1	68.4	12.3	22.8	30.0	19.7	16.6
5.3	0.0	1.8	43.9	0.0	0.0	7.6	2.5	.4	3.9	54.0	.2	18.0	0.0
0.0	0.0	.9	4.5	0.0	1.1	1.1	4.8	0.0	0.0	.7	0.0	1.0	0.0
6.6	2.2	1.5	57.8	2.2	0.0	4.8	24.3	10.2	4.5	235.0	2.1	90.0	0.0
3.8	10.1	5.3	99.4	1.0	6.4	3.7	67.8	190.0	2.1	26.6	11.0	3.5	6.4
3.4	2.1	0.0	26.1	.9	0.0	0.0	37.1	9.8	.7	285.0	.5	90.0	0.0
20.2	89.1	120.0	1893.5	14.9	51.4	56.3	2531.2	356.7	104.5	146.3	184.1	185.2	61.7
1.4	13.7	7.4	49.3	0.0	1.6	0.0	75.3	42.9	.8	19.8	3.8	2.6	0.0
20.1	33.0	99.1	1169.7	8.4	74.7	30.4	645.0	77.4	47.1	83.2	91.5	76.1	19.2
1.5	.4	3.0	62.4	0.0	5.7	5.0	19.5	1.4	0.0	5.9	4.0	5.9	.9
3.7	0.0	4.8	57.5	1.0	0.0	3.6	16.1	6.6	3.7	102.0	0.0	37.0	0.0
6.1	1.8	.7	36.7	0.0	4.8	0.0	57.6	4.9	44.8	7.0	.8	6.6	0.0
0.0	13.0	0.0	245.7	1.9	23.6	0.0	70.7	7.0	.7	.8	18.1	0.0	7.4
.1	0.0	.4	4.0	0.0	.6	.5	11.1	1.1	0.0	1.4	.5	0.0	.4
0.0	1.4	0.0	8.5	0.0	0.0	0.0	32.2	3.0	0.0	0.0	.6	10.0	0.0
21.9	14.5	54.4	0.0	5.7	51.1	176.3	471.7	49.5	30.2	88.5	80.3	82.1	32.8
5.0	0.0	0.0	.1	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4
11.0	3.0	0.0	5.9	8.7	0.0	13.4	27.9	.7	0.0	0.0	.1	0.0	0.0
0.0	1.6	0.0	409.9	0.0	.2	0.0	146.8	21.6	0.0	0.0	0.0	2.3	0.0
4.8	30.2	29.7	400.7	4.3	13.9	18.2	0.0	82.8	12.5	26.3	27.1	24.5	20.1
1.0	6.0	22.2	63.6	0.0	.9	.9	54.6	0.0	.8	11.8	9.5	.4	.9
3.5	2.7	0.0	19.3	0.0	0.0	0.0	13.3	.3	0.0	16.5	5.4	5.5	11.1
4.6	10.8	.7	74.2	1.1	0.0	7.4	20.1	17.3	24.1	0.0	3.0	47.0	0.0
1.3	2.1	1.9	16.8	0.0	2.1	0.0	16.1	9.7	1.0	1.8	0.0	1.6	.8
5.1	1.2	8.8	71.1	2.7	0.0	8.1	9.6	.9	5.4	50.0	4.6	0.0	0.0
0.0	7.0	0.0	181.3	5.3	0.0	0.0	85.5	10.6	.8	0.0	0.0	0.0	0.0
1.3	5.1	2.6	44.6	0.0	5.1	5.0	78.1	12.5	.6	11.8	46.7	11.7	1.5
12.0	22.3	13.8	154.5	2.0	5.3	3.8	227.0	514.1	6.9	37.9	30.0	21.7	7.4
9.1	7.9	29.7	352.0	1.5	15.8	12.5	103.5	44.0	13.7	17.4	42.7	22.7	10.4
5.9	0.0	0.0	8.4	7.1	37.4	.9	2.3	0.0	0.0	4.3	0.0	3.2	3.7
.4	.9	5.1	24.1	.4	23.2	.8	15.3	1.7	.3	7.8	6.7	9.1	.1
8.4	0.0	0.0	20.9	2.1	5.2	4.9	5.1	.5	.2	20.0	0.0	17.6	6.7
38.3	654.0	210.8	426.3	19.8	50.4	83.4	613.3	305.9	113.7	106.8	145.8	76.7	112.9
31.7	6.0	0.0	256.1	3.7	0.0	4.2	48.6	24.3	32.8	2082.0	2.4	873.0	0.0
3.4	0.0	9.6	176.5	.7	2.9	6.8	15.4	4.5	23.2	37.0	0.0	22.2	2.1
145.5	213.0	398.8	3272.3	60.1	-211.2	167.7	1962.0	803.4	474.4	357.1	273.1	138.6	180.3
403.4	1174.1	1081.6	10252.3	159.1	195.1	644.0	9291.3	2705.5	992.5	3906.5	1038.9	1942.7	511.9

Table 4.2 (Continued)

SPAI	SWED	SWIT	SYRI	TURK	UARE	U.K.	USSR	YUGO	REST	TOTL
0.0	0.0	1.8	0.0	0.0	0.0	11.7	0.0	0.0	23.8	76.3
13.5	73.3	182.6	4.3	11.5	2.5	126.1	68.4	76.3	249.6	1988.3
67.5	140.8	163.1	5.2	18.5	6.4	357.0	47.5	20.4	1531.3	8163.0
6.2	2.6	4.2	4.2	5.8	10.1	16.2	865.0	20.4	48.1	1458.1
4.4	.6	.4	0.0	0.0	0.0	32.9	4.4	.5	4.6	88.2
6.6	20.8	25.8	32.9	11.2	21.6	50.0	1012.0	92.7	170.2	2687.8
20.9	394.5	61.9	1.8	6.8	2.1	544.0	18.9	7.6	555.0	2637.6
3.2	32.5	7.8	4.7	12.0	24.2	38.1	1571.0	63.7	120.9	3086.9
450.9	963.6	1428.4	22.1	172.6	65.0	1006.7	273.4	340.2	6579.5	24884.1
14.0	171.5	18.6	.8	2.3	3.5	336.5	251.4	.9	217.4	1635.2
336.0	205.9	608.4	23.6	26.3	64.0	604.8	256.5	64.6	3794.8	12707.7
6.6	7.5	4.7	0.0	.4	6.5	19.4	24.4	22.5	71.0	467.9
3.3	13.9	15.4	2.9	16.9	5.3	21.6	683.0	47.7	163.7	1724.2
11.8	10.4	7.2	0.0	0.0	0.0	322.3	31.4	5.5	1175.1	1870.0
43.3	4.1	0.0	19.5	23.6	6.3	47.2	4.3	11.8	159.5	1039.8
5.6	3.9	2.2	0.0	.2	.2	553.8	.8	1.3	149.6	797.1
5.6	9.5	29.9	0.0	3.6	0.0	70.6	0.0	11.4	272.2	640.5
210.3	161.5	457.1	23.3	79.1	34.7	449.5	179.0	286.6	2775.1	10158.9
0.0	0.0	0.0	2.3	1.2	0.0	0.0	0.0	2.6	20.2	39.3
2.7	2.2	1.6	14.2	4.6	2.0	9.2	0.0	1.8	39.3	195.1
108.5	.8	16.3	.2	6.6	.6	344.5	0.0	3.6	131.2	1867.4
95.2	230.8	171.1	6.0	17.3	11.6	712.4	46.8	26.5	1521.2	8339.5
19.6	293.7	21.6	0.0	2.6	1.1	373.2	19.0	4.2	433.3	1936.9
8.8	3.8	2.3	0.0	5.0	4.4	83.7	14.0	8.4	404.3	720.3
15.2	36.6	10.7	4.6	7.8	15.7	130.7	1042.0	40.2	247.2	2594.7
11.5	38.8	13.6	.1	3.3	.2	146.8	0.0	.4	326.3	731.3
10.9	6.3	5.4	7.9	8.0	38.6	55.9	456.0	19.9	58.2	1246.4
155.1	29.1	0.0	.4	10.3	.9	148.6	0.0	0.0	797.3	1806.9
0.0	48.6	35.2	5.4	2.5	23.2	162.0	17.8	5.6	662.3	1589.4
75.4	0.0	118.1	3.6	10.7	7.2	726.7	78.8	22.0	988.9	4934.8
94.9	138.7	0.0	6.0	18.3	6.2	300.5	27.2	41.8	1250.5	4036.9
2.6	0.0	.9	0.0	7.3	6.6	.7	19.6	.2	36.1	168.1
9.6	3.2	26.8	1.2	0.0	1.6	33.9	29.9	5.5	96.3	496.0
15.1	1.9	6.2	5.0	.7	0.0	14.8	174.7	12.0	174.5	622.0
275.9	630.7	327.1	12.0	84.1	29.9	0.0	249.5	59.9	7530.5	15346.8
17.1	96.1	12.3	25.6	27.5	95.6	341.5	0.0	169.3	272.9	13618.8
8.0	17.7	28.0	1.5	3.8	27.7	60.5	207.0	0.0	178.2	1257.5
1384.3	1323.0	703.2	70.6	153.1	134.2	10704.6	345.8	296.3	0.0	39614.6
3522.2	5113.8	4519.9	311.9	770.5	665.7	18958.6	8019.5	1794.3	33230.1	177274.3

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4.3 Relationship between Value and Weight

In order to find the degree of association between value (expressed in U.S. dollars) and weight (expressed in metric tons) of country-to-country trade flows, simple correlation coefficients are computed for the set of eight countries for which published weight data are available for 1959.[1/] Tables 4.3 through 4.10 give the value and weight data for the eight countries. Although the eight countries are not drawn randomly from the population of 37 countries, the sample set can be considered representative of the region because it includes at least one from the industrially developed countries, the Communist Bloc, and the developing countries.

The descriptive statistics at the bottom of Tables 4.3 through 4.10 give some insight as to the distribution of value and weight figures. First, as expected, the more industrially advanced the country, the greater the average value and weight of its trade. This is true because a

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1/ For this computation Michigan State University, Agricultural Experiment Station's BASTAT Routine (Description #5) is used on the same University's CDC3600.

Table 4.3:

Destination
Afghanistar
Austria
Bulgaria
Cyprus
Czechoslov
Denmark
Eastern Ge
Federal Ge
Finland
France
Greece
Hungary
Iran
Iraq
Ireland
Israel
Italy
Jordan
Lebanon
Libya
Netherlar
Norway
Pakistan
Poland
Portugal
Spain
Sweden
Switzerla
Syria
Turkey
U.A.R.
U.K.
U.S.S.R
Yugosla
Descri
Total
Mean
Skewne
Kurtos

Source

Trade,

1960.

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Table 4.3: Exports from Belgium to Selected Countries, 1959

Destination Country	Value (Mil. US $)	Weight (Metric tons)
Afghanistan	.1	0
Austria	25.9	145,230
Bulgaria	4.9	10,556
Cyprus	2.9	0
Czechoslovakia	14.2	29,241
Denmark	54.7	516,355
Eastern Germany	8.4	77,605
Federal Germany	442.1	3,357,017
Finland	21.5	196,232
France	294.4	4,057,045
Greece	20.3	176,735
Hungary	7.7	40,475
Iran	14.1	71,807
Iraq	11.6	74,869
Ireland	11.9	229,344
Israel	9.9	26,423
Italy	86.3	562,303
Jordan	2.2	0
Lebanon	9.3	37,237
Libya	.7	0
Netherlands	700.2	8,047,297
Norway	34.7	240,866
Pakistan	8.8	73,267
Poland	14.2	63,574
Portugal	31.2	225,981
Spain	25.9	185,297
Sweden	90.9	675,748
Switzerland	91.2	1,180,956
Syria	6.2	52,279
Turkey	11.0	53,144
U.A.R.	7.5	42,395
U.K.	194.9	1,384,386
U.S.S.R.	7.5	27,587
Yugoslavia	8.0	71,467
Descriptive Statistics		
Total	2,275.3	21,932,718
Mean	68.5	645,080
Skewness	3.20	3.55
Kurtosis	13.08	15.76

Source: Value figures are from U.N., Direction of International Trade, Statistical Papers Series T, Vol. XI, No. 9, New York, 1960. Weight figures are from Royaume de Belgique, Ministère des Affaires Économiques, Institut National de Statistique; Annuaire Statistique de la Belgique et du Congo Belge; 1959, Bruxelles, undated.

Table 4.4: Exports from Federal Germany to Selected Countries, 1959

Destination Country	Value (Mil. US $)	Weight (Metric tons)
Austria	467.3	2,661,481
Belgium	593.1	8,746,717
Denmark	337.5	1,971,027
Finland	145.5	406,429
France	788.1	11,428,778
Iran	122.9	240,296
Italy	524.5	4,103,872
Netherlands	825.4	12,437,395
Norway	246.8	551,906
Spain	103.2	444,824
Sweden	544.5	2,043,490
Switzerland	573.8	2,834,656
Turkey	113.2	275,409
U.K.	395.7	910,495
U.S.S.R.	91.1	208,702
Descriptive Statistics		
Total	5,872.6	49,265,477
Mean	391.5	3,284,365
Skewness	.26	1.34
Kurtosis	1.85	3.28

Source: Value figures are from U.N., Direction of International Trade, Statistical Papers Series T, Vol. XI, No. 9, New York, 1960. Weight figures are from Bundesrepublik Deutschland, Statistisches Bundesamt, Statistiches Jahrbuch Für Die Bundesrepublik Deutschland, 1960, Wiesbaden, 1960.

Table 4.

Destina
Afghani
Austria
Belgiun
Bulgari
Cyprus
Czecho
Denma
Easter
Federa
Finland
France
Hungar
Iran
Iraq
Ireland
Israel
Italy
Jordan
Lebano
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Table 4.5: Exports from Greece to Selected Countries, 1959

Destination Country	Value (Mil. US $)	Weight (Metric tons)
Afghanistan	0	0
Austria	3.5	125,783
Belgium	2.4	9,443
Bulgaria	2.0	4,696
Cyprus	2.4	3,654
Czechoslovakia	8.2	54,901
Denmark	.3	646
Eastern Germany	2.2	12,016
Federal Germany	41.8	457,887
Finland	3.3	8,306
France	14.9	80,038
Hungary	3.4	6,524
Iran	0	13
Iraq	1.3	22,985
Ireland	.4	1,627
Israel	1.0	10,040
Italy	15.1	47,910
Jordan	.1	0
Lebanon	.6	1,969
Neterhlands	6.5	110,227
Norway	.9	38,817
Pakistan	0	1,517
Poland	4.2	16,369
Portugal	1.0	5,384
Romania	1.9	8,641
Spain	.2	15,333
Sweden	2.1	15,367
Switzerland	2.2	5,421
Syria	.4	1,928
Turkey	.5	3,165
U.A.R.	1.9	5,249
U.K.	19.0	199,602
U.S.S.R.	11.8	476,710
Yugoslavia	10.4	36,045
Descriptive Statistics		
Total	165.9	1,788,213
Mean	4.9	52,595
Skewness	3.07	3.01
Kurtosis	13.54	11.17

Source: Value figures are from U.N., Direction of International Trade, Statistical Papers Series T, Vol. XI, No. 9, New York, 1960. Weight figures are from Royaume de Grece, Office National de Statistique, Bulletin Mensuel De Statistique Du Commerce Exterieur Athènes, Nov. 1968.

Table 4.6: Exports from Lebanon to Selected Countries, 1959

Destination Country	Value (Mil. US $)	Weight (Metric tons)
Afghanistan	0	159
Austria	.1	9,022
Belgium	.3	5,042
Bulgaria	0	3,242
Cyprus	1.0	8,711
Czechoslovakia	.2	4,652
Denmark	0	8,244
Eastern Germany	.2	3,389
Federal Germany	.9	24,045
Finland	0	0
France	1.0	9,842
Greece	.9	2,082
Hungary	0	338
Iran	1.6	1,104
Iraq	3.1	14,544
Ireland	0	184
Israel	0	0
Italy	1.4	16,759
Jordan	3.8	0
Libya	0	649
Netherlands	.3	8,878
Norway	0	1,340
Pakistan	0	67
Poland	.1	839
Portugal	0	3,011
Romania	0	2,590
Spain	0	2,561
Sweden	0	8,364
Switzerland	.7	15,127
Syria	6.6	105,230
Turkey	.2	848
U.A.R.	.7	9,669
U.K.	1.4	210,141
U.S.S.R.	2.1	6,722
Yugoslavia	.3	2,294
Descriptive Statistics		
Total	26.9	489,689
Mean	.8	13,991
Skewness	2.79	4.32
Kurtosis	11.35	21.36

Source: Value figures are from U.N., Direction of International Trade, Statistical Papers Series T, Vol. XI, No. 9, New York, 1960. Weight figures are from Direction Centrale de la Statistique au Ministère du Plan, Statistique du Commerce Exterieur du Liban, Vol. 1, Sept. 1965.

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Table 4.7: Exports from Syria to Selected Countries, 1959

Destination Country	Value (Mil. US $)	Weight (Metric tons)
Afghanistan	0	6
Austria	0	29
Belgium	1.2	3,996
Bulgaria	1.3	2,517
Cyprus	0	704
Czechoslovakia	3.4	11,129
Denmark	.4	6,051
Eastern Germany	.4	924
Federal Germany	2.5	10,735
Finland	0	0
France	16.1	31,001
Greece	0	2
Hungary	.6	1,002
Iran	.7	122
Iraq	3.3	12,831
Ireland	0	0
Israel	0	0
Italy	5.8	11,241
Jordan	6.6	75,686
Lebanon	14.7	104,528
Libya	0	24
Netherlands	.3	1,529
Norway	0	1
Pakistan	0	0
Poland	0	2,642
Portugal	0	0
Romania	.8	1,211
Spain	0	11,355
Sweden	0	45
Switzerland	0	231
Turkey	0	823
U.K.	4.3	31,928
U.S.S.R.	4.3	7,529
Yugoslavia	.5	1,065
Descriptive Statistics		
Total	67.2	330,891
Mean	2.0	9,732
Skewness	2.64	3.23
Kurtosis	9.46	12.99

Source: Value figures are from U.N., Direction of International Trade, Statistical Papers Series T, Vol. XI, No. 9, New York, 1960. Weight figures are from U.A.R. (Syrian Region), Ministère Des Finances, Statistiques Du Commerce Exterieur, Annee 1959, Damas, 1960.

Table 4.8

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Table 4.8: Exports from Turkey to Selected Countries, 1959

Destination Country	Value (Mil. US $)	Weight (Metric tons)
Afghanistan	0	0
Austria	5.3	25,725
Belgium	7.5	42,420
Bulgaria	1.2	3,369
Cyprus	.4	1,837
Czechoslovakia	11.7	42,258
Denmark	4.4	61,521
Eastern Germany	8.7	32,411
Federal Germany	79.6	557,466
Finland	7.8	44,199
France	16.5	157,104
Greece	3.1	32,928
Hungary	6.5	18,885
Iran	0	17
Iraq	2.6	39,073
Ireland	.4	1,419
Israel	8.9	97,946
Italy	29.4	259,966
Jordan	1.6	8,117
Lebanon	13.7	78,826
Libya	.4	3,039
Netherlands	6.8	46,236
Norway	.5	3,914
Pakistan	0	0
Poland	7.5	11,466
Portugal	0	76
Romania	.5	4,848
Saudia Arabia	0	5
Spain	2.6	45,502
Sweden	1.1	8,840
Switzerland	8.7	23,252
Syria	4.4	38,859
U.A.R.	1.6	19,395
U.K.	34.0	91,092
U.S.S.R.	4.8	6,551
Yugoslavia	3.6	19,480
Descriptive Statistics		
Total	285.8	1,828,042
Mean	7.9	50,779
Skewness	3.74	3.93
Kurtosis	18.25	19.36

Source: Value figures are from U.N., Direction of International Trade, Statistical Papers Series T, Vol. XI, No. 9, New York, 1960. Weight figures are from Institut National de la Statistique, Annuaire Statistique de la Turquie, No. 510, Ankara, undated.

Table 4.9:

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Table 4.9: Exports from U.A.R. (Egypt) to Selected Countries, 1959

Destination Country	Value (Mil. US $)	Weight (Metric tons)
Afghanistan	0	0
Austria	7.8	39,173
Belgium	4.1	41,268
Bulgaria	3.9	4,486
Cyprus	.1	2,906
Czechoslovakia	46.6	90,447
Denmark	1.2	11,747
Eastern Germany	30.2	31,940
Federal Germany	21.9	79,338
Finland	.8	2,114
France	9.1	13,054
Greece	3.1	51,178
Hungary	7.2	7,240
Iran	.2	668
Iraq	.3	242
Ireland	.1	2,960
Israel	0	0
Italy	21.0	1,136,387
Jordan	1.4	16,533
Lebanon	7.1	68,762
Libya	1.2	1,197
Netherlands	8.9	162,682
Norway	.5	1,849
Pakistan	0	1
Poland	16.5	62,467
Portugal	1.1	901
Romania	8.3	8,569
Spain	5.7	126,845
Sweden	.8	4,775
Switzerland	10.9	18,894
Turkey	.5	10,308
U.K.	12.1	119,700
U.S.S.R.	81.4	76,979
Yugoslavia	10.2	52,881
Descriptive Statistics		
Total	324.2	2,248,491
Mean	9.6	66,132
Skewness	3.05	5.17
Kurtosis	12.96	29.04

Source: Value figures are from U.N., Direction of International Trade, Statistical Papers Series T, Vol. XI, No. 9, New York, 1960. Weight figures are from U.A.R., Presidency, Department of Statistics and Census, Annual Statement of Foreign Trade: 1959, General Organization for Government Printing Offices, Cairo, 1961

Table 4.1

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Table 4.10: Exports from Yugoslavia to Selected Countries, 1959

Destination Country	Value (Mil. US $)	Weight (Metric tons)
Afghanistan	0	0
Austria	21.0	352,759
Belgium	4.7	45,911
Bulgaria	8.0	42,069
Cyprus	.7	5,912
Czechoslovakia	16.4	63,989
Denmark	1.3	3,830
Eastern Germany	26.7	151,113
Federal Germany	44.8	832,992
Finland	.3	975
France	11.6	57,096
Greece	14.4	61,023
Hungary	13.1	330,034
Iran	1.0	2,738
Iraq	1.1	2,212
Ireland	0	0
Israel	3.4	32,268
Italy	57.7	1,183,237
Jordan	.8	4,377
Lebanon	2.2	45,592
Libya	.7	21,279
Netherlands	6.1	42,130
Norway	5.5	10,543
Pakistan	1.1	32,589
Poland	33.9	159,355
Portugal	0	0
Romania	1.8	8,916
Saudi Arabia	.3	6,297
Spain	.9	15,936
Sweden	3.8	33,017
Switzerland	10.1	49,571
Syria	0	0
Turkey	1.9	7,965
U.A.R.	14.6	86,462
U.K.	34.0	161,629
U.S.S.R.	47.2	264,007
Descriptive Statistics		
Total	391.1	4,116,923
Mean	10.9	114,359
Skewness	1.66	3.30
Kurtosis	4.81	13.76

Source: Value figures are from U.N., Direction of International Trade, Statistical Papers Series T., Vol. XI, No. 9, New York, 1960. Weight figures are from Socijalisticka Federativna Republika Jugoslavija, Savez ni Zavod Za Statistiku, Statistika Spoljne Trgovine SFR Jugoslavije, 1959, Beograd, 1960.

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developed country exports more in an absolute sense than a developing country. The largest average trade value in the sample is $391.5 million for Federal Germany, and the second largest is $68.5 million for Belgium. The great discrepancy between F. Germany and Belgium is partially produced by using only 15 observations -- buying countries -- for F. Germany, whereas the subset of Belgium has 34 observations. Also, the subset of F. Germany shows a greater concentration on industrially advanced countries. In other words, average trade size value for F. Germany is actually inflated. The least average value of trade size is $.8 million for Lebanon, and the next in line is Syria with $2 million. Since trade data include only domestic exports, the figure for Lebanon is considerably lower than Syria. However, if re-exports were also included, Lebanon's average trade size would be considerably higher due to the trade of Beyrouth free trade zone.

Secondly, all value and weight distributions are skewed to the right, signifying a concentration of trade size around values smaller than the mean. Also, generally the skewness of we

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of weight distributions is considerably greater than the skewness of value distributions.

Third, all value distributions, except Federal Germany, and all weight distributions, are lepto kurtic.[2/]
Generally, weight distributions are more peaked than value distributions.

After noting these general characteristics, an analysis of simple correlation coefficients will follow.

Simple correlation coefficients, together with the corresponding significance levels, are presented in Table 4.11. As expected, in all eight countries the direction of interrelationship between weight and value is positive.

In six of the eight sample countries, the simple correlation coefficients between value and weight is significant at .0005 level. Only in one country -- UAR -- the degree of

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2/ Kurtosis is a measure of peakedness of a distribution. An index of kurtosis is computed by dividing the 4th. moment about the mean by the square of the 2nd. moment. When the value of this index is equal to 3, the distribution is normal (mesokurtic). When it is < 3, the distribution is flatter than the normal curve (platykurtic). When it is > 3 the distribution is more peaked than the normal curve (leptokurtic).

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association between weight and value cannot be assumed significant at an acceptable level.

Table 4.11: Simple Correlation Coefficients between Weight and Value for Selected Exporting Countries, 1959

Country	Number of Observations	r	r^2	Level of Significance for r
Belgium	34	.976	.952	.0005
Federal Germany	15	.871	.758	.0005
Greece	34	.785	.617	.0005
Lebanon	35	.429	.184	.010
Syria	34	.793	.629	.0005
Turkey	36	.949	.900	.0005
U.A.R.	34	.216	.047	.220
Yugoslavia	36	.825	.680	.0005

Since no assumption can be made as to the distribution of r values around the population correlation coefficient (R) because the number of r observations is small (n = 8) an estimate of R can be made only by computing the rank correlation coefficient. The Pearsonian rank correlation coefficient (r_{rank}) between mean weights and mean values for 8 countries is equal to .952 which is significant at the .015 level.

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Applying Tchebycheff's Inequality to the case of UAR,

$$P(|r_{uar} - r_{rank}| \geq k\sigma_{r_{rank}}) \leq \frac{1}{k^2} \quad \text{for } k = 1.92 \ (\sigma_{r_{rank}} =$$

.378) shows that the probability that r_{uar} differs from r_{rank} by more than 1.92 standard errors of r_{rank} is equal to or less than .27, indicating that r_{uar} is more likely drawn from a different universe of weight and value figures than the universe from which other countries are drawn.

The significant deviation of r_{uar} from r_{rank} can be attributed (a) either to the fact that weight figures are taken from individual countries, whereas value figures are taken from one source (leading to an inevitable disagreement between two sources due to definitional differences) or (b) to the speculation that the commodity composition of exports from U.A.R. to the 34 countries differs significantly.

In conclusion, it can be said that there is a significant positive relationship between value and weight of trade flows among countries within the region.

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4.4 Elimination of Size Effects, 1959 Data

To compute the theoretical trade sizes from actual trade data, the Goodman-Alker recursive procedure explained in Section 3.5 of the preceding Chapter is used. In six successive iterations the desired accuracy level of 10^{-4} is achieved.2/

Table 4.12 contains the data from which the recursive procedure started and the estimates of the model parameters obtained at the final iteration.

The theoretical cell values (A_{ij}) are then computed by using Equation (3-32). The value of S is computed by applying Equation (3-7) at the end of the sixth iteration. This value turned out to be equal to 1.17967892. The value of

$\sum_{k=1}^{K} S_k D_k$ used in Equation (3-7) is equal to .15231216. The value of T used in computing A_{ij} is equal to \$83,925.1 million. It should be noted that in arriving at this value,

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2/ The program is run at Delta College's (University Center, Michigan) IBM 360 systemwith 16K storage.

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Table 4.12: Proportions of Trade and Estimates of Model Parameters, 1959

Country	Proportion of Exports X_i/T	Model Parameter of Exports $\hat{S}_i$	Proportion of Imports I_i/T	Model Parameter of Imports $\hat{D}_i$
Afghanistan	.00089	.00076	.00071	.00060
Austria	.01153	.00989	.01364	.01168
Belgium	.03926	.03453	.04101	.03601
Bulgaria	.00479	.00408	.00601	.00512
Cyprus	.00063	.00054	.00137	.00116
Czechoslovakia	.02058	.01774	.01909	.01648
Denmark	.01664	.01434	.01908	.01641
Eastern Germany	.01943	.01676	.02002	.01726
Federal Germany	.11689	.10972	.10166	.09681
Finland	.00995	.00851	.00993	.00849
France	.06690	.06000	.06063	.05468
Greece	.00243	.00208	.00673	.00572
Hungary	.00913	.00780	.00941	.00804
Iran	.01105	.00941	.00628	.00537
Iraq	.00723	.00615	.00388	.00331
Ireland	.00433	.00369	.00709	.00603
Israel	.00214	.00182	.00511	.00434
Italy	.03450	.03030	.03981	.03480
Jordan	.00010	.00009	.00132	.00112
Lebanon	.00053	.00045	.00380	.00323
Libya	.00014	.00012	.00135	.00115
Netherlands	.04298	.03801	.04694	.04137
Norway	.00965	.00830	.01568	.01341
Pakistan	.00381	.00325	.00421	.00358
Poland	.01364	.01174	.01692	.01451
Portugal	.00346	.00294	.00564	.00480
Romania	.00622	.00530	.00598	.00510
Saudi Arabia	.00992	.00843	.00223	.00190
Spain	.00599	.00512	.00947	.00807
Sweden	.02628	.02245	.02866	.02486
Switzerland	.02017	.01745	.02293	.01978
Syria	.00119	.00101	.00212	.00180
Turkey	.00423	.00360	.00527	.00449
U.A.R. (Egypt)	.00528	.00450	.00734	.00625
U.K.	.11530	.11199	.13312	.12710
U.S.S.R.	.06483	.05812	.06045	.05441
Yugoslavia	.00568	.00485	.00819	.00697
Rest of World	.28229	.35379	.24692	.32380
Total	1.00000	1.00000	1.00000	1.00000

Note: Totals may not add to 1.00000 due to rounding at the 10^{-5} digit.

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trade size between pairs of countries both of which are in the "rest of the world" is ignored, i.e., $a_{38,38} = 0$. (The reader is referred to the convention stated in paragraph #2, Section 3.3 of the preceding Chapter.)

The matrix of 1959 theoretical trade flows (A_{ij}) is given in Table 4.13. The value appearing in each cell is interpreted as the size of flow due to the "size" of trading partners. In other words, if all resistance factors between country i and country j were nonexistent, then the value of A_{ij} would be the size of trade from country i to country j. The ratio of the actual (a_{ij}) to the theoretical (A_{ij}) trade sizes is given in Table 4.14. A value smaller than one in Table 4.14 shows that the effects of trade-reducing barriers (such as distance and political hostility) are greater than the effects of trade-stimulating forces (such as preferential trade arrangements due to regional economic and/or political integration, and favorable location of exporting country) so that a smaller than theoretical trade size is actually realized. The reverse is true for a value greater than one in Table 4.14. A value of one in a non-diagonal cell means

Table 4.13

THEORETICAL TRADE FLOWS, 1959, (MILLION U.S.$).

	AFGH	AUST	BELG	BULG	CYPR	CZEC	DENM	EGER	FEDG	FINL	FRAN	GREE	HUNG	IRAN
FGH	0.0	.9	2.7	.4	.1	1.2	1.2	1.3	7.3	.6	4.1	.4	.6	.4
UST	.6	0.0	35.2	5.0	1.1	16.1	16.1	16.9	94.7	8.3	53.5	5.6	7.9	5.3
ELG	2.0	39.9	0.0	17.5	4.0	56.3	56.1	59.0	330.7	29.0	186.8	19.5	27.5	18.4
ULG	.2	4.7	14.5	0.0	.5	6.7	6.6	7.0	39.1	3.4	22.1	2.3	3.2	2.2
YPR	.0	.6	1.9	.3	0.0	.9	.9	.9	5.2	.5	2.9	.3	.4	.3
ZEC	1.1	20.5	63.2	9.0	2.0	0.0	28.8	30.3	169.9	14.9	96.0	10.0	14.1	9.4
ENM	.9	16.6	51.1	7.3	1.7	23.4	0.0	24.5	137.4	12.1	77.6	8.1	11.4	7.6
GER	1.0	19.4	59.7	8.5	1.9	27.3	27.2	0.0	160.6	14.1	90.7	9.5	13.3	8.9
EDG	6.5	126.8	390.9	55.6	12.6	178.9	178.1	187.4	0.0	92.2	593.5	62.0	87.3	58.3
INL	.5	9.8	30.3	4.3	1.0	13.9	13.8	14.5	81.5	0.0	46.0	4.8	6.8	4.5
RAN	3.6	69.3	213.8	30.4	6.9	97.8	97.4	102.5	574.7	50.4	0.0	33.9	47.7	31.9
REE	.1	2.4	7.4	1.1	.2	3.4	3.4	3.5	19.9	1.7	11.2	0.0	1.7	1.1
UNG	.5	9.0	27.8	4.0	.9	12.7	12.7	13.3	74.7	6.6	42.2	4.4	0.0	4.1
RAN	.6	10.9	33.5	4.8	1.1	15.4	15.3	16.1	90.2	7.9	50.9	5.3	7.5	0.0
RAQ	.4	7.1	21.9	3.1	.7	10.0	10.0	10.5	58.9	5.2	33.3	3.5	4.9	3.3
REL	.2	4.3	13.2	1.9	.4	6.0	6.0	6.3	35.4	3.1	20.0	2.1	2.9	2.0
SRA	.1	2.1	6.5	.9	.2	3.0	3.0	3.1	17.4	1.5	9.8	1.0	1.4	1.0
TAL	1.8	35.0	108.0	15.3	3.5	49.4	49.2	51.8	290.2	25.5	163.9	17.1	24.1	16.1
ORD	.0	.1	.3	.0	.0	.1	.1	.2	.8	.1	.5	.0	.1	.0
EBA	.0	.5	1.6	.2	.1	.7	.7	.8	4.3	.4	2.4	.3	.4	.2
IBY	.0	.1	.4	.1	.0	.2	.2	.2	1.1	.1	.6	.1	.1	.1
ETH	2.3	43.9	135.4	19.3	4.4	62.0	61.7	64.9	364.0	31.9	205.6	21.5	30.2	20.2
ORW	.5	9.6	29.6	4.2	1.0	13.5	13.5	14.2	79.5	7.0	44.9	4.7	6.6	4.4
AKI	.2	3.7	11.6	1.6	.4	5.3	5.3	5.5	31.1	2.7	17.6	1.8	2.6	1.7
OLA	.7	13.6	41.8	5.9	1.4	19.1	19.1	20.1	112.4	9.9	63.5	6.6	9.3	6.2
ORT	.2	3.4	10.5	1.5	.3	4.8	4.8	5.0	28.2	2.5	15.9	1.7	2.3	1.6
OMA	.3	6.1	18.9	2.7	.6	8.6	8.6	9.1	50.7	4.5	28.7	3.0	4.2	2.8
AUD	.5	9.7	30.0	4.3	1.0	13.7	13.7	14.4	80.7	7.1	45.6	4.8	6.7	4.5
PAI	.3	5.9	18.2	2.6	.6	8.3	8.3	8.7	49.0	4.3	27.7	2.9	4.1	2.7
WED	1.4	26.4	81.4	11.6	2.6	37.3	37.1	39.0	218.9	19.2	123.6	12.9	18.2	12.1
WIT	1.0	20.2	62.2	8.8	2.0	28.4	28.3	29.8	167.1	14.7	94.4	9.9	13.9	9.3
YRI	.1	1.2	3.6	.5	.1	1.6	1.6	1.7	9.7	.8	5.5	.6	.8	.5
URK	.2	4.2	12.8	1.8	.4	5.9	5.8	6.2	34.5	3.0	19.5	2.0	2.9	1.9
ARE	.3	5.2	16.0	2.3	.5	7.3	7.3	7.7	43.1	3.8	24.4	2.5	3.6	2.4
.K.	6.6	129.4	399.0	56.7	12.9	182.6	181.8	191.3	1072.6	94.1	605.8	63.3	89.1	59.5
SSR	3.4	67.2	207.1	29.4	6.7	94.8	94.4	99.3	556.7	48.8	314.4	32.9	46.2	30.9
UGO	.3	5.6	17.3	2.5	.6	7.9	7.9	8.3	46.4	4.1	26.2	2.7	3.9	2.6
EST	21.0	409.5	1262.8	179.5	40.8	577.9	575.4	605.4	3394.7	297.9	1917.4	200.5	281.9	188.4

Table 4.13 (Continued)

IRAQ	IREL	ISRA	ITAL	JORD	LEBA	LIBY	NETH	NORW	PAKI	POLA	PORT	ROMA	SAUD
.2	.5	.3	2.6	.1	.2	.1	3.1	1.0	.3	1.1	.4	.4	.1
3.2	5.9	4.2	34.1	1.1	3.2	1.1	40.5	13.1	3.5	14.2	4.7	5.0	1.9
11.3	20.6	14.8	118.9	3.8	11.0	3.9	141.3	45.8	12.2	49.6	16.4	17.4	6.5
1.3	2.4	1.8	14.1	.5	1.3	.5	16.7	5.4	1.4	5.9	1.9	2.1	.8
.2	.3	.2	1.9	.1	.2	.1	2.2	.7	.2	.8	.3	.3	.1
5.8	10.6	7.6	61.1	2.0	5.7	2.0	72.6	23.5	6.3	25.5	8.4	8.9	3.3
4.7	8.6	6.2	49.4	1.6	4.6	1.6	58.7	19.0	5.1	20.6	6.8	7.2	2.7
5.5	10.0	7.2	57.7	1.9	5.4	1.9	68.6	22.2	5.9	24.1	8.0	8.5	3.2
36.0	65.5	47.1	377.8	12.2	35.0	12.5	449.0	145.5	38.8	157.5	52.1	55.3	20.7
2.8	5.1	3.7	29.3	.9	2.7	1.0	34.8	11.3	3.0	12.2	4.0	4.3	1.6
19.7	35.8	25.7	206.6	6.7	19.2	6.8	245.6	79.6	21.2	86.1	28.5	30.3	11.3
.7	1.2	.9	7.1	.2	.7	.2	8.5	2.8	.7	3.0	1.0	1.0	.4
2.6	4.7	3.3	26.9	.9	2.5	.9	31.9	10.3	2.8	11.2	3.7	3.9	1.5
3.1	5.6	4.0	32.4	1.0	3.0	1.1	38.5	12.5	3.3	13.5	4.5	4.7	1.8
0.0	3.7	2.6	21.2	.7	2.0	.7	25.2	8.2	2.2	8.8	2.9	3.1	1.2
1.2	0.0	1.6	12.7	.4	1.2	.4	15.1	4.9	1.3	5.3	1.8	1.9	.7
.6	1.1	0.0	6.3	.2	.6	.2	7.4	2.4	.6	2.6	.9	.9	.3
9.9	18.1	13.0	0.0	3.4	9.7	3.4	124.0	40.2	10.7	43.5	14.4	15.3	5.7
.0	.1	.0	.3	0.0	.0	.0	.4	.1	.0	.1	.0	.0	.0
.1	.3	.2	1.5	.0	0.0	.1	1.8	.6	.2	.6	.2	.2	.1
.0	.1	.0	.4	.0	.0	0.0	.5	.2	.0	.2	.1	.1	.0
12.5	22.7	16.3	130.9	4.2	12.1	4.3	0.0	50.4	13.5	54.6	18.0	19.2	7.2
2.7	5.0	3.6	28.6	.9	2.6	.9	34.0	0.0	2.9	11.9	3.9	4.2	1.6
1.1	1.9	1.4	11.2	.4	1.0	.4	13.3	4.3	0.0	4.7	1.5	1.6	.6
3.8	7.0	5.0	40.4	1.3	3.7	1.3	48.0	15.6	4.2	0.0	5.6	5.9	2.2
1.0	1.8	1.3	10.1	.3	.9	.3	12.1	3.9	1.0	4.2	0.0	1.5	.6
1.7	3.2	2.3	18.2	.6	1.7	.6	21.7	7.0	1.9	7.6	2.5	0.0	1.0
2.8	5.0	3.6	29.0	.9	2.7	1.0	34.5	11.2	3.0	12.1	4.0	4.3	0.0
1.7	3.1	2.2	17.6	.6	1.6	.6	21.0	6.8	1.8	7.4	2.4	2.6	1.0
7.5	13.6	9.8	78.7	2.5	7.3	2.6	93.5	30.3	8.1	32.8	10.8	11.5	4.3
5.7	10.4	7.5	60.1	1.9	5.6	2.0	71.4	23.1	6.2	25.0	8.3	8.8	3.3
.3	.6	.4	3.5	.1	.3	.1	4.1	1.3	.4	1.4	.5	.5	.2
1.2	2.2	1.5	12.4	.4	1.2	.4	14.7	4.8	1.3	5.2	1.7	1.8	.7
1.5	2.7	1.9	15.5	.5	1.4	.5	18.4	6.0	1.6	6.5	2.1	2.3	.8
36.7	66.9	48.1	385.6	12.4	35.8	12.7	458.3	148.5	39.6	160.8	53.2	56.5	21.1
19.0	34.7	24.9	200.1	6.5	18.6	6.6	237.9	77.1	20.6	83.4	27.6	29.3	10.9
1.6	2.9	2.1	16.7	.5	1.5	.6	19.8	6.4	1.7	7.0	2.3	2.4	.9
116.2	211.6	152.1	1220.3	39.4	113.2	40.2	1450.6	470.1	125.5	508.8	168.2	178.8	66.7

Table 4.13 (Continued)

SPAI	SWED	SWIT	SYRI	TURK	UARE	U.K.	USSR	YUGO	REST
.6	1.9	1.5	.1	.3	.5	9.5	4.1	.5	24.3
7.9	24.3	19.4	1.8	4.4	6.1	124.4	53.2	6.8	317.5
27.6	84.9	67.6	6.2	15.3	21.3	434.2	185.9	23.8	1108.4
3.3	10.0	8.0	.7	1.8	2.5	51.3	22.0	2.8	131.0
.4	1.3	1.1	.1	.2	.3	6.8	2.9	.4	17.3
14.2	43.6	34.7	3.2	7.9	11.0	223.1	95.5	12.2	569.4
11.4	35.3	28.1	2.6	6.4	8.9	180.3	77.2	9.9	460.4
13.4	41.2	32.8	3.0	7.4	10.4	210.8	90.2	11.6	538.1
87.6	269.9	214.7	19.5	48.7	67.8	1379.5	590.6	75.7	3521.7
6.8	20.9	16.7	1.5	3.8	5.3	107.0	45.8	5.9	273.1
47.9	147.6	117.4	10.7	26.6	37.1	754.5	323.0	41.4	1926.0
1.7	5.1	4.1	.4	.9	1.3	26.1	11.2	1.4	66.6
6.2	19.2	15.3	1.4	3.5	4.8	98.1	42.0	5.4	250.4
7.5	23.2	18.4	1.7	4.2	5.8	118.4	50.7	6.5	302.2
4.9	15.1	12.0	1.1	2.7	3.8	77.3	33.1	4.2	197.3
2.9	9.1	7.2	.7	1.6	2.3	46.4	19.9	2.5	118.5
1.5	4.5	3.6	.3	.8	1.1	22.9	9.8	1.3	58.4
24.2	74.5	59.3	5.4	13.5	18.7	381.0	163.1	20.9	972.6
.1	.2	.2	.0	.0	.1	1.1	.5	.1	2.8
.4	1.1	.9	.1	.2	.3	5.6	2.4	.3	14.3
.1	.3	.2	.0	.1	.1	1.5	.6	.1	3.7
30.3	93.5	74.4	6.8	16.9	23.5	477.9	204.6	26.2	1220.0
6.6	20.4	16.2	1.5	3.7	5.1	104.3	44.7	5.7	266.3
2.6	8.0	6.4	.6	1.4	2.0	40.8	17.5	2.2	104.2
9.4	28.9	23.0	2.1	5.2	7.3	147.6	63.2	8.1	376.8
2.4	7.2	5.8	.5	1.3	1.8	37.0	15.9	2.0	94.5
4.2	13.0	10.4	.9	2.4	3.3	66.6	28.5	3.7	170.1
6.7	20.7	16.5	1.5	3.7	5.2	106.0	45.4	5.8	270.6
0.0	12.6	10.0	.9	2.3	3.2	64.4	27.6	3.5	164.4
14.2	0.0	44.7	4.1	10.1	14.1	287.3	123.0	15.8	733.5
13.9	42.9	0.0	3.1	7.7	10.8	219.4	93.9	12.0	560.0
.8	2.5	2.0	0.0	.4	.6	12.7	5.4	.7	32.4
2.9	8.9	7.1	.6	0.0	2.2	45.3	19.4	2.5	115.7
3.6	11.1	8.8	.8	2.0	0.0	56.6	24.2	3.1	144.5
89.4	275.5	219.2	20.0	49.7	69.2	0.0	602.8	77.3	3594.5
46.4	143.0	113.8	10.4	25.8	35.9	730.8	0.0	40.1	1865.7
3.9	11.9	9.5	.9	2.2	3.0	61.0	26.1	0.0	155.6
282.9	871.9	693.6	63.2	157.4	219.1	4456.6	1908.0	244.6	0.0

either one of the following two things:

(1) There are no resistance factors between country i and country j.

(3) The effects of trade-reducing barriers are equal to the effects of trade-stimulating forces.

The matrix given in Table 4.14 will be used as the input data for the dependent variable in the multiple regression analysis of the next Chapter.

Table 4.14

RATIO OF ACTUAL TO THEORETICAL TRADE FLOWS (RELATIVE ACCEPTANCES), 1959 (MILLION U.S.$).

	AFGH	AUST	BELG	BULG	CYPR	CZEC	DENM	EGER	FEDG	FINL	FRAN	GREE	HUNG	IRAN
GH	1.000	.457	0.000	0.000	0.000	0.000	0.000	0.000	1.543	0.000	.317	0.000	0.000	.248
JST	.170	1.000	.502	1.996	1.230	1.129	.579	.917	2.709	.577	.312	1.734	3.305	1.046
LG	.049	.649	1.000	.280	.730	.252	.976	.142	1.337	.741	1.576	1.040	.280	.768
JLG	0.000	1.336	.069	1.000	0.000	6.656	.015	0.000	.394	.204	.127	.910	3.111	.092
PR	0.000	.322	.313	0.000	1.000	1.026	.801	0.000	2.620	0.000	.447	1.972	.234	0.000
EC	0.000	1.103	.191	5.954	0.000	1.000	0.000	5.877	.359	.718	.108	0.000	6.102	0.000
NM	.235	.398	.348	.096	.969	.304	1.000	.612	2.028	1.576	.427	.530	.245	.498
ER	0.000	.805	.216	0.000	.052	6.403	.547	1.000	0.000	1.015	.078	.295	6.795	.180
DG	.522	3.686	1.517	.732	.816	.335	1.895	0.000	1.000	1.578	1.328	1.557	.413	2.108
NL	0.000	.193	1.013	.070	0.000	.440	1.947	.729	1.119	1.000	.858	1.704	.488	.332
AN	.169	.643	1.758	.250	.738	.157	.564	.081	1.281	.760	1.000	.607	.285	1.145
EE	0.000	1.459	.325	1.902	10.046	2.423	.089	.620	2.103	1.892	1.327	1.000	2.059	0.000
JNG	0.000	3.073	.201	3.594	0.000	6.902	.237	6.618	.652	.595	.230	0.000	1.000	.868
AN	0.000	.184	1.619	0.000	.185	0.000	.098	0.000	1.083	.670	1.027	4.601	.240	1.000
AQ	0.000	0.000	1.073	0.000	0.000	.050	.050	.029	.970	0.000	3.897	0.000	.041	.673
EL	0.000	.047	.190	0.000	.235	.083	.083	.032	.277	.064	.170	.096	0.000	0.000
RA	0.000	.428	1.435	1.194	10.507	.034	.813	.064	1.016	1.962	.427	1.847	.415	1.345
AL	.278	2.331	.680	1.095	1.921	.211	.551	.122	1.621	.491	1.053	2.235	.676	1.292
RD	0.000	0.000	0.000	0.000	0.000	4.182	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
RA	0.000	.194	.188	0.000	19.440	.274	0.000	.262	.210	0.000	.414	3.561	0.000	6.736
RY	0.000	0.000	.241	0.000	0.000	.527	0.000	0.000	.449	0.000	.159	1.520	0.000	0.000
TH	.177	.877	3.904	.275	.937	.134	1.471	.176	2.143	1.055	.929	.800	.152	.827
RW	0.000	.470	.575	.190	.314	.429	3.943	.473	1.501	1.965	.566	.618	.152	.227
KI	16.625	.187	1.176	0.000	.535	.340	.304	0.000	.611	.147	.775	.490	.465	1.044
LA	0.000	2.006	.172	2.860	0.000	4.211	.782	6.828	.694	1.815	.249	.678	3.974	.834
RT	0.000	.529	.906	0.000	4.426	.458	.711	.099	.851	.242	.772	1.141	.085	.192
MA	0.000	1.078	.048	2.460	1.804	4.063	.023	3.923	.473	.427	.488	1.468	5.411	0.000
UD	0.000	0.000	.323	0.000	.103	0.000	0.000	0.000	1.367	0.000	1.498	.797	0.000	0.000
AI	0.000	.980	.767	.231	.339	.719	.878	0.000	1.307	1.046	.942	.242	.540	.257
ED	0.000	.477	1.033	.156	.722	.290	3.844	.530	1.523	3.812	.681	.867	.264	.642
IT	.483	2.555	1.031	.260	1.046	.552	.985	.201	1.735	1.303	1.235	1.135	.555	1.014
RI	0.000	0.000	.334	2.546	0.000	2.069	.244	.232	.259	0.000	2.953	0.000	.748	1.307
RK	0.000	1.273	.584	.658	.964	1.991	.752	1.413	2.306	2.576	.846	1.521	2.268	0.000
RE	0.000	1.499	.256	1.710	.193	6.347	.164	3.926	.508	.211	.374	1.217	2.010	.084
K.	.211	.374	.456	.111	2.964	.124	1.376	.061	.414	1.144	.397	.758	.132	1.811
SR	8.238	.593	.132	9.848	0.000	6.363	.282	10.375	.160	2.958	.279	.487	5.620	.583
GO	0.000	3.749	.272	3.258	1.254	2.075	.165	3.224	.965	.074	.442	5.252	3.397	.388
ST	.975	.405	.976	.044	.740	.490	.766	.036	.989	.418	1.333	.949	.392	.746

Table 4.14 (Continued)

IRAQ	IREL	ISRA	ITAL	JORD	LEBA	LIBY	NETH	NORW	PAKI	POLA	PORT	ROMA	SAUD
0.000	0.000	0.000	.077	0.000	0.000	0.000	.032	0.000	34.659	0.000	0.000	0.000	0.000
.648	.203	.542	4.675	.728	1.013	.534	.657	.587	.600	1.408	.788	1.042	.376
1.025	.577	.668	.726	.574	.844	.179	4.955	.758	.720	.286	1.904	.172	.477
.523	0.000	.856	.505	0.000	0.000	0.000	.096	.037	0.000	3.771	0.000	2.429	0.000
.567	.623	1.732	1.188	3.347	4.075	1.637	2.361	.561	0.000	0.000	0.000	.737	0.000
0.000	0.000	0.000	.270	0.000	0.000	0.000	.240	0.000	0.000	4.511	0.000	6.773	0.000
.404	.502	.390	1.203	.440	.655	.430	.503	3.322	.158	.670	.353	.083	.518
.291	.130	0.000	.102	1.182	.243	0.000	.226	.373	0.000	7.783	.038	5.298	0.000
.851	.435	.971	1.388	.977	.817	.907	1.838	1.696	1.203	.444	1.569	.296	.784
0.000	1.437	2.191	.502	0.000	0.000	0.000	1.206	.523	.066	1.457	.149	.489	0.000
.097	.226	1.025	1.294	.345	1.488	1.071	.588	.491	.499	.166	1.362	.294	.274
1.911	.323	1.123	2.113	.434	.905	2.121	.765	.327	0.000	1.409	1.015	1.815	.768
0.000	0.000	0.000	.666	0.000	0.000	0.000	.319	0.000	0.000	3.482	0.000	4.600	0.000
.616	.053	.074	.978	0.000	.366	0.000	.431	.080	6.632	.074	.761	0.000	0.000
1.000	.545	0.000	3.733	0.000	2.904	.430	1.093	0.000	.092	.034	5.347	.032	1.469
0.000	1.000	.063	.173	0.000	.085	.716	.205	.020	.306	0.000	.285	0.000	0.000
0.000	.092	1.000	.718	0.000	0.000	0.000	1.061	.953	0.000	.459	0.000	2.071	0.000
.252	.194	.992	1.000	2.348	1.943	6.220	.613	.535	.904	.379	1.279	.530	1.192
17.340	0.000	0.000	0.000	1.000	39.160	0.000	0.000	0.000	0.000	3.167	0.000	0.000	60.365
21.164	0.000	0.000	.910	76.566	1.000	0.000	.164	0.000	0.000	.156	0.000	0.000	65.360
0.000	0.000	0.000	7.991	0.000	0.000	1.000	1.261	0.000	0.000	0.000	0.000	0.000	0.000
.682	.745	1.165	.744	.806	.585	.857	1.000	1.571	.513	.262	.887	.130	1.286
.331	.182	.562	.798	.109	.227	0.000	.778	1.000	.511	.378	.813	.669	.192
3.855	1.032	0.000	.859	0.000	.386	.271	.565	.023	1.000	.794	1.688	0.000	1.309
0.000	0.000	.179	.510	0.000	0.000	0.000	.210	.270	.241	1.000	.251	2.990	0.000
.725	.512	1.504	1.134	.612	1.596	.598	.705	.717	.192	.260	1.000	.337	0.000
.230	0.000	.836	.515	.850	1.123	0.000	.097	.342	0.000	2.892	0.000	1.000	0.000
0.000	.715	0.000	3.790	1.602	5.722	0.000	.614	0.000	1.341	0.000	0.000	0.000	1.000
.358	.556	0.000	.947	.528	.918	.344	.926	1.546	.055	.775	3.004	.116	.207
.748	.557	.530	.937	.473	.644	.039	1.153	7.229	.223	.631	.940	.095	.302
.752	.202	.895	2.299	.361	.951	.202	.933	.838	.648	.523	2.174	.841	1.065
9.990	0.000	0.000	1.671	58.965	45.680	0.000	.073	0.000	0.000	0.000	0.000	1.574	30.035
2.202	.186	5.756	2.370	3.999	11.909	.978	.461	.105	0.000	1.450	0.000	.275	0.000
.203	.037	0.000	1.354	2.800	4.938	2.347	.483	.084	0.000	2.552	.515	3.654	8.846
2.433	4.799	.955	.561	1.303	.764	1.848	.739	1.134	2.447	.289	1.189	.117	.925
1.223	0.000	0.000	.390	0.000	.178	0.000	.280	.230	.049	5.829	.047	7.927	0.000
.692	0.000	1.634	3.456	1.486	1.421	1.272	.307	.855	.641	4.870	0.000	.736	.329
1.043	.799	1.459	.921	1.131	.977	.991	.886	.752	.984	.406	.901	.237	1.479

Table 4.14 (Continued)

SPAI	SWED	SWIT	SYRI	TURK	UARE	U.K.	USSR	YUGO	REST
0.000	.161	.674	0.000	0.000	0.000	.734	3.823	0.000	1.171
1.026	.921	2.268	1.419	2.255	.736	.200	.631	3.985	.516
.940	1.070	1.350	1.008	.718	.351	.449	.040	.336	.915
.051	.070	.113	1.237	.386	1.427	.086	11.869	1.669	.030
0.000	.453	.095	1.043	1.256	.301	2.661	0.000	.539	.359
0.000	0.000	1.040	0.000	2.171	2.352	.160	6.151	1.789	.631
.629	2.874	.684	.430	.518	.214	2.022	.193	.232	.664
0.000	.330	.159	.636	1.492	2.461	.061	9.857	2.498	.072
1.178	2.017	2.672	1.217	2.324	1.146	.287	.154	1.312	.881
.236	1.085	.198	.594	.424	.627	1.763	3.057	.204	.561
1.255	.673	1.957	1.253	1.047	.480	.332	.279	.312	1.482
.121	.411	.542	1.082	.543	1.481	.728	1.056	7.261	.564
0.000	.292	1.434	0.000	1.559	2.654	.130	4.867	5.851	.376
3.579	1.028	.255	.596	.718	.052	1.353	.369	0.000	1.222
4.443	0.000	0.000	1.461	0.000	.105	1.384	.076	.519	.632
.407	.297	.055	.152	0.000	.044	5.758	.005	0.000	.565
.207	.916	2.725	0.000	11.144	0.000	1.478	.010	4.302	.926
.901	.914	3.540	2.093	2.966	1.447	.570	.267	3.147	1.041
0.000	0.000	0.000	127.575	0.000	0.000	0.000	0.000	29.647	.460
0.000	0.000	.800	82.879	1.008	2.533	.249	.873	.973	.816
0.000	0.000	0.000	0.000	0.000	65.365	.752	.639	1.246	.134
.669	1.615	1.144	1.063	.788	.366	.810	.059	.477	.733
1.661	3.808	.678	.203	.380	.214	1.586	.363	.245	.778
1.544	.276	.031	0.000	.555	.449	1.446	.200	.759	1.525
.534	.696	.509	0.000	1.132	.827	.587	4.953	2.556	.472
1.234	.884	.590	.953	.535	.220	.883	.101	0.000	1.622
0.000	.054	.405	0.000	.553	3.725	.129	8.772	1.121	.275
9.675	.593	0.000	.999	2.432	3.243	.142	0.000	0.000	1.349
1.000	.802	1.607	.548	.660	5.939	1.225	.152	.792	1.054
.762	1.000	.615	.884	1.005	.389	1.153	.319	.501	.706
2.082	1.090	1.000	1.319	1.136	1.354	.439	.047	1.121	1.003
0.000	0.000	0.000	1.000	0.000	0.000	.339	.792	.719	.825
.904	.124	1.234	6.853	1.000	.718	.750	.247	1.448	.599
1.586	.072	1.237	0.000	.250	1.000	.214	3.358	3.282	.770
.772	1.174	.689	.937	.905	.562	1.000	.162	.414	1.642
.063	.311	.040	1.468	.217	2.449	.227	1.000	1.154	.803
.233	.319	1.064	0.000	.883	4.871	.558	1.808	1.000	.549
1.003	.804	.469	.765	.524	.785	1.648	.933	.841	1.000

4.5 Elimination of Size Effects, 1968 Data

The procedure developed and explained in Section 4.4 is also applied for the 1968 data given in Table 4.2.

Table 4.15 gives the trade proportions and estimates of model parameters for 1968 data. Again, six iterations were necessary to achieve the accuracy level of 10^{-4}. The values of S, $\sum_{k=1}^{K} S_k D_k$, and T for 1968 are 1.11577463, .10376154, and \$177,274.1 million, respectively. Table 4.16 shows the theoretical trade flow sizes (A_{ij}) and Table 4.17 gives the RA_{ij} values for 1968.

Now that the size effects are eliminated from the actual trade flows, the multiple regression analysis can be attempted in order to explain RA_{ij} values in terms of the four resistance factors as given in Equation (3-33). This will be the subject matter of the next Chapter.

Table 4.15: Proportions of Trade and Estimates of Model Parameters, 1968

Country	Proportion of Exports X_i/T	Model Parameter of Exports $\hat{S}_i$	Proportion of Imports I_i/T	Model Parameter of Imports $\hat{D}_i$
Afghanistan	.00043	.00038	.00043	.00039
Austria	.01121	.01018	.01408	.01275
Belgium	.04604	.04316	.04700	.04402
Bulgaria	.00822	.00747	.01462	.01320
Cyprus	.00049	.00044	.00096	.00086
Czechoslovakia	.01516	.01385	.02082	.01892
Denmark	.01487	.01355	.01818	.01652
Eastern Germany	.01741	.01597	.02541	.02314
Federal Germany	.14036	.14291	.11448	.11971
Finland	.00922	.00833	.00898	.00811
France	.07168	.06952	.07889	.07599
Greece	.00263	.00238	.00785	.00706
Hungary	.00972	.00882	.01305	.01180
Iran	.01054	.00952	.00786	.00711
Iraq	.00586	.00526	.00227	.00295
Ireland	.00449	.00495	.00662	.00596
Israel	.00361	.00325	.00610	.00548
Italy	.05730	.05433	.05783	.05481
Jordan	.00022	.00019	.00089	.00080
Lebanon	.00110	.00098	.00110	.00098
Libya	.01053	.00947	.00363	.00328
Netherlands	.04707	.04434	.05241	.04915
Norway	.01092	.00992	.01541	.04915
Pakistan	.00406	.00366	.00559	.00503
Poland	.01463	.01338	.02293	.02001
Portugal	.00412	.00361	.00586	.00527
Romania	.00703	.00636	.01095	.00988
Saudi Arabia	.01019	.00915	.00288	.00261
Spain	.00896	.00818	.01986	.01795
Sweden	.02783	.02562	.02887	.02655
Switzerland	.02277	.02089	.02549	.02333
Syria	.00094	.00085	.00175	.00157
Turkey	.00279	.00251	.00434	.00390
U.A.R.	.00350	.00315	.00375	.00337
U.K.	.08657	.08668	.10694	.10494
U.S.S.R.	.07682	.07199	.04523	.04368
Yugoslavia	.00709	.00641	.01012	.00913
Rest of World	.22346	.25798	.18745	.22670
Total	1.00000	1.00000	1.00000	1.00000

Note: Totals may not add to 1.00000 due to rounding at the 10^{-5} digit.

Table 4.16

THEORETICAL TRADE FLOWS, 1968, (MILLION U.S.$).

	AFGH	AUST	BELG	BULG	CYPR	CZEC	DENM	EGER	FEDG	FINL	FRAN	GREE	HUNG	IRAN
'GH	0.0	1.0	3.4	1.0	.1	1.4	1.3	1.8	9.1	.6	5.8	.5	.9	.5
)ST	.8	0.0	88.7	26.6	1.7	38.1	33.3	46.6	241.1	16.4	153.0	14.2	23.8	14.3
:LG	3.3	108.9	0.0	112.7	7.4	161.6	141.1	197.7	1022.3	69.3	648.9	60.3	100.8	60.8
JLG	.6	18.8	65.1	0.0	1.3	28.0	24.4	34.2	176.9	12.0	112.3	10.4	17.4	10.5
'PR	.0	1.1	3.9	1.2	0.0	1.7	1.5	2.0	10.6	.7	6.7	.6	1.0	.6
ZEC	1.1	34.9	120.6	36.2	2.4	0.0	45.3	63.4	328.0	22.2	208.2	19.3	32.3	19.5
ENM	1.0	34.2	118.1	35.4	2.3	50.8	0.0	62.1	321.1	21.8	203.8	18.9	31.7	19.1
GER	1.2	40.3	139.1	41.7	2.7	59.8	52.2	0.0	378.3	25.7	240.1	22.3	37.3	22.5
EDG	11.1	360.5	1244.5	373.2	24.3	535.0	467.0	654.4	0.0	229.5	2148.1	199.6	333.7	201.1
INL	.6	21.0	72.6	21.8	1.4	31.2	27.2	38.2	197.4	0.0	125.3	11.6	19.5	11.7
RAN	5.4	175.4	605.5	181.6	11.8	260.3	227.2	318.4	1646.5	111.7	0.0	97.1	162.3	97.9
REE	.2	6.0	20.7	6.2	.4	8.9	7.8	10.9	56.4	3.8	35.8	0.0	5.6	3.4
JNG	.7	22.3	76.8	23.0	1.5	33.0	28.8	40.4	208.9	14.2	132.6	12.3	0.0	12.4
RAN	.7	24.0	82.9	24.9	1.6	35.6	31.1	43.6	225.5	15.3	143.1	13.3	22.2	0.0
RAQ	.4	13.3	45.9	13.8	.9	19.7	17.2	24.1	124.7	8.5	79.2	7.4	12.3	7.4
REL	.3	10.2	35.3	10.6	.7	15.2	13.2	18.6	96.0	6.5	60.9	5.7	9.5	5.7
SPA	.3	8.2	28.4	8.5	.6	12.2	10.6	14.9	77.1	5.2	48.9	4.5	7.6	4.6
TAL	4.2	137.1	473.2	141.9	9.3	203.4	177.6	248.8	1286.7	87.3	816.7	75.9	126.9	76.5
ORD	.0	.5	1.7	.5	.0	.7	.6	.9	4.7	.3	3.0	.3	.5	.3
EBA	.1	2.5	8.6	2.6	.2	3.7	3.2	4.5	23.4	1.6	14.8	1.4	2.3	1.4
IBY	.7	23.9	82.5	24.7	1.6	35.5	31.0	43.4	224.3	15.2	142.4	13.2	22.1	13.3
ETH	3.4	111.9	386.1	115.8	7.6	165.0	144.9	203.0	1050.0	71.2	666.5	61.9	103.5	62.4
ORW	.5	25.0	86.5	25.9	1.7	37.2	32.4	45.5	235.1	15.9	149.2	13.9	23.2	14.0
AKI	.3	9.2	31.9	9.6	.6	13.7	12.0	16.8	86.7	5.9	55.0	5.1	8.5	5.2
OLA	1.0	33.8	116.6	35.0	2.3	50.1	43.7	61.3	317.0	21.5	201.2	18.7	31.3	18.8
ORT	.3	9.4	32.4	9.7	.6	13.9	12.1	17.0	88.0	6.0	55.9	5.2	8.7	5.2
OMA	.5	16.1	55.4	16.6	1.1	23.8	20.8	29.1	150.7	10.2	95.7	8.9	14.9	9.0
AUD	.7	23.1	79.8	23.9	1.6	34.3	29.9	41.9	216.9	14.7	137.7	12.8	21.4	12.9
PAI	.6	20.6	71.3	21.4	1.4	30.6	26.7	37.5	193.8	13.1	123.0	11.4	19.1	11.5
WED	2.0	64.7	223.2	66.9	4.4	95.9	83.7	117.4	606.9	41.2	385.2	35.8	59.8	36.1
WIT	1.6	52.7	182.0	54.6	3.6	78.2	68.3	95.7	494.8	33.6	314.1	29.2	48.8	29.4
YRI	.1	2.1	7.4	2.2	.1	3.2	2.8	3.9	20.2	1.4	12.8	1.2	2.0	1.2
URK	.2	6.4	21.9	6.6	.4	9.4	8.2	11.5	59.6	4.0	37.8	3.5	5.9	3.5
AWE	.2	8.0	27.5	8.2	.5	11.8	10.3	14.4	74.7	5.1	47.4	4.4	7.4	4.4
.K.	6.7	218.7	754.9	226.4	14.8	324.5	283.3	396.9	2052.7	139.2	1303.0	121.1	202.4	122.0
SSR	5.6	181.6	627.0	188.0	12.3	269.5	235.3	329.7	1704.9	115.6	1082.2	100.6	168.1	101.3
UGO	.5	16.2	55.9	16.8	1.1	24.0	21.0	29.4	151.9	10.3	96.4	9.0	15.0	9.0
EST	20.1	653.3	2255.3	676.4	44.1	969.5	846.3	1185.9	6132.7	415.9	3892.8	361.7	604.7	364.5

Table 4.16 (Continued)

IRAQ	IREL	ISRA	ITAL	JORD	LEBA	LIBY	NETH	NORW	PAKI	POLA	PORT	ROMA	SAUD
.2	.5	.4	4.2	.1	.1	.3	3.8	1.1	.4	1.5	.4	.8	.2
4.1	12.0	11.0	110.4	1.6	2.0	6.6	99.0	27.8	10.1	40.3	10.6	19.9	5.3
17.5	50.9	46.8	468.0	6.9	8.4	28.1	419.7	118.0	43.0	170.9	45.0	84.4	22.3
3.0	8.8	8.1	81.0	1.2	1.5	4.9	72.6	20.4	7.4	29.6	7.8	14.6	3.9
.2	.5	.5	4.8	.1	.1	.3	4.3	1.2	.4	1.8	.5	.9	.2
5.6	16.3	15.0	150.2	2.2	2.7	9.0	134.7	37.8	13.8	54.8	14.4	27.1	7.2
5.5	16.0	14.7	147.0	2.2	2.6	8.8	131.8	37.1	13.5	53.7	14.1	26.5	7.0
6.5	18.8	17.3	173.2	2.5	3.1	10.4	155.3	43.7	15.9	63.3	16.7	31.2	8.3
58.0	168.5	155.1	1549.4	22.7	27.9	92.9	1389.5	390.5	142.4	565.9	149.0	279.4	73.8
3.4	9.8	9.0	90.4	1.3	1.6	5.4	81.0	22.8	8.3	33.0	8.7	16.3	4.3
28.2	82.0	75.4	753.8	11.1	13.6	45.2	676.0	190.0	69.3	275.3	72.5	135.9	35.9
1.0	2.8	2.6	25.8	.4	.5	1.5	23.2	6.5	2.4	9.4	2.5	4.7	1.2
3.6	10.4	9.6	95.6	1.4	1.7	5.7	85.8	24.1	8.8	34.9	9.2	17.2	4.6
3.9	11.2	10.3	103.2	1.5	1.9	6.2	92.6	26.0	9.5	37.7	9.9	18.6	4.9
0.0	6.2	5.7	57.1	.8	1.0	3.4	51.2	14.4	5.2	20.9	5.5	10.3	2.7
1.6	0.0	4.4	44.0	.6	.8	2.6	39.4	11.1	4.0	16.1	4.2	7.9	2.1
1.3	3.8	0.0	35.3	.5	.6	2.1	31.7	8.9	3.2	12.9	3.4	6.4	1.7
22.0	64.1	59.0	0.0	8.6	10.6	35.3	528.3	148.5	54.1	215.2	56.7	106.2	28.1
.1	.2	.2	2.2	0.0	.0	.1	1.9	.5	.2	.8	.2	.4	.1
.4	1.2	1.1	10.7	.2	0.0	.6	9.6	2.7	1.0	3.9	1.0	1.9	.5
3.8	11.2	10.3	102.7	1.5	1.8	0.0	92.1	25.9	9.4	37.5	9.9	18.5	4.9
18.0	52.3	48.1	480.7	7.1	8.7	28.8	0.0	121.2	44.2	175.6	46.2	86.7	22.9
4.0	11.7	10.8	107.7	1.6	1.9	6.5	96.5	0.0	9.9	39.3	10.4	19.4	5.1
1.5	4.3	4.0	39.7	.6	.7	2.4	35.6	10.0	0.0	14.5	3.8	7.2	1.9
5.4	15.8	14.5	145.1	2.1	2.6	8.7	130.1	36.6	13.3	0.0	14.0	26.2	6.9
1.5	4.4	4.0	40.3	.6	.7	2.4	36.1	10.2	3.7	14.7	0.0	7.3	1.9
2.6	7.5	6.9	69.0	1.0	1.2	4.1	61.9	17.4	6.3	25.2	6.6	0.0	3.3
3.7	10.8	9.9	99.3	1.5	1.8	6.0	89.0	25.0	9.1	36.3	9.6	17.9	0.0
3.3	9.6	8.9	88.7	1.3	1.6	5.3	79.6	22.4	8.2	32.4	8.5	16.0	4.2
10.4	30.2	27.8	277.9	4.1	5.0	16.7	249.2	70.0	25.5	101.5	26.7	50.1	13.2
8.5	24.6	22.7	226.6	3.3	4.1	13.6	203.2	57.1	20.8	82.7	21.8	40.9	10.8
.3	1.0	.9	9.2	.1	.2	.6	8.3	2.3	.8	3.4	.9	1.7	.4
1.0	3.0	2.7	27.3	.4	.5	1.6	24.5	6.9	2.5	10.0	2.6	4.9	1.3
1.3	3.7	3.4	34.2	.5	.6	2.1	30.7	8.6	3.1	12.5	3.3	6.2	1.6
35.2	102.2	94.1	939.8	13.8	16.9	56.4	842.8	236.9	86.4	343.2	90.4	169.5	44.8
29.2	84.9	78.1	780.6	11.5	14.1	46.8	700.0	196.7	71.7	285.1	75.1	140.8	37.2
2.6	7.6	7.0	69.6	1.0	1.3	4.2	62.4	17.5	6.4	25.4	6.7	12.5	3.3
105.0	305.3	281.0	2807.8	41.2	50.6	168.4	2518.0	707.7	258.0	1025.5	270.1	506.4	133.8

Table 4.16 (Continued)

SPAI	SWED	SWIT	SYRI	TURK	UARE	U.K.	USSR	YUGO	REST
1.4	2.0	1.8	.1	.3	.3	8.0	3.3	.7	17.3
36.2	53.5	47.0	3.2	7.9	6.8	211.4	88.0	18.4	456.6
153.3	226.8	199.3	13.5	33.3	28.8	896.1	373.1	78.0	1935.9
26.5	39.2	34.5	2.3	5.8	5.0	155.1	64.6	13.5	335.0
1.6	2.3	2.1	.1	.3	.3	9.3	3.9	.8	20.0
49.2	72.8	63.9	4.3	10.7	9.2	287.5	119.7	25.0	621.1
48.2	71.2	62.6	4.2	10.5	9.1	281.5	117.2	24.5	608.0
56.7	83.9	73.8	5.0	12.3	10.7	331.6	138.1	28.9	716.4
507.5	750.8	659.8	44.6	110.4	95.4	2966.7	1235.1	258.1	6408.7
29.6	43.8	38.5	2.6	6.4	5.6	173.0	72.0	15.1	373.7
246.9	365.3	321.0	21.7	53.7	46.4	1443.3	600.9	125.6	3117.9
8.5	12.5	11.0	.7	1.8	1.6	49.5	20.6	4.3	106.8
31.3	46.3	40.7	2.8	6.8	5.9	183.1	76.2	15.9	395.6
33.8	50.0	44.0	3.0	7.4	6.4	197.7	82.3	17.2	427.0
18.7	27.7	24.3	1.6	4.1	3.5	109.3	45.5	9.5	236.2
14.4	21.3	18.7	1.3	3.1	2.7	84.2	35.0	7.3	181.8
11.6	17.1	15.0	1.0	2.5	2.2	67.6	28.1	5.9	146.0
193.0	285.5	250.8	17.0	42.0	36.3	1128.0	469.6	98.1	2436.7
.7	1.0	.9	.1	.2	.1	4.1	1.7	.4	8.9
3.5	5.2	4.6	.3	.8	.7	20.5	8.5	1.8	44.3
33.6	49.8	43.7	3.0	7.3	6.3	196.6	81.9	17.1	424.8
157.5	232.9	204.7	13.8	34.3	29.6	920.5	383.2	80.1	1988.4
35.3	52.2	45.8	3.1	7.7	6.6	206.1	85.8	17.9	445.3
13.0	19.2	16.9	1.1	2.8	2.4	76.0	31.6	6.6	164.1
47.5	70.3	61.8	4.2	10.3	8.9	277.9	115.7	24.2	600.3
13.2	19.5	17.2	1.2	2.9	2.5	77.2	32.1	6.7	166.7
22.6	33.4	29.4	2.0	4.9	4.3	132.1	55.0	11.5	285.4
32.5	48.1	42.3	2.9	7.1	6.1	190.1	79.2	16.5	410.7
0.0	43.0	37.8	2.6	6.3	5.5	169.9	70.7	14.8	366.9
91.0	0.0	118.3	8.0	19.8	17.1	532.0	221.5	46.3	1149.3
74.2	109.8	0.0	6.5	16.1	14.0	433.8	180.6	37.7	937.1
3.0	4.5	3.9	0.0	.7	.6	17.7	7.4	1.5	38.2
8.9	13.2	11.6	.8	0.0	1.7	52.3	21.8	4.5	112.9
11.2	16.6	14.6	1.0	2.4	0.0	65.5	27.3	5.7	141.5
307.8	455.4	400.2	27.1	67.0	57.9	0.0	749.1	156.5	3887.2
255.7	378.2	332.4	22.5	55.6	48.1	1494.6	0.0	130.0	3228.6
22.8	33.7	29.6	2.0	5.0	4.3	133.2	55.4	0.0	287.7
919.7	1360.6	1195.6	80.8	200.1	173.0	5376.1	2238.1	467.7	0.0

Table 4.17

RATIO OF ACTUAL TO THEORETICAL TRADE FLOWS (RELATIVE ACCEPTANCES), 1968 (MILLION U.S.$).

	AFGH	AUST	BELG	BULG	CYPR	CZEC	DENM	EGER	FEDG	FINL	FRAN	GREE	HUNG	IRAN
AFGH	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.248	0.000	.155	0.000	0.000	1.289
AUST	.254	1.000	.280	.944	.865	1.217	1.097	.553	1.929	1.021	.295	1.385	2.187	.858
BELG	0.000	.437	1.000	.077	.449	.129	.561	.075	1.672	.434	2.335	.733	.113	.388
BULG	0.000	.573	.043	1.000	.943	2.753	.082	3.859	.270	.092	.098	1.687	1.835	.228
CYPR	0.000	.355	.257	.686	1.000	.539	.411	.538	1.580	.698	.373	2.888	0.000	0.000
CZEC	0.000	1.196	.112	2.543	.806	1.000	.365	5.030	.316	.423	.128	.641	4.700	.713
DENM	0.000	1.070	.382	.107	1.299	.195	1.000	.332	.995	2.416	.345	.407	.190	.624
EGER	0.000	.514	.190	2.996	.331	5.300	.333	1.000	0.000	.515	.135	.412	4.933	.039
FEDG	.587	3.068	1.498	.203	.468	.330	1.296	0.000	1.000	1.036	1.426	1.261	.254	1.407
FINL	0.000	.433	.558	.147	.916	.285	2.185	.296	.872	1.000	.523	1.314	.324	.571
FRAN	.502	.517	2.129	.249	.667	.147	.536	.083	1.432	.518	1.000	.990	.190	.853
GREE	0.000	.965	.737	1.752	11.093	.976	.128	.733	1.625	.366	.941	1.000	1.402	.149
HUNG	0.000	1.640	.142	1.346	0.000	4.633	.208	4.060	.335	.346	.166	.641	1.000	.677
IRAN	5.561	.037	.168	.048	0.000	.160	.241	.057	.188	.543	.262	.436	.211	1.000
IRAQ	0.000	0.000	.992	.015	0.000	.030	0.000	.004	.284	.012	2.765	3.099	0.000	.364
IREL	0.000	.078	.351	0.000	0.000	.033	.106	.011	.203	.077	.392	0.000	0.000	.035
ISRA	0.000	.816	1.414	.106	6.313	.008	.432	0.000	.751	.899	.623	1.935	1.000	3.622
ITAL	.333	1.269	.893	.343	1.567	.272	.590	.094	1.478	.392	1.567	1.932	.476	.995
JORD	0.000	0.000	0.000	0.000	0.000	.537	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LEBA	0.000	.562	2.943	0.000	16.112	0.000	.744	0.000	.287	.126	.222	.798	0.000	3.382
LIBY	0.000	0.000	.732	0.000	0.000	0.000	.594	0.000	1.768	0.000	1.384	.015	0.000	0.000
NETH	.408	.764	3.089	.088	.622	.178	.805	.135	2.208	.628	1.317	.733	.130	.606
NORW	0.000	.415	.379	.015	2.070	.196	4.216	.222	1.082	2.170	.320	3.656	.168	.243
PAKI	30.699	.168	.819	.398	0.000	.540	.109	.018	.333	.017	.378	.293	.328	1.029
POLA	0.000	1.090	.147	1.459	.263	4.051	.860	2.871	.341	1.049	.196	.824	3.616	.658
PORT	0.000	1.163	.436	.031	2.844	.137	1.531	.029	.486	1.223	.594	.559	0.000	.153
ROMA	0.000	1.233	.121	1.253	1.292	3.652	.072	2.402	.622	.352	.418	1.541	2.557	1.719
SAUD	0.000	0.000	.698	0.000	0.000	0.000	.464	0.000	.954	0.000	.500	2.291	0.000	0.000
SPAI	0.000	.228	.393	.346	.431	.323	.748	.163	.848	.396	1.132	.420	.408	.191
SWED	0.000	.852	.678	.136	.962	.217	5.585	.351	.948	5.640	.597	.735	.219	.493
SWIT	1.669	3.718	.535	.216	.365	.331	1.251	.170	1.158	1.168	1.109	.915	.396	.901
SYRI	0.000	0.000	.108	0.000	0.000	.502	.431	.257	.278	0.000	.688	0.000	.906	.083
TURK	0.000	.976	.753	.837	0.000	1.454	.802	1.015	1.449	.049	.576	1.052	2.093	2.060
UARE	0.000	.477	.160	.837	0.000	2.768	.136	1.564	.325	.513	.264	1.747	.896	0.000
U.K.	.372	.581	.772	.043	3.774	.135	1.335	.076	.424	1.377	.466	.807	.151	1.200
USSR	0.000	.290	.095	9.791	.244	7.524	.112	9.440	.155	2.046	.152	.243	7.995	.383
YUGO	0.000	2.756	.188	1.665	1.261	2.286	.215	1.855	.799	.049	.304	3.872	1.929	.453
REST	2.354	.387	.923	.168	.789	.209	.953	.149	1.098	.714	1.186	.939	.064	1.433

Table 4.17 (Continued)

IRAQ	IREL	ISRA	ITAL	JORD	LEBA	LIBY	NETH	NORW	PAKI	POLA	PORT	ROMA	SAUD
0.000	0.000	0.000	.143	0.000	0.000	0.000	.053	0.000	65.554	0.000	0.000	0.000	0.000
1.090	.208	.561	1.857	.494	3.420	.604	.622	.769	.158	.967	1.347	1.869	.779
.714	.324	.905	.660	.408	1.542	.452	4.093	.580	.286	.133	.666	.233	.744
1.749	0.000	.222	.542	0.000	0.000	1.565	.034	.020	.524	1.826	.026	1.232	0.000
0.000	0.000	1.858	.930	0.000	12.621	3.791	1.106	0.000	0.000	.396	0.000	1.146	0.000
1.175	.135	.100	.385	.998	0.000	.533	.180	.269	.326	4.285	.145	3.323	0.000
.691	.632	.360	.676	.463	2.417	.420	.514	5.128	.155	.495	.778	.132	.914
.525	.111	0.000	.151	.354	0.000	0.000	.239	.224	.044	4.505	.030	2.881	0.000
.349	.529	.774	1.222	.655	1.842	.606	1.822	.913	.734	.259	1.235	.663	.836
.414	1.394	.818	.546	0.000	.983	0.000	.929	1.884	.096	.600	.437	.160	0.000
.713	.403	1.313	1.552	.759	5.501	.672	.954	.407	.680	.302	1.262	.560	.534
1.553	.142	1.160	2.416	0.000	12.251	3.228	.842	.215	0.000	.625	1.610	1.267	.731
1.034	0.000	.501	.601	.712	0.000	.628	.188	.274	.421	2.920	0.000	2.145	0.000
1.580	.160	.068	.356	0.000	2.581	0.000	.622	.188	4.723	.186	.081	.355	0.000
1.000	2.093	0.000	4.302	2.267	22.940	0.000	1.380	.486	.133	.038	3.295	0.000	2.719
.061	1.000	.091	.091	0.000	.758	.190	.282	.099	0.000	.087	.118	0.000	.191
0.000	.365	1.000	.241	0.000	0.000	0.000	1.017	.337	0.000	0.000	.177	1.571	0.000
.994	.226	.923	1.000	.659	4.815	4.990	.893	.333	.558	.411	1.417	.773	1.168
62.003	0.000	0.000	.046	1.000	79.827	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.830
27.472	2.577	0.000	.551	55.372	1.000	20.875	2.906	.259	0.000	0.000	.097	0.000	0.000
0.000	.143	0.000	3.992	0.000	.108	1.000	1.594	.834	0.000	0.000	0.000	.124	0.000
.267	.578	.617	.834	.609	1.605	.631	1.000	.683	.283	.150	.586	.283	.877
.248	.513	2.060	.591	0.000	.464	.139	.566	1.000	.081	.300	.917	.021	.175
2.358	.626	0.000	.486	0.000	0.000	0.000	.374	.030	1.000	1.139	1.415	.769	5.870
.847	.684	.048	.511	.516	0.000	.850	.154	.473	1.807	1.000	.215	1.796	0.000
.862	.479	.471	.417	0.000	2.893	0.000	.446	.955	.270	.122	1.000	.220	.417
1.976	.160	1.274	1.030	2.666	0.000	1.958	.155	.052	.852	1.984	.693	1.000	0.000
0.000	.648	0.000	1.826	3.636	0.000	0.000	.960	.424	.088	0.000	0.000	0.000	1.000
.392	.529	.293	.503	0.000	3.192	.940	.982	.559	.074	.364	5.473	.731	.355
1.155	.738	.496	.556	.490	1.059	.228	.911	7.340	.270	.373	1.123	.433	.559
1.074	.321	1.310	1.554	.451	3.872	.920	.509	.771	.658	.210	1.960	.556	.963
17.092	0.000	0.000	.910	52.416	224.983	1.626	.278	0.000	0.000	1.276	0.000	1.923	8.414
.392	.303	1.867	.883	.998	47.189	.489	.625	.247	.120	.783	2.552	1.849	.077
6.565	0.000	0.000	.611	4.182	8.439	2.389	.166	.058	.064	1.601	0.000	2.853	4.110
1.089	6.400	2.241	.454	1.435	2.977	1.480	.728	1.291	1.317	.311	1.613	.453	2.521
1.086	.071	0.000	.328	.323	0.000	.090	.069	.124	.457	7.303	.032	6.202	0.000
1.307	0.000	1.379	2.537	.686	2.314	1.630	.247	.257	3.630	1.456	0.000	1.770	.634
1.385	.698	1.419	1.165	1.458	-4.176	.996	.779	1.135	1.839	.348	1.011	.274	1.348

Table 4.17 (Continued)

SPAI	SWED	SWIT	SYRI	TURK	UARE	U.K.	USSR	YUGO	REST
0.000	0.000	1.010	0.000	0.000	0.000	1.461	0.000	0.000	1.375
.373	1.370	3.885	1.353	1.462	.368	.597	.777	4.149	.547
.440	.621	.818	.386	.555	.222	.398	.127	.262	.791
.234	.066	.122	1.801	1.005	2.025	.104	13.399	1.512	.144
2.776	.256	.194	0.000	0.000	0.000	3.551	1.141	.620	.230
.134	.286	.403	7.609	1.047	2.335	.174	8.455	3.706	.274
.434	5.538	.989	.425	.649	.232	1.933	.161	.310	.913
.056	.387	.106	.942	.972	2.737	.115	11.379	2.208	.169
.888	1.283	2.165	.495	1.563	.692	.339	.221	1.318	1.027
.473	3.917	.483	.307	.357	.629	1.945	3.490	.060	.582
1.361	.564	1.895	1.087	.490	1.378	.419	.427	.514	1.217
.780	.599	.427	0.000	.217	4.086	.392	1.185	5.230	.665
.105	.298	.378	1.053	2.480	.900	.118	8.960	2.994	.414
.349	.208	.164	0.000	0.000	0.000	1.631	.382	.320	2.752
2.315	.148	0.000	11.858	7.029	1.791	.432	.094	1.240	.675
.389	.183	.118	0.000	.064	.074	6.581	.023	.178	.823
.484	.555	1.389	0.000	1.431	0.000	1.045	0.000	1.939	1.864
1.090	.566	1.322	1.374	1.885	.956	.399	.381	2.921	1.139
0.000	0.000	0.000	37.053	7.812	0.000	0.000	0.000	7.240	2.265
.770	.424	.351	46.072	6.031	3.033	.449	0.000	1.010	.888
3.228	.016	.373	.068	.902	.095	1.752	0.000	.210	.309
.605	.991	.836	.433	.505	.392	.774	.122	.331	.765
.556	5.630	.471	0.000	.339	.166	1.811	.221	.234	.973
.677	.198	.136	0.000	1.769	1.800	1.102	.443	1.271	2.463
.320	.520	.173	1.101	.754	1.756	.470	9.008	1.663	.412
.871	1.987	.793	.086	1.149	.081	1.903	0.000	.060	1.958
.482	.188	.184	3.976	1.627	9.082	.423	8.291	1.731	.204
4.768	.605	0.000	.140	1.456	.147	.782	0.000	0.000	1.941
1.000	1.131	.932	2.114	.396	4.246	.954	.252	.379	1.805
.839	1.000	.998	.450	.540	.421	1.366	.356	.475	.860
1.279	1.263	1.000	.920	1.134	.444	.693	.151	1.108	1.334
.860	0.000	.229	1.000	11.102	11.611	.040	2.665	.130	.946
1.074	.242	2.306	1.527	1.000	.952	.649	1.374	1.210	.853
1.348	.115	.426	5.076	.287	1.000	.226	6.407	2.106	1.233
.899	1.385	.817	.443	1.256	.516	1.000	.333	.383	1.937
.067	.254	.037	1.139	.494	1.988	.228	1.000	1.302	.085
.351	.525	.945	.749	.767	6.465	.454	3.733	1.000	.619
1.505	.972	.588	.873	.765	.776	1.991	.155	.634	1.000

CHAPTER 5: SECOND STAGE ANALYSIS: MULTIPLE REGRESSION

5.1 Introduction

It is appropriate at this point to review analyses made thus far and point out what remains to be done. Starting with the actual inter-country trade data for 1959 and 1968, the Goodman-Alker procedure explained in Chapter 3 was used in Chapter 4 to determine the theoretical inter-country trade flows. Theoretical trade flow values presented in Tables 4.13 and 4.16 in Chapter 4 give the trade size from one country to the next under conditions of equal resistance. In other words, if there were no spatial and locational distortions and if there were no deviations from the normal pattern of artificial barriers, then trade from one country to another in 1959 and 1968 would be expected to be equal to the theoretical trade flows shown in Tables 4.13 and 4.16, respectively. However, spatial and locational distortions undeniably exist and there are important deviations from the normal artificial barriers; for example, wars or political hostilities are negative, and preferential trade agreements are positive deviations from the normal pattern. Due to these distortions and deviations the actual trade size is not expected to be equal to the resistance-free theoretical trade size.

The purpose of this Chapter is to determine the effects of these distortions and deviations on the trade between countries. To achieve this purpose a multiple regression analysis will be used to make an estimate of the parameters and to assess the significance of each independent variable in explaining the values of the dependent variable in the following model:

$$RA_{ij} = \lambda_0 D_{ij}^{-\lambda_1} C_i^{\lambda_2} S_{ij}^{\lambda_3} W_{ij}^{-\lambda_4} \quad \ldots\ldots\ldots\ldots \quad (5\text{-}1)$$

where

RA_{ij} is the relative acceptance of trade from country i to country j, or the ratio of actual trade values to theoretical trade values.

D_{ij} is the geographic distance between country i and country j.

S_{ij} is the preferential trade arrangement between country i and country j.

C_i is the composite locational index of country i.

W_{ij} is war or political hostility between country i and country j.

$\lambda_0, \ldots, \lambda_4$ are parameters.

5.2 Operational Data

RA_{ij} values for 1959 and 1968 are computed in Chapter 4. Specifically, Tables 4.14 and 4.17 of Chapter 4 give RA_{ij} values for 1959 and 1968, respectively.

The distance chart for 1959 is given in Table 5.1. Table 5.2 presents the distance chart for 1968. In computing 1968 distances appropriate adjustments are made to reflect a route change from the Suez to the Cape of Good Hope. Tables 5.1 and 5.2 do not include port-to-port distances only. Starting from the premise that the foreign trade of a country is neither produced nor consumed at the port of exit or entry, the distances between the port and the approximate economic center of the country are added to the port-to-port distances. The ports and hinterland distances to the approximate economic center of the countries in the region are given in Table 5.3. It is assumed that no significant shift in the approximate economic center occurred from 1959 to 1968.

Table 5.1: Geographic Distance (Statute Miles) Between Countries, 1959

	Afghanistan	Austria	Belgium	Bulgaria	Cyprus	Czechoslovakia	Denmark	Eastern Germany	Federal Germany	Finland	France	Greece
Afghanistan	0											
Austria	5,221	0										
Belgium	6,959	729	0									
Bulgaria	4,771	950	3,528	0								
Cyprus	3,896	1,165	1,351	1,066	0							
Czechoslovakia	5,371	150	720	1,100	1,915	0						
Denmark	7,576	920	728	4,020	3,849	964	0					
Eastern Germany	7,915	550	1,078	1,650	4,199	400	350	0				
Federal Germany	7,471	421	261	1,800	3,819	400	760	370	0			
Finland	8,268	1,865	1,505	4,711	4,616	1,015	872	1,222	1,527	0		
France	5,539	709	349	2,030	1,981	1,985	889	1,239	861	2,093	0	
Greece	5,362	1,200	3,031	759	665	1,350	3,523	3,873	3,493	4,290	1,516	0
Hungary	5,284	150	3,319	700	1,715	450	3,911	650	750	4,678	1,973	1,250
Iran	800	5,227	7,015	4,785	3,902	5,377	7,507	7,857	7,477	8,274	5,545	4,368
Iraq	2,177	5,127	6,915	4,685	3,802	5,277	7,407	7,757	7,377	8,174	4,334	4,268
Ireland	6,801	3,161	731	3,310	3,149	3,311	434	884	1,199	2,000	595	2,823
Israel	3,836	1,747	3,437	1,148	150	1,897	4,029	4,379	3,899	4,696	2,063	747
Italy	5,294	200	2,486	1,726	1,759	350	2,978	3,328	563	3,745	753	1,294
Jordan	4,095	1,946	3,650	1,348	312	2,096	4,142	4,492	4,112	4,909	2,146	946
Lebanon	3,895	1,746	3,450	1,148	112	1,896	3,942	4,292	3,912	4,709	1,946	746
Libya	4,459	1,050	2,547	1,251	1,202	1,200	3,039	3,389	3,009	3,806	1,093	737
Netherlands	6,962	755	171	3,581	3,310	755	597	947	284	1,364	350	2,984
Norway	7,816	4,706	1,009	4,301	4,130	1,536	572	922	1,041	1,348	1,170	3,804
Pakistan	400	4,821	6,639	4,371	3,496	4,971	7,101	7,451	7,071	7,868	5,139	3,762
Poland	8,009	500	1,430	1,250	1,715	450	764	400	1,462	815	1,834	4,225
Portugal	6,266	2,260	1,157	2,399	2,228	2,410	1,649	1,999	1,619	2,416	1,009	1,902
Romania	5,021	850	3,778	350	1,316	850	4,270	1,250	1,700	4,961	2,280	1,009
Saudi Arabia	3,329	2,533	4,321	2,128	1,208	2,728	4,813	5,208	4,783	5,380	1,851	1,674
Spain	5,565	1,930	1,037	2,077	2,028	2,080	1,529	1,879	1,499	2,296	837	1,563
Sweden	7,211	4,606	1,437	4,789	4,595	1,130	846	1,196	1,505	539	1,634	4,268
Switzerland	5,294	575	419	1,791	1,759	550	2,978	3,328	274	3,745	154	1,294
Syria	4,125	1,844	3,745	1,392	212	1,994	4,037	4,387	4,007	4,804	2,160	844
Turkey	4,671	1,627	3,428	500	966	1,777	3,920	4,270	3,890	4,687	1,930	659
United Arab Republic	3,815	1,706	3,484	1,256	381	1,856	3,986	4,336	3,956	4,753	2,024	847
United Kingdom	7,065	3,426	393	3,501	3,414	3,576	854	1,214	825	1,621	455	3,154
U.S.S.R.	1,800	1,100	2,049	1,300	1,959	1,050	1,517	1,717	2,081	772	2,200	2,562
Yugoslavia	5,134	5,134	3,169	700	1,565	600	3,761	4,111	3,731	4,528	1,823	1,100

	Hungary	Iran	Iraq	Ireland	Israel	Italy	Jordan	Lebanon	Libya	Netherlands	Norway	Pakistan	Poland
Hungary	0												
Iran	5,307	0											
Iraq	5,107	600	0										
Ireland	3,211	6,807	6,707	0									
Israel	1,797	3,842	3,742	1,429	0								
Italy	712	5,300	5,200	2,278	1,841	0							
Jordan	1,952	4,101	4,001	3,442	150	1,907	0						
Lebanon	1,752	3,901	3,801	3,242	100	1,707	200	0					
Libya	1,290	4,665	4,565	2,339	1,284	919	1,321	1,121	0				
Netherlands	3,372	6,968	6,868	686	3,390	2,439	3,602	3,402	2,500	0			
Norway	4,174	7,788	7,688	979	4,268	3,317	4,480	4,223	3,320	854	0		
Pakistan	4,884	1,877	1,777	6,401	3,436	4,894	3,695	3,495	4,259	6,562	7,382	0	
Poland	450	8,015	7,915	3,111	4,793	3,742	4,906	4,706	3,803	1,361	1,336	7,609	0
Portugal	2,290	6,096	5,996	942	2,308	1,357	2,521	2,321	1,418	1,110	1,930	5,866	2,413
Romania	550	5,035	4,935	3,560	1,398	1,976	1,598	1,398	1,501	3,731	4,551	4,621	900
Saudi Arabia	2,678	3,336	3,236	4,113	1,168	2,606	1,407	1,207	1,971	4,274	5,094	2,929	5,560
Spain	2,072	5,571	5,471	1,421	2,110	856	2,188	1,988	1,061	990	1,810	5,165	2,293
Sweden	4,656	8,252	8,152	2,028	4,732	4,223	4,887	4,687	3,784	1,342	1,319	6,811	850
Switzerland	700	5,300	5,200	2,278	1,841	333	1,907	1,707	919	2,439	3,259	4,894	3,742
Syria	1,894	4,131	950	3,337	436	2,139	300	100	1,241	3,498	4,318	3,725	4,801
Turkey	1,709	4,677	1,300	3,220	1,048	1,619	1,248	1,048	1,151	3,381	4,301	4,271	4,684
United Arab Republic	1,756	3,821	3,721	3,386	321	1,779	580	380	1,144	3,447	4,367	3,415	4,750
United Kingdom	3,475	7,072	6,972	795	3,560	2,609	3,773	3,573	2,670	334	1,118	6,665	1,618
U.S.S.R.	1,200	1,900	5,570	2,604	2,041	2,684	2,231	2,031	2,144	1,918	1,895	5,164	750
Yugoslavia	150	5,157	5,057	3,061	1,647	562	1,802	1,602	1,140	3,222	4,024	4,734	800

	Portugal	Romania	Saudi Arabia	Spain	Sweden	Switzerland	Syria	Turkey	United Arab Republic	United Kingdom	U.S.S.R.	Yugoslavia
Portugal	0											
Romania	2,649	0										
Saudi Arabia	3,192	2,378	0									
Spain	405	2,327	2,977	0								
Sweden	2,934	5,039	5,558	2,274	0							
Switzerland	1,357	2,041	2,606	856	3,723	0						
Syria	2,416	1,642	1,437	2,207	4,782	2,139	0					
Turkey	2,299	750	1,983	1,984	4,665	1,691	500	0				
United Arab Republic	2,365	1,506	1,077	2,050	4,731	1,779	610	1,156	0			
United Kingdom	1,273	3,751	4,378	1,194	2,276	2,609	3,688	3,551	3,517	0		
U.S.S.R.	2,970	1,200	2,976	2,950	1,086	2,684	2,161	1,393	2,049	2,175	0	
Yugoslavia	2,140	500	2,433	1,922	4,506	1,536	1,744	1,559	1,606	3,325	2,552	0

Source: Water distances are taken from U.S. Navy Department, Hydrographic Office, Table of Distances Between Ports, Washington, D.C., 1943. Inland distances are taken from U.S. Department of the Army, the Navy, and the Air Force, Official Table of Distances: Foreign Travel, Washington, D.C., October 1968.

Table 5.2: Geographic Distance (Statute Miles) Between Countries, 1968

	Afghanistan	Austria	Belgium	Bulgaria	Cyprus	Czechoslovakia	Denmark	Eastern Germany	Federal Germany	Finland	France	Greece	Hungary	Iran	Iraq	Ireland	Israel	Italy	Jordan	Lebanon	Libya	Netherlands	Norway	Pakistan	Poland	Portugal	Romania	Saudi Arabia	Spain	Sweden	Switzerland	Syria	Turkey	United Arab Republic	United Kingdom	U.S.S.R.	Yugoslavia
Afghanistan	0																																				
Austria	12,510	0																																			
Belgium	11,959	729	0																																		
Bulgaria	12,469	950	3,528	0																																	
Cyprus	12,498	1,665	1,357	1,066	0																																
Czechoslovakia	12,660	150	720	1,100	1,915	0																															
Denmark	12,251	920	728	4,020	3,849	964	0																														
Eastern Germany	12,601	550	1,078	1,650	4,199	400	350	0																													
Federal Germany	12,418	421	261	1,800	3,819	400	760	370	0																												
Finland	13,118	1,865	1,505	4,711	4,616	1,015	872	1,222	1,527	0																											
France	11,612	709	349	2,030	1,981	1,985	889	1,239	861	2,093	0																										
Greece	12,172	1,200	3,031	759	665	1,350	3,523	3,873	3,493	3,429	1,516	0																									
Hungary	12,610	150	3,319	700	1,715	450	3,911	650	750	4,678	1,973	1,250	0																								
Iran	800	12,574	12,023	2,100	12,532	12,724	12,265	12,615	12,231	13,028	11,676	12,236	12,674	0																							
Iraq	2,177	12,474	11,923	1,600	12,432	12,624	12,165	12,515	12,131	12,928	11,576	12,136	12,564	600	0																						
Ireland	11,590	3,161	731	3,310	3,149	3,311	534	884	1,199	2,000	595	2,823	3,211	11,554	11,454	0																					
Israel	12,518	1,747	3,437	1,148	150	1,897	4,029	4,379	3,899	4,696	2,063	747	1,797	12,642	12,542	3,429	0																				
Italy	11,627	200	2,486	1,726	1,758	350	2,978	3,328	563	3,745	753	1,294	912	11,691	11,591	2,278	1,841	0																			
Jordan	12,791	1,946	3,650	1,348	312	2,096	4,142	4,492	4,112	14,909	2,146	946	1,952	12,855	12,755	3,442	150	1,907	0																		
Lebanon	12,591	1,746	3,450	1,148	112	1,896	3,942	4,292	3,912	4,709	1,946	746	1,752	12,655	12,555	3,242	100	1,707	200	0																	
Libya	11,688	1,050	2,547	1,251	1,202	1,200	3,039	3,389	3,009	3,806	1,093	737	1,290	11,752	11,652	2,339	1,284	919	1,321	1,121	0																
Netherlands	11,912	755	171	3,481	3,310	755	597	947	284	1,364	350	2,984	3,372	11,722	11,622	686	3,390	2,439	3,602	3,402	2,500	0															
Norway	12,732	4,706	1,009	4,301	4,130	1,536	572	922	1,041	1,348	1,170	3,804	4,174	12,542	12,442	979	4,268	3,317	4,480	4,280	3,320	854	0														
Pakistan	400	12,110	11,559	12,264	12,068	12,260	11,797	12,147	11,767	12,718	11,218	11,872	12,210	1,877	1,777	11,190	12,118	11,227	12,391	12,191	11,288	11,592	12,332	0													
Poland	12,901	500	1,430	1,250	1,715	450	764	400	1,462	815	1,834	5,224	450	12,915	12,815	3,111	4,793	3,742	4,906	4,706	3,803	1,361	1,336	12,447	0												
Portugal	10,830	2,260	1,157	2,399	2,228	2,410	1,649	1,999	1,619	2,416	1,009	1,902	2,290	10,894	10,794	942	2,308	1,357	2,521	2,321	1,418	1,110	1,930	10,430	2,413	0											
Romania	12,619	850	3,778	350	1,316	850	4,270	1,250	1,700	4,961	2,280	1,009	550	2,250	1,750	3,560	1,398	1,967	1,598	1,398	1,501	3,731	4,551	12,419	900	2,649	0										
Saudi Arabia	3,329	12,073	11,422	12,232	12,031	12,223	11,630	11,980	11,730	12,527	11,175	11,735	12,173	3,336	3,236	11,314	12,141	11,190	12,354	12,154	11,251	11,221	12,041	2,929	12,280	10,393	12,382	0									
Spain	11,386	1,930	1,037	2,077	2,028	2,080	1,529	1,879	1,499	2,296	837	1,563	2,072	11,450	11,350	1,421	2,110	956	2,188	1,988	1,061	990	1,801	10,986	2,293	405	2,326	10,949	0								
Sweden	13,196	4,606	1,473	4,789	4,595	1,130	846	1,196	1,505	539	1,634	4,268	4,656	13,006	12,906	2,028	4,632	4,223	4,887	4,687	3,784	1,342	1,319	12,542	850	2,394	5,039	12,657	2,274	0							
Switzerland	11,627	575	419	1,791	1,759	550	2,978	3,328	274	3,645	154	1,294	700	11,691	11,591	2,278	1,841	333	1,907	1,707	919	2,439	3,259	11,227	3,742	1,357	2,040	11,190	845	3,723	0						
Syria	12,686	1,844	3,745	1,392	212	1,994	4,037	4,387	4,007	4,804	2,160	844	1,894	12,750	950	3,337	436	2,139	300	100	1,241	3,498	4,318	12,286	4,801	2,416	1,642	12,249	2,206	4,782	2,139	0					
Turkey	12,369	1,627	3,428	500	966	1,777	3,920	4,270	3,890	4,687	1,930	659	1,709	1,800	1,300	3,220	1,048	1,691	1,248	1,048	1,151	3,321	4,301	12,169	4,684	2,299	750	12,132	1,974	4,665	1,691	500	0				
United Arab Republic	3,815	1,706	3,484	1,256	381	1,856	3,986	4,336	3,956	4,753	2,024	847	1,756	13,363	13,263	3,386	321	1,669	508	380	1,144	3,446	4,361	3,415	4,750	2,365	1,506	1,077	2,050	4,731	1,779	610	1,156	0			
United Kingdom	12,082	3,426	393	3,501	3,414	3,576	854	1,214	825	1,621	455	3,154	3,475	11,885	11,785	795	3,560	2,609	3,773	3,573	2,670	334	1,118	11,421	1,618	1,273	3,751	11,645	1,194	2,276	2,609	3,688	355	3,517	0		
U.S.S.R.	1,800	1,100	2,049	1,300	1,959	1,050	1,517	1,717	2,081	772	2,202	2,562	1,200	1,900	13,842	2,604	2,041	2,684	2,231	2,031	2,144	1,918	1,895	13,162	750	2,970	1,200	13,081	2,950	1,086	2,684	2,161	1,393	2,049	2,175	0	
Yugoslavia	12,410	450	3,169	700	1,565	600	3,761	4,111	3,731	4,528	1,823	1,100	150	12,474	12,374	3,061	1,647	562	1,802	1,602	1,140	3,222	1,024	12,010	800	2,140	500	11,963	1,922	4,506	1,536	1,744	1,559	1,606	3,325	2,552	0

Source: Water distances are taken from U.S. Navy Department, Hydrographic Office, Table of Distances Between Ports, Washington, D.C., 1943. Inland distances are taken from U.S. Department of the Army, the Navy, and the Air Force, Official Table of Distances: Foreign Travel, Washington, D.C., October 1968.

Table 5.3: Ports and Inland Distances to the Economic Center of the Country

Country	Port	Inland Distance (Miles)
Afghanistan	Karachi	800
Austria	Trieste	250
Belgium	Antwerp	50
Bulgaria	Burgas	150
Cyprus	Limassol	-
Czechoslovakia	Trieste	400
	Gdansk	500
Denmark	Copenhagen	-
Eastern Germany	Wismar	200
Federal Germany	Hamburg	250
Finland	Helsinki	100
France	Marseille	350
	LeHavre	100
Greece	Pireaus	100
Hungary	Trieste	350
Iran	Abadan	300
Iraq	Basra	200
Ireland	Dublin	-
Israel	Haifa	-
Italy	Genoa	200
	Venice	250
Jordan	Beirut	200
Lebanon	Beirut	-
Libya	Tripoli	-
Netherlands	Rotterdam	-
Norway	Oslo	300
Pakistan	Karachi	400
Poland	Gdansk	300
Portugal	Lisbon	-
Romania	Constanta	200
Saudi Arabia	Jiddah	300
Spain	Barcelona	300
	Bilbao	200
Sweden	Stockholm	200
Switzerland	Genoa	200
Syria	Latakia	100
Turkey	Istanbul	200
U.A.R.	Port Said	150
United Kingdom	London	150
U.S.S.R.	Odessa	850
	Leningrad	500
Yugoslavia	Rijeka	200

Source: All except Bulgaria, Czechoslovakia, Eastern Germany, Hungary, Poland, Romania, Saudi Arabia, and U.S.S.R. are taken from H. Linnemann, An Econometric Study of International Trade Flows, North-Holland Publishing Co., Amsterdam: 1966, pp. 223-225. For remaining countries distances from ports to economic centers are assumed by the writer.

The composite locational index for each country is computed by using Equation (2-18) developed in Chapter 2. In this computation the value of β^1 is assumed to be equal to unity. The index values for 1959 and 1968 are given in Table 5.4.

The effects of preferential trade agreements (trade stimulating artificial forces) and war or political hostility (trade reducing artificial forces) on the dependent variable are estimated by the use of dummy variables. Since the model given by Equation (5-1) is of logarithmic - linear type, to avoid the impossibility of dealing with the logarithm of zero, the following values will be used for the dummy variables:

S_{ij}	= 1	No preferential trade ties exist.
	= 2	Both countries are members of the same preferential trade group.
W_{ij}	= 1	War or political hostility exist between the two countries.
	= 2	No war or political hostility exist between the two countries.

Admittedly, the numerical values assigned to S_{ij} and W_{ij} are largely arbitrary. "Despite this fact, . . . the

Table 5.4: Locational Index Values for 1959 and 1968

Country	Index Value	
	1959	1968
Afghanistan	.2241	1.0318
Austria	1,179.7961	2,830.0648
Belgium	6,996.7949	14,843.5920
Bulgaria	134.8393	224.1061
Cyprus	230.3862	1,575.2084
Czechoslovakia	495.7393	2,157.6090
Denmark	3,685.9121	8,193.6931
Eastern Germany	1,285.7854	2,102.2966
Federal Germany	3,650.6943	8,349.2889
Finland	904.8385	1,788.8506
France	11,141.0293	27,217.8181
Greece	192.6393	436.9380
Hungary	671.6808	1,065.7813
Iran	3.6362	5.1190
Iraq	6.6936	9.0748
Ireland	2,061.1499	3,785.7269
Israel	344.3472	510.7763
Italy	933.8633	2,262.0128
Jordan	20.4595	73.3101
Lebanon	224.2476	636.1949
Libya	2.7583	69.5224
Netherlands	2,652.5908	5,205.6940
Norway	933.4465	1,854.8159
Pakistan	2.5928	2.1170
Poland	482.3961	750.6875
Portugal	132.4219	259.9660
Romania	184.8945	278.9028
Saudi Arabia	3.1121	3.3877
Spain	233.2476	513.6184
Sweden	1,770.9810	4,141.2237
Switzerland	4,478.6660	9,539.7380
Syria	35.6575	39.9311
Turkey	35.5031	65.7776
U.A.R.	21.2847	25.7832
United Kingdom	2,504.3120	4,181.5692
U.S.S.R.	224.0506	371.5146
Yugoslavia	297.2520	611.1225

results obtained by such [an arbitrary assignment] procedure tend to be invariant, for all practical purposes, to any reasonable method of assigning these numbers."[1]

In 1959 the following group of countries had preferential trade relations:

1. British Commonwealth of Nations:[2]
   - United Kingdom
   - Ireland
   - Cyprus
   - Pakistan

2. The Communist Bloc:
   - Bulgaria
   - Czechoslovakia
   - Eastern Germany
   - Hungary
   - Poland
   - Romania
   - U.S.S.R.
   - Yugoslavia

3. Arab League of Nations:
   - Iraq
   - Jordan
   - Lebanon
   - Libya
   - Saudi Arabia
   - Syria
   - United Arab Republic

1/ R. Ferber and P.J. Verdoorn, Research Methods in Economics and Business, The Macmillan Co., New York: 1962, p. 372.

2/ H. Linnemann, An Econometric Study of International Trade Flows, North-Holland Publishing Co., Amsterdam: 1966, p. 72.

A fourth group, namely, the European Economic Community, is added to the above to complete the list for 1968:

4. Common Market:
   Belgium
   Federal Germany
   France
   Italy
   Netherlands

Therefore, S_{ij} values for 1959 are assumed to be equal to 2 for the first three groups. For 1968, all four groups' S_{ij} values are taken as 2. The remaining country pairs in the region are given the value of 1.

As for war or political hostility in 1959 and 1968, W_{ij} values

1. Between The Communist Bloc countries and Belgium, Denmark, Federal Germany, France, Iran, Ireland, Israel, Italy, Netherlands, Norway, Pakistan, Portugal, Spain, Sweden, United Kingdom, except between Italy and Yugoslavia

2. Between Israel and Iraq, Jordan, Lebanon, Libya, Saudi Arabia, Syria, U.A.R.

3. Between Turkey and Greece

are assumed to be equal to 2, with remaining W_{ij} values being equal to 1.

5.3 Multiple Regression Analysis of 1959 Data[3/]

In the first section of this Chapter, the general format of the multiple regression model was presented by Equation (5-1). In the preceding section, the numeric data for this multiple regression exercise were identified. The data inputs for 1959 were run for two types of general regression models:

(1) Additive format, whereby the independent variables are assumed to be related to each other in a linear fashion such as:

$$RA_{i,j} = \lambda_0 + \lambda_1 D_{i,j} + \lambda_2 C_i + \lambda_3 S_{i,j} + \lambda_4 W_{i,j} \quad . \; . \quad (5\text{-}2)$$

(2) Multiplicative format where the independent variables are assumed to be related to each other in a logarithmically linear fashion as shown in Equation (5-1).

Table 5.5 shows the parameter estimates and the statistical significance of the additive (linear) multiple

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3/ For the analyses of this and the next section the LSDEL Routine at the CDC 3600 in Michigan State University is used. Access to this routine is provided through a grant from the Graduate School of Business, Michigan State University.

Table 5.5: Parameter Values and Related Statistics of the Linear Multiple Regression Model, 1959

Parameter	Regression Coefficient	Std. Error of Regression Coefficient	Partial Correlation Coefficient	Beta Weight
λ_0	-5.2429	1.1945	-	-
λ_1	-0.0004	0.0001	-0.12	-0.11
λ_2	-0.0001	0.0001	-0.05	-0.05
λ_3	8.9059	0.7242	0.36	0.37
λ_4	-1.0227	0.5153	-0.06	-0.06

regression run. The multiple correlation coefficient is .42, with the multiple coefficient of determination being equal to .18 and the standard error of estimate being 6.34.

The results indicate that for all practical purposes the linear model does not adequately explain the variation in the dependent variable. Of the four independent variables preferential trade relations (λ_3) provide the greatest contribution to an explanation of the variations in relative acceptances (because its beta weight is highest), but even this variable has a low partial correlation coefficient. The conclusion reached is that the linear (additive) model shown by Equation (5-2) does not adequately explain the values of relative acceptances for 1959.

Another multiple regression run with the same data for 1959 was made for the multiplicative format given in Equation (5-1). The results of this run are shown in Table 5.6.

The multiple correlation coefficient and the standard error of estimate were 0.63 and 0.44, respectively.

Table 5.6: Parameter Values and Related Statistics of the Logarithmic-Linear Multiple Regression Model, 1959

Parameter	Regression Coefficient	Std. Error of Regression Coefficient	Partial Correlation Coefficient	Beta Weight	Level of Significance
λ_0	1.6138	0.1421	-	-	<0.0005
λ_1	-0.5004	0.0390	-0.37	-0.33	<0.0005
λ_2	-0.0381	0.0139	-0.09	-0.07	0.006
λ_3	2.0230	0.1688	0.35	0.31	<0.0005
λ_4	-1.5420	0.1202	-0.37	-0.32	<0.0005

The locational index (λ_2) is the least significant of the independent variables in explaining the variations in relative acceptances. When this variable was eliminated from the model, the multiple coefficient of determination was reduced from 0.401 to 0.397 with no significant reduction in the multiple correlation coefficient. This variable's insignificance probably results from its being constant per country, thus indicating the necessity for further study to develop a better index of location.

The other three independent variables are significant in predicting relative acceptance values. Their significance is approximately equal to each other with distance leading the other two.

In conclusion, the model and parameter estimates for 1959 can be expressed as follows:

$$(RA_{ij})_{1959} = 1.6138\, D_{ij}^{-0.5}\, S_{ij}^{2.0}\, W_{ij}^{-1.5} \quad \ldots\ldots \quad (5\text{-}3)$$

or

$$(RA_{ij})_{1959} = 1.6138 \frac{S_{ij}^{2}}{W_{ij}\sqrt{W_{ij}\, D_{ij}}} \quad \ldots\ldots\ldots\ldots \quad (5\text{-}4)$$

The general trade and transport policy implications of these equations will be covered in Section 5.5 and a detailed analysis will follow in Chapter 6.

5.4 Multiple Regression Analysis of 1968 Data

Since the linear exercise on 1959 data clearly showed that the additive model is not a good tool, the linear model is not run on 1968 data. The results obtained for the logarithmic-linear model are given in Table 5.7. The multiple correlation coefficient was 0.78, the coefficient of determination .62, and the standard error of estimate 0.39.

A comparison of Table 5.6 with Table 5.7 shows that, in general, the results for 1968 are not too different from the results for 1959. However, 1968 data seem to give a better fit than 1959. Again, the least significant variable is the locational index. Although the statistics related to this variable are slightly improved when compared with 1959, it is still justifiable to drop the variable from the model due to the low partial correlation coefficient and beta weight.

Table 5.7: Parameter Values and Related Statistics of the Logarithmic-Linear Multiple Regression Model, 1968

Parameter	Regression Coefficient	Std. Error of Regression Coefficient	Partial Correlation Coefficient	Beta Weight	Level of Significance
λ_0	1.2316	0.1785	-	-	0.001
λ_1	-0.6210	0.0310	-0.49	-0.56	<0.0005
λ_2	-0.0085	0.0021	-0.12	-0.09	0.005
λ_3	1.9673	0.1523	0.38	0.33	<0.0005
λ_4	-1.3596	-.2114	-0.30	-0.28	<0.0005

The effect of distance on the dependent variable appears to be clearer in 1968 than in 1959. The partial correlation coefficient and the beta weight of distance in 1968 are significantly higher. The value of the distance parameter (λ_1) also jumped from .50 to .62 which indicates that the countries in the region have become more distance conscious. This is partially due to the closing of the Suez, which, in some cases, led to a more than 50 percent increase in the distance between countries. The increase in distance made the unit transport cost so high that either marginal markets shrinked, or transit times increased. Both of these results have undoubtedly led to smaller amounts of trade between nations who used the Suez as a pre-war gateway to reach markets.

Another possible reason for the greater distance sensitivity could be the decreasing trend in the real prices of agricultural commodities traded in the world market. The unit value of agricultural commodity exports of developing countries remained unchanged from 1959-1960 to 1965-1966, whereas, in the same period, the unit values of the same exports from developed countries increased by 8 percent.[4/] A more dramatic comparison is the unit value of world exports of primary products and manufactures between 1953 and 1966. From 1953 to 1966 the unit value of primary products decreased by 4 percent, whereas the unit value of manufactures increased by 11 percent.[5/] When this reduction in value is coupled with increased distances, the obvious result is a reduction in trade and a greater sensitivity toward distance.

Another interesting difference between the 1959 and 1968 parameter estimates is the decrease in the constant term from 1.6138 to 1.2316. When the two years' models are compared the calculated relative acceptance values for 1968 are consistently lower than the corresponding values for 1959. This is mainly due to increased distances and a lower λ_0 value for 1968.

4/ GATT, International Trade 1966, Geneva: 1967, p. 45.
5/ *Ibid.*, p. 1.

5.5 Implications of the Model

The role played by distance and Turkey's potential in offering trade stimulating forces within the region by reducing the distance between trading partners can be made clearer when we reconsider the model estimate given by Equation (5-4).

It should be remembered that S_{ij} and W_{ij} are dummy variables whose values are either one or two, whereas the values of D_{ij} for 1959 range from 100 to 8,268 miles. Undoubtedly, any nation seeking to increase trade with another should not be engaged in war or political hostility with that nation. When a nation is "friendly" with the other, the value of W_{ij} is one which reduces Equation (5-4) to

$$(RA_{ij})_{1959} = 1.6138 \frac{S_{ij}^{2}}{\sqrt{D_{ij}}} \quad \ldots\ldots\ldots\ldots \quad (5\text{-}5)$$

As will be seen from Equation (5-5), the ideal trade position for a country is to achieve a bilateral preferential trade arrangement so that the value of S_{ij} will be equal to 2, and minimize the distance so that the denominator of

Equation (5-5) is low. For countries like the United Kingdom and the EEC group where the distance between each other cannot be reduced or the cost of transport cannot be substantially reduced, the next best thing is to eatablish preferential trade arrangements, because such arrangements will quadruple[6/] the relative acceptance levels.[7/] Turkey cannot offer any potential benefit by being a transit point for the trade between the United Kingdom and EEC countries. However, the potential for Turkey lies with reducing the distance between East and West. For instance, ocean service from Genoa to Iskenderun and rail connection from Iskenderun to Iraq will reduce the 1968 distance from Italy to Iraq from 12,542 miles to approximately 2,700

6/ In Equation (5-5) the value of $S_{i,j}$ is equal to 1 when two countries have no preferential trade arrangements. $S_{i,j} = 2$ when such arrangements exist. Assuming no change in distance, which is the case between the United Kingdom and EEC, $RA_{i,j}$ value increases four times when two countries enter into a preferential trade arrangement.

7/ The relative acceptance value was defined as the ratio of actual trade to theoretical trade. It will be remembered that the theoretical trade was determined by population and income of trading countries which do not significantly change in a year. Therefore, any change in the relative acceptance value during the short run is due to a change in the actual trade size.

miles. Assuming no change in the preferential trade arrangements between the two countries, Equation (5-5) shows that this reduction in distance will more than double the relative acceptance value. In the next Chapter the relative acceptance value of each potential secondary trade flow will be computed in order to put Turkey's role as a transit point into proper perspective.

5.6 Conclusion

As a result of the analyses of this Chapter the following conclusions can be derived:

1. The hypothesis that distance has a significant negative effect on trade size is accepted.
2. The hypothesis that location has a significant positive effect on trade size is temporarily rejected, until a more reliable index of location is developed and tested by further research.
3. The hypothesis that political hostility or war has a significant negative effect on trade is accepted.
4. The hypothesis that preferential trade arrangements have a significant positive effect on trade size is accepted.

In the next Chapter a general trade policy for Turkey will be outlined on the basis of the analysis made in this Chapter.

CHAPTER 6: A GENERAL TRADE POLICY AND POTENTIALS FOR TURKEY

6.1 Introduction

The analyses made so far indicate the importance of distance, preferential trade arrangements, and political hostility on the trade between two countries. In this Chapter the potential role for Turkey will be outlined with respect to two distinct but closely related dimensions:

1. The potential of preferential trade arrangements on primary external flows.
2. The potential of reducing distance through gateway transit service on secondary external flows.

6.2 Preferential Trade Arrangements and Primary External Flows

Turkish trade potential will be greatly increased when Turkey becomes a full member of the Common Market. Turkey has entered into a preparatory stage of membership to the Common Market by the Ankara Agreement enacted on September 12, 1963. The Agreement stipulates (with provisions to increase) an initial period of eight years for the preparatory stage, followed by transition and final stages. The normal period for the transition would be twelve years.

Some Turkish planners humorously state that Turkey will become the "common market of the Common Market" by being a full member. Yet the relative dependence of Turkey on the Common Market can be shown by a comparison of 1968 relative acceptances[1/] of Common Market nations with Turkey and the United Kingdom. The comparison is evident in Table 6.1.

1/ Relative acceptance (RA_{ij}) was defined as the ratio of actual trade size to the theoretical trade size.

Table 6.1: Relative Acceptances of Common Market, United Kingdom, and Turkey, 1968

From/To	Belgium	Federal Germany	France	Italy	Netherlands	Average EEC	United Kingdom	Turkey
Belgium	0	1.7	2.3	.7	4.1	2.2	.4	.6
Federal Germany	1.5	0	1.4	1.2	1.8	1.5	.3	1.6
France	2.1	1.4	0	1.6	1.0	1.5	.4	.5
Italy	.9	1.5	1.6	0	.9	1.2	.4	1.9
Netherlands	3.1	2.2	1.3	.8	0	1.8	.8	.5
Average EEC	1.9	1.7	1.7	1.1	2.0	1.6	.5	1.0
United Kingdom	.8	.4	.5	.5	.7	.6	0	1.3
Turkey	.8	1.4	.6	.9	.6	.9	.7	0

As will be seen from Table 6.1, Turkish exports to individual Common Market nations are always lower than the exports of Common Market countries to other countries in the Common Market. In one case, namely, Turkey to the Netherlands, versus Common Market nations to the Netherlands, the difference is more than threefold (.6 versus 2.0). On the import side, Turkish imports from Federal Germany and Italy are higher than the average Common Market imports from these nations. It should be stated that Federal Germany and Italy were among the main suppliers of machinery and equipment for six dams and a number of other major government projects in Turkey. Therefore, the import figures of 1968 from Federal Germany and Italy to Turkey do not reflect the "normal" level of trade flow from these nations. In the remaining three cases (Belgium, France, and the Netherlands) the Turkish imports are again considerably lower than the average imports of the Common Market from these nations.

The case of the United Kingdom is clearer than the

case for Turkey: In both imports and exports the figures shown in Table 6.1 for the United Kingdom are considerably lower than the average Common Market figures. It could be argued that the low trade levels between the United Kingdom and EEC in relation to the trade of EEC countries with each other is due to the effect of longer distance between the United Kingdom and EEC than the distance among EEC countries. However, Table 6.2 shows that, even at comparable distances, the ratio of actual trade to theoretical trade (relative acceptance) from the United Kingdom to EEC countries is considerably lower than the ratio from one EEC country to another.

The cases in Table 6.2 indicate the potential of preferential trade arrangements on trade size.

Turkey is already more dependent on the Common Market than on the United Kingdom and might under preference expect to become even more interdependent. This trade growth under preference might warrant Turkish consideration of early full membership to the Common Market and an urgent evaluation of other potential preferential

Table 6.2: Selective 1968 Cases Comparing Distance with Relative Acceptances in EEC and the United Kingdom

Exporting Country	Importing Country	Distances Between		Relative Acceptance	
		Exporting Country & Importing Country (Miles)	U.K. and Importing Country (Miles)	Exporting Country-Importing Country	U.K.-Importing Country
Belgium	Netherlands	171	334	4.1	.7
Belgium	France	349	455	2.3	.5
Netherlands	Belgium	171	334	3.1	.8
France	Belgium	349	455	2.1	.8
Netherlands	Federal Germany	284	823	2.2	.4
Italy	Federal Germany	563	823	1.5	.4
Italy	France	753	455	1.6	.5

trade arrangements with the Middle Eastern nations. However, no attempt should be made for a blind entry into any preferential trade arrangement on either a regional or individual basis. Clearly, other factors such as commodity composition of exports and imports, domestic production and consumption patterns, industry-wide productivities and cost structures, commodity wide price and tariff elasticities of demand, trade quotas and proposed concessions, etc., are to be critically evaluated before a decision of entry into any type of preferential trade arrangement can be made. These and other factors are not within the scope of this research. Therefore, further study and evaluation will be needed before pursuing a pattern of preferences.

6.3 Secondary External Flows and Transit Service Potential

6.3.1 Secondary External Flows and the Suez Canal

The closing of the Suez Canal after the Six Day War in 1967 has led to an increasing use of the South African ocean routes for trade between Europe and North Africa on one hand, and South West Asia on the other. A cursory review of Tables 5.1 and 5.2 in Chapter 5 indicates that, in some cases, the 1968 distances are more than threefold the corresponding distances in 1959.

The distance elasticity (λ_1) of the relative acceptance values were -.5 in 1959 and -.62 in 1968 (from Tables 5.6 and 5.7). In other words, other things being equal, as distance increases the relative acceptance value decreases by an amount approximately equal to the difference between the square roots of the old and new distances.

The potential for Turkey rests with this relationship between distance and relative acceptance. When Turkey assumes an active role as a transit and gateway service point for the third country flows, the reduced distance will increase the relative acceptance value. It should be remembered that the relative acceptance values were derived by dividing the actual trade by the theoretical trade. Since the increase in relative acceptance is not due to changes in the "size" effects, the theoretical trade values will remain unchanged. Therefore, an increase in the relative acceptance values due to a decrease in distance will only be possible by an increased actual trade.

In the next two sections some potential trade routes through Turkey will be identified and the increase in actual trade values will be computed on the basis of reduced distances through Turkey.

6.3.2 Potential Trade Routes

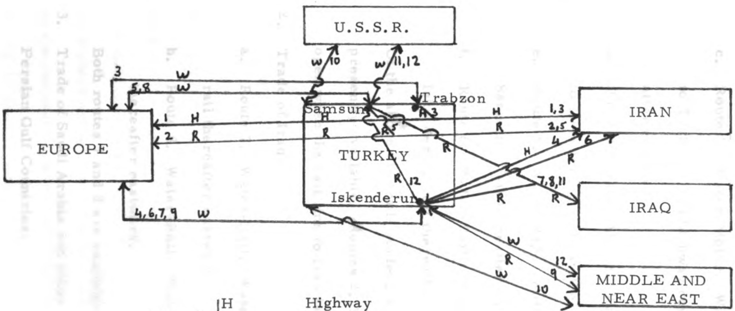
In order to gear the Turkish transport system to service secondary external flows a number of potential routes must be identified. The issues related with the development of these routes will be raised in Chapter 8. In identifying trade routes, water-rail or motor-rail coordinated transport services will become a necessity.

Figure 6.1 identifies 12 trade routes through Turkey. A brief description of each route follows.

East-West Routes. Railroads and highways link Turkey with Europe. Trade movements between European countries, on one hand, and Iran, Iraq, Afghanistan, Pakistan, and Saudi Arabia on the other, can use the following alternative routes:

1. Trade of Iran:
   a. Route 1. Highway entirely.
   b. Route 2. Rail entirely. This route is not possible at the present because of a small section in East Turkey under construction. The Turkish and Iranian governments agreed to connect the two countries by rail. The Iranian portion between Tabriz and the Iran-Turkish border is completed. On the Turkish side, an extension between Mus and Van is recently completed. To complete the project, a 75-mile link between Van and the border is presently under construction.

Figure 6.1: Proposed Transit Trade Routes through Turkey*



Legend:
- H Highway
- R Rail
- W Water
- 1, . . . , 12 Route number

*Block sizes are not indicative of any actual criteria.

c. Route 3. Water-Motor. Water movement to Trabzon, and highway connection thereafter eastward.

d. Route 4. Water-Motor. Water movement to Iskenderun; highway thereafter eastward.

e. Route 5. Water-Rail. Water movement to Samsun; rail thereafter eastward.

f. Route 6. Water-Rail. Water movement to Iskenderun; rail thereafter eastward.

Of the above six trade routes, 1, 3, and 4 are presently available. Routes 2, 5, and 6 will be open when the rail link to Iran is completed.

2. Trade of Iraq:

a. Route 7. Water-Rail. Water to Iskenderun; rail thereafter eastward.

b. Route 8. Water-Rail. Water to Samsun; rail thereafter eastward.

Both routes 7 and 8 are available at present.

3. Trade of Saudi Arabia and other Arabian Sea and Persian Gulf Countries:

a. Route 9. Water-Rail-Water. An extension of route 7 to the port of Abadan, and water to the other Gulf ports or Arabian Sea ports.

North-South Routes

a. Route 10. Water. Water connection between the Black Sea and Mediterranean ports through Bosphorus and Dardanelles.

b. Route 11. Water-Rail. Water to Samsun; rail thereafter southward.

c. Route 12. Water-Rail-Water. Water to Samsun; rail to Iskenderun; water to Mediterranean ports.

Of the above three north-south routes, route 10 is presently used entirely. Route 11 appears to have a good service potential since it presently enables rail only and rail-water connections to Iraq and other Persian Gulf countries, respectively. Route 11 will reach its highest potential when route 5 is opened to service by the completion of the rail link to Iran.

6.3.3 Potential Increases in Third Country Actual Trade Flows

When the potential trade routes identified in Section 6.3.2 are used for third country trade flows, the actual trade is expected to increase by the amounts shown in Table 6.3. In order to prepare Table 6.3 a decision rule was developed to identify those secondary external flows which are suited to through Turkey transit service. Specifically, the decision rule incorporates a comparison of 1968 distances with the through Turkey transit distances for non-zero flows. Those flows whose present distance is greater than the transit distance through Turkey are identified as potential secondary external flows which are suitable to diversion through Turkey. When this rule was used, a total of 281 trade flows are identified as potential secondary external flows which are listed in Table 6.3.

As shown in the table, the increase in actual trade will range from 2.9 percent to 212 percent with an average increase of 61 percent. Due to transport cost differentials between the present water mode and the potential rail and motor modes, the percentage increases in Table 6.3

TABLE 6.3
POTENTIAL EFFECT OF TURKEYS TRANSIT SERVICE ON SECONDARY EXTERNAL FLOWS WHEN THE SUEZ IS CLOSED

	TRADING COUNTRIES ORIGIN	DESTINATION	DISTANCE(MILES) PRESENT	THROUGH TURKEY	1968 ACTUAL TRADE(MIL$)	TRADE INCREASE (PERCENT)	WEIGHT(TONS) OPTIMISTIC	PESSIMISTIC	
1	AFGH	FGER	12418.	5050.	11.4	56.8	154919.	46476.	1
2	AFGH	FRAN	11612.	5150.	.9	50.2	11711.	3513.	2
3	AFGH	ITAL	11627.	4850.	.6	54.8	8051.	2415.	3
4	AFGH	NETH	11912.	5450.	.2	47.8	2562.	769.	4
5	AFGH	SWIT	11627.	4850.	1.8	54.8	24152.	7246.	5
6	AFGH	UK	12082.	7100.	11.7	30.4	132265.	39679.	6
7	AUST	AFGH	12510.	4450.	.2	67.7	2906.	872.	7
8	AUST	CYPR	1665.	1550.	1.5	3.6	13473.	4042.	8
9	AUST	IRAN	12574.	2650.	12.3	117.8	232187.	69656.	9
10	AUST	IRAQ	12474.	2100.	4.5	143.7	95044.	28513.	10
11	AUST	ISRA	1747.	1650.	6.2	2.9	55285.	16586.	11
12	AUST	JORD	1948.	1600.	.8	10.3	7646.	2294.	12
13	AUST	LEBA	1746.	1500.	6.8	7.9	63578.	19073.	13
14	AUST	PAKI	12110.	4050.	1.6	72.9	23976.	7193.	14
15	AUST	SAAR	12073.	3100.	4.1	97.3	70118.	21035.	15
16	AUST	SYRI	1844.	1400.	4.3	14.5	42766.	12830.	16
17	BELG	IRAN	12023.	3400.	23.8	88.0	384590.	115377.	17
18	BELG	IRAQ	11923.	2850.	12.5	104.5	221564.	66469.	18
19	BELG	LEBA	3450.	2600.	13.0	15.2	129773.	38932.	19
20	BELG	PAKI	11559.	4800.	12.3	55.2	165411.	49623.	20
21	BELG	SAAR	11422.	3850.	16.6	72.2	247781.	74334.	21
22	BELG	SYRI	3745.	2250.	5.2	29.0	58138.	17441.	22
23	BULG	PAKI	12269.	3600.	3.9	84.6	62393.	18718.	23
24	CYPR	AUST	1665.	1550.	.4	3.6	3593.	1078.	24
25	CYPR	CZEC	1915.	1650.	.9	7.7	8402.	2521.	25
26	CYPR	DENM	3849.	2350.	.6	28.0	6654.	1995.	26
27	CYPR	EGER	4199.	1950.	1.1	46.7	13988.	4197.	27
28	CYPR	FGER	3819.	1950.	16.7	39.9	202532.	60759.	28
29	CYPR	FINL	4615.	3150.	.5	21.1	5245.	1574.	29
30	CYPR	NETH	3310.	2400.	4.8	17.4	48850.	14655.	30
31	CYPR	POLA	4249.	1850.	.7	51.6	9193.	2758.	31
32	CYPR	SWED	4595.	3100.	.6	21.7	6330.	1899.	32
33	CZEC	CYPR	1915.	1650.	1.9	7.7	17738.	5322.	33
34	CZEC	IRAN	12724.	2750.	13.9	115.1	259107.	77732.	34
35	CZEC	IRAQ	12624.	2200.	6.6	139.5	137009.	41103.	35
36	CZEC	ISRA	1897.	1750.	1.5	4.1	13534.	4060.	36
37	CZEC	JORD	2048.	1800.	2.2	7.9	20573.	6172.	37
38	CZEC	PAKI	12260.	4150.	4.5	71.9	67027.	20108.	38
39	CZEC	SYRI	1994.	1550.	32.9	13.4	323379.	97014.	39
40	DENM	CYPR	3849.	2350.	3.0	28.0	33272.	9982.	40
41	DENM	IRAN	12265.	3450.	11.9	88.5	194442.	58333.	41
42	DENM	IRAQ	12165.	2950.	3.8	103.1	66672.	20002.	42
43	DENM	ISRA	4029.	2650.	5.3	23.3	56633.	16990.	43
44	DENM	JORD	4142.	2700.	1.0	23.9	10734.	3220.	44
45	DENM	LEBA	3942.	2550.	6.4	29.3	69959.	20988.	45
46	DENM	PAKI	11797.	4850.	2.1	56.0	28383.	8515.	46
47	DENM	SAAR	11630.	3900.	6.4	72.7	95776.	28733.	47
48	DENM	SYRI	4037.	2350.	1.8	31.1	20445.	6133.	48
49	DENM	UAR	3985.	2900.	2.1	17.2	21336.	6401.	49
50	EGER	CYPR	4199.	1250.	.9	63.3	14245.	4274.	50
51	EGER	IRAN	12615.	3050.	2.0	103.4	35249.	10575.	51
52	FGER	IRAN	12515.	2500.	3.4	123.7	65924.	19777.	52

53	EGER	JORD	3328.	2000.	.9	29.0	10061.	3018.	53
54	EGER	PAKI	12147.	4450.	.7	65.2	10022.	3007.	54
55	EGER	SYRI	4387.	1750.	4.7	58.3	64488.	19347.	55
56	EGER	UAR	4336.	2500.	29.2	31.7	333255.	99976.	56
57	FGER	AFGH	12418.	5050.	6.5	50.8	88331.	26499.	57
58	FGER	CYPR	3819.	1950.	11.4	39.9	138255.	41477.	58
59	FGER	IRAN	12231.	3050.	283.1	100.3	4912919.	1473876.	59
60	FGER	IRAQ	12131.	2500.	20.2	120.3	385610.	115683.	60
61	FGER	ISRA	3899.	1950.	120.0	41.4	1470480.	441144.	61
62	FGER	JORD	4142.	2000.	14.9	43.9	185821.	55746.	62
63	FGER	LEBA	3942.	1850.	51.4	46.0	650211.	195063.	63
64	FGER	PAKI	11767.	4450.	104.5	62.6	1472610.	441783.	64
65	FGER	SAAR	11730.	3500.	81.7	83.1	978856.	293657.	65
66	FGER	SYRI	4007.	1750.	22.1	51.3	289802.	86941.	66
67	FGER	UAR	3950.	2500.	60.0	25.8	719483.	215845.	67
68	FINL	CYPR	4616.	3150.	1.3	21.1	13638.	4091.	68
69	FINL	IRAN	13028.	4250.	84.0	75.1	1274507.	382352.	69
70	FINL	IRAQ	12928.	3750.	1.4	85.7	22527.	6758.	70
71	FINL	ISRA	4698.	3450.	7.4	16.7	74818.	22445.	71
72	FINL	LEBA	4709.	3350.	1.6	18.6	16439.	4932.	72
73	FINL	PAKI	12718.	5650.	.8	50.0	10401.	3120.	73
74	FINL	SYRI	4804.	3250.	.8	21.6	8429.	2529.	74
75	FINL	UAR	4753.	3700.	3.5	13.3	34377.	10313.	75
76	FRAN	AFGH	11612.	5150.	2.7	50.2	35134.	10540.	76
77	FRAN	IRAN	11676.	3400.	84.0	85.3	1348980.	404694.	77
78	FRAN	IRAQ	11576.	2850.	20.1	101.5	351052.	105316.	78
79	FRAN	PAKI	11218.	4800.	47.1	52.9	623989.	187197.	79
80	FRAN	SAAR	11175.	3850.	19.2	70.4	283474.	85042.	80
81	GREE	IRAN	12235.	2250.	.5	133.2	10105.	3031.	81
82	GREE	IRAQ	12136.	1750.	1.5	163.3	34232.	10270.	82
83	GREE	SAAR	11735.	1850.	.4	151.9	19643.	5893.	83
84	HUNG	IRAN	12674.	2450.	8.4	127.4	165566.	49670.	84
85	HUNG	IRAQ	12574.	1900.	3.7	157.3	82485.	24746.	85
86	HUNG	ISRA	1797.	1350.	4.8	15.4	47992.	14398.	86
87	HUNG	JORD	1952.	1400.	1.0	18.1	10233.	3070.	87
88	HUNG	PAKI	12210.	3850.	3.7	78.1	57102.	17130.	88
89	HUNG	SYRI	1894.	1150.	2.9	28.3	32252.	9676.	89
90	IRAN	AUST	12574.	2650.	.9	117.8	16989.	5097.	90
91	IRAN	BELG	12023.	3400.	13.9	88.0	226517.	67955.	91
92	IRAN	CZEC	12724.	2750.	5.7	115.1	106252.	31876.	92
93	IRAN	DENM	12265.	3450.	7.5	88.5	122547.	36764.	93
94	IRAN	EGER	12615.	3050.	2.5	103.4	44061.	13218.	94
95	IRAN	FGER	12231.	3050.	92.4	100.3	735810.	220743.	95
96	IRAN	FINL	13028.	4250.	8.3	75.1	125933.	37780.	96
97	IRAN	FRAN	11676.	3400.	37.5	85.3	602223.	180667.	97
98	IRAN	GREE	12236.	2250.	5.8	133.2	117213.	35164.	98
99	IRAN	HUNG	12674.	2450.	4.7	127.4	92638.	27791.	99
100	IRAN	IREL	11554.	4920.	1.2	53.2	23904.	7171.	100
101	IRAN	ISRA	12842.	1750.	.7	168.4	16304.	4891.	101
102	IRAN	ITAL	11691.	3200.	30.7	91.1	607905.	182371.	102
103	IRAN	LEBA	12655.	1300.	4.8	212.0	129783.	38935.	103
104	IRAN	NETH	11722.	3450.	57.6	84.3	920095.	276028.	104
105	IRAN	NORW	12542.	4050.	4.9	76.0	74726.	22418.	105
106	IRAN	POLO	12915.	2950.	7.0	109.2	126927.	38078.	106
107	IRAN	PORT	10894.	3400.	.5	79.0	12410.	3723.	107
108	IRAN	SPAI	11450.	3200.	11.5	89.2	188514.	56554.	108
109	IRAN	SWED	13005.	3750.	10.4	86.2	167845.	50353.	109
110	IRAN	SWIT	11691.	3050.	7.2	95.8	122159.	36648.	110
111	IRAN	UK	11885.	4950.	322.3	55.0	4327688.	1298306.	111
112	IRAN	YUGO	12474.	2350.	5.5	130.4	109812.	32944.	112
113	IRAQ	BELG	11923.	2650.	45.5	104.5	806493.	241948.	113
114	IRAQ	CZEC	12624.	2200.	.6	139.5	12455.	3737.	114
115	IRAQ	EGER	12515.	2500.	.1	123.7	1939.	582.	115
116	IRAQ	FGER	12131.	2500.	35.4	120.3	675772.	202732.	116
117	IRAQ	FINL	12928.	3750.	.1	85.7	1609.	483.	117
118	IRAQ	FRAN	11576.	2850.	218.9	101.5	3823149.	1146945.	118

119	IRAQ	GREE	12136.	1750.	22.8	163.3	520322.	156097.	119
120	IRAQ	IREL	11454.	4420.	13.0	61.0	181355.	54406.	120
121	IRAQ	ITAL	11591.	2700.	245.7	107.2	4411664.	1323499.	121
122	IRAQ	NETH	11622.	2950.	70.7	98.5	1216095.	364829.	122
123	IRAQ	NORW	12442.	3550.	7.0	87.2	113566.	34070.	123
124	IRAQ	POLA	12815.	2450.	.8	128.7	15856.	4757.	124
125	IRAQ	PORT	10794.	2900.	18.1	92.9	302614.	90784.	125
126	IRAQ	SPAI	11350.	2700.	43.3	105.0	769348.	230804.	126
127	IRAQ	SWED	12906.	3250.	4.1	99.3	70804.	21241.	127
128	IRAQ	UK	11785.	4450.	47.2	62.7	665649.	199695.	128
129	IRAQ	USSR	13842.	2800.	4.3	122.3	82853.	24856.	129
130	IRAQ	YUGO	12374.	1850.	11.5	158.6	257742.	77323.	130
131	IREL	IRAN	11554.	4920.	.2	53.2	2656.	797.	131
132	IREL	IRAQ	11454.	4420.	.1	61.0	1395.	419.	132
133	IREL	SAAR	11314.	4920.	.4	51.6	5257.	1577.	133
134	ISRA	AUST	1747.	1650.	6.7	2.9	59745.	17923.	134
135	ISRA	CZEC	1897.	1750.	.1	4.1	902.	271.	135
136	ISRA	IRAN	12642.	1750.	16.6	168.8	386648.	115994.	136
137	ISRA	DENM	4029.	2650.	4.6	23.3	49153.	14746.	137
138	ISRA	FGER	3899.	1950.	57.9	41.4	709507.	212852.	138
139	ISRA	FINL	4096.	3450.	4.7	16.7	47519.	14256.	139
140	ISRA	HUNG	1797.	1350.	7.6	15.4	75987.	22796.	140
141	ISRA	NETH	3390.	2650.	32.2	13.1	315611.	94683.	141
142	ISRA	NORW	4268.	3050.	3.0	18.3	30754.	9226.	142
143	ISRA	SWED	4732.	3250.	9.5	20.7	99340.	29802.	143
144	ITAL	AFGH	11627.	4650.	1.4	54.8	18785.	5635.	144
145	ITAL	IRAN	11691.	3200.	76.1	91.1	1260533.	378160.	145
146	ITAL	IRAQ	11591.	2700.	21.9	107.2	393225.	117968.	146
147	ITAL	PAKI	11227.	4450.	30.2	58.8	415698.	124709.	147
148	ITAL	SAAR	11190.	3550.	32.8	77.5	504654.	151396.	148
149	LEBA	AUST	1745.	1500.	1.4	7.9	13090.	3927.	149
150	LEBA	BELG	3450.	2600.	25.3	15.2	252559.	75768.	150
151	LEBA	DENM	3942.	2550.	2.4	24.3	25859.	7758.	151
152	LEBA	FGER	3912.	1850.	6.7	45.4	84432.	25330.	152
153	LEBA	FINL	4709.	3350.	.2	18.6	2055.	616.	153
154	LEBA	IRAN	12655.	1300.	4.7	212.0	127080.	38124.	154
155	LEBA	NETH	3402.	2500.	27.9	16.7	282046.	84614.	155
156	LEBA	NORW	4280.	2900.	.7	21.5	7370.	2211.	156
157	LEBA	SWED	4687.	3100.	2.2	23.0	23443.	7033.	157
158	NETH	AFGH	11912.	5450.	1.4	47.8	17937.	5381.	158
159	NETH	CYPR	3310.	2400.	4.7	17.4	47833.	14350.	159
160	NETH	IRAN	11722.	3450.	37.5	84.3	603812.	181144.	160
161	NETH	IRAQ	11622.	2950.	4.8	98.5	82564.	24769.	161
162	NETH	ISRA	3390.	2650.	29.7	13.1	291107.	87332.	162
163	NETH	JORD	3802.	2600.	4.3	17.7	43860.	13158.	163
164	NETH	LEBA	3402.	2500.	13.9	16.7	140518.	42155.	164
165	NETH	PAKI	11592.	5050.	12.5	51.5	164120.	49236.	165
166	NETH	SAAR	11221.	4100.	20.1	65.4	288163.	86449.	166
167	NETH	SYRI	3498.	2400.	6.0	20.7	62773.	18832.	167
168	NORW	CYPR	4130.	2900.	3.5	19.3	36196.	10859.	168
169	NORW	IRAN	12542.	4050.	1.4	70.0	51851.	15555.	169
170	NORW	IRAQ	12442.	3550.	1.0	87.2	16224.	4867.	170
171	NORW	ISRA	4268.	3050.	22.2	18.3	227580.	68274.	171
172	NORW	LEBA	4280.	2900.	.9	21.5	9475.	2843.	172
173	NORW	PAKI	12332.	5550.	.8	49.1	10334.	3100.	173
174	NORW	SAAR	12041.	4600.	.9	61.6	12519.	3756.	174
175	NORW	JAM	4361.	1450.	1.1	12.4	10718.	3215.	175
176	PAKI	AUST	12113.	4050.	1.0	72.9	14985.	4495.	176
177	PAKI	BELG	11559.	4800.	28.1	55.2	350997.	105299.	177
178	PAKI	BULG	12269.	3600.	3.8	84.8	60793.	18238.	178
179	PAKI	CZEC	12260.	4150.	7.4	71.9	110223.	33067.	179
180	PAKI	DENM	11797.	4850.	1.1	56.3	17570.	5271.	180
181	PAKI	EGER	12147.	4450.	.3	65.2	4245.	1274.	181
182	PAKI	FGER	11767.	4450.	27.9	56.8	407258.	122177.	182
183	PAKI	FINL	12719.	5650.	.1	50.0	1300.	390.	183
184	PAKI	FRAN	11218.	4800.	20.8	52.9	215562.	64669.	184

185	PAKI	GREE	11872.	3650.	1.5	80.3	23444.	7033.	185
186	PAKI	HUNG	12210.	3850.	2.8	78.1	43212.	12964.	186
187	PAKI	IREL	11190.	5870.	2.7	38.1	32306.	9692.	187
188	PAKI	ITAL	11727.	4450.	19.3	62.3	271512.	81454.	188
189	PAKI	NETH	11592.	5050.	13.3	51.5	174624.	52387.	189
190	PAKI	NORW	12332.	5550.	.3	49.1	3875.	1163.	190
191	PAKI	POLA	12447.	4450.	15.5	67.2	239142.	71742.	191
192	PAKI	PORT	10430.	4950.	5.4	45.2	67928.	20379.	192
193	PAKI	ROMA	12418.	3900.	5.5	78.4	85050.	25515.	193
194	PAKI	SPAI	10988.	4750.	8.8	52.1	115978.	34793.	194
195	PAKI	SWED	12542.	5750.	3.8	47.7	48635.	14591.	195
196	PAKI	SWIT	11227.	4550.	2.3	57.1	31309.	9393.	196
197	PAKI	UK	11421.	5900.	83.7	39.1	1009184.	302755.	197
198	PAKI	USSR	13162.	4650.	14.0	68.2	204118.	61235.	198
199	PAKI	YUGO	12010.	4100.	8.4	71.2	124588.	37377.	199
200	POLA	CYPR	4249.	1850.	.6	51.6	7880.	2364.	200
201	POLA	IRAN	12915.	2950.	12.4	109.2	224842.	67452.	201
202	POLA	IRAQ	12815.	2450.	4.6	128.7	91170.	27351.	202
203	POLA	ISRA	4793.	1950.	.7	56.8	9510.	2853.	203
204	POLA	JORD	4905.	2000.	1.1	56.6	14930.	4479.	204
205	POLA	PAKI	12447.	4450.	24.1	67.2	349292.	104787.	205
206	POLA	SYRI	4801.	1700.	4.6	68.1	66991.	20097.	206
207	POLA	UAR	4750.	2350.	15.7	42.2	193433.	58030.	207
208	PORT	IRAN	10894.	3400.	.8	79.0	12410.	3723.	208
209	PORT	IRAQ	10794.	2900.	1.3	92.9	21735.	6520.	209
210	PORT	PAKI	10430.	4950.	1.0	45.2	12579.	3774.	210
211	PORT	SAAR	10393.	4000.	.8	61.2	11175.	3353.	211
212	ROMA	PAKI	12419.	3900.	5.4	78.4	83507.	25052.	212
213	ROMA	SYRI	1642.	1150.	7.9	19.5	81806.	24542.	213
214	SAAR	BELG	11422.	3850.	55.7	72.2	831409.	249423.	214
215	SAAR	DENM	11630.	3900.	13.9	72.7	208013.	62404.	215
216	SAAR	FGER	11730.	3500.	207.0	83.1	3284007.	985202.	216
217	SAAR	FRAN	11175.	3850.	68.8	70.4	1015782.	304735.	217
218	SAAR	GREE	11735.	1850.	29.3	151.9	639502.	191851.	218
219	SAAR	IREL	11314.	4920.	7.0	51.6	91990.	27597.	219
220	SAAR	ITAL	11190.	3550.	181.3	77.5	2789442.	836833.	220
221	SAAR	NETH	11221.	4100.	85.5	65.4	1225769.	367731.	221
222	SAAR	NORW	12041.	4600.	10.8	61.8	148620.	44586.	222
223	SAAR	SPAI	10949.	3800.	155.1	69.7	2281529.	684459.	223
224	SAAR	SWED	12657.	4800.	29.1	62.4	409502.	122851.	224
225	SAAR	UK	11645.	5200.	148.6	49.6	1927106.	578132.	225
226	SPAI	IRAN	11450.	3200.	2.2	89.2	36064.	10819.	226
227	SPAI	IRAQ	11350.	2700.	1.3	105.0	23098.	6929.	227
228	SPAI	PAKI	10988.	4750.	.6	52.1	7908.	2372.	228
229	SPAI	SAAR	10949.	3800.	1.5	69.7	22065.	6620.	229
230	SWED	CYPR	4595.	3100.	4.2	21.7	44313.	13294.	230
231	SWED	IRAN	13006.	3750.	17.8	86.2	287273.	86182.	231
232	SWED	IRAQ	12906.	3250.	12.0	99.3	207231.	62169.	232
233	SWED	ISRA	4732.	3250.	13.8	20.7	144304.	43291.	233
234	SWED	JORD	4887.	3300.	2.0	21.7	21092.	6328.	234
235	SWED	LEBA	4687.	3100.	5.3	23.0	56476.	16943.	235
236	SWED	PAKI	12542.	5750.	6.9	47.7	88311.	26493.	236
237	SWED	SAAR	12657.	4800.	7.4	62.4	104135.	31240.	237
238	SWED	SYRI	4782.	3000.	3.8	28.3	39388.	11816.	238
239	SWED	UAR	4731.	3550.	7.2	13.8	71036.	21311.	239
240	SWIT	AFGH	11627.	4850.	2.7	54.8	36228.	10868.	240
241	SWIT	IRAN	11691.	3050.	25.5	95.8	449615.	134884.	241
242	SWIT	IRAQ	11591.	2550.	9.1	113.2	168132.	50440.	242
243	SWIT	PAKI	11227.	4550.	13.7	57.1	186484.	55945.	243
244	SWIT	SAAR	11190.	3600.	10.4	76.3	158897.	47669.	244
245	SWIT	SYRI	2139.	1800.	6.0	9.0	56681.	17004.	245
246	SWIT	USSR	2684.	2400.	27.2	3.8	249272.	74782.	246
247	SYRI	BELG	3745.	2250.	.8	29.0	8944.	2683.	247
248	SYRI	CZEC	1994.	1550.	1.8	13.4	15727.	4718.	248
249	SYRI	DENM	4037.	2450.	1.2	28.4	13349.	4005.	249
250	SYRI	FGER	4387.	1750.	1.0	58.3	13721.	4116.	250

251	SYRI	FGER	4007.	1750.	5.6	51.3	73434.	22030.	251
252	SYRI	HUNG	1894.	1150.	1.8	28.3	20019.	6006.	252
253	SYRI	IRAN	12750.	1500.	.1	191.5	2527.	758.	253
254	SYRI	NETH	3498.	2400.	2.3	20.7	24063.	7219.	254
255	SYRI	POLA	4801.	1700.	4.3	68.1	62622.	18787.	255
256	SYRI	ROMA	1642.	1150.	3.2	19.5	33136.	9941.	256
257	SYRI	SWIT	2139.	1600.	.9	9.0	8502.	2551.	257
258	SYRI	USSR	2161.	1900.	19.6	6.6	181145.	54343.	258
259	UAR	DENM	3986.	2900.	1.4	17.2	14224.	4267.	259
260	UAR	EGER	4336.	2500.	22.6	31.7	257930.	77379.	260
261	UAR	FGER	3956.	2500.	24.3	25.8	264901.	79470.	261
262	UAR	FINL	4753.	3700.	2.6	13.3	25537.	7661.	262
263	UAR	NORW	4361.	3450.	.5	12.4	4872.	1461.	263
264	UAR	POLD	4750.	2350.	20.0	42.2	246412.	73924.	264
265	UAR	SWED	4731.	3650.	1.9	13.8	18746.	5624.	265
266	UK	AFGH	12082.	7100.	2.5	30.4	28262.	8479.	266
267	UK	IRAN	11885.	4950.	146.4	55.0	1965879.	589764.	267
268	UK	IRAQ	11785.	4450.	38.3	62.7	540135.	162040.	268
269	UK	PAKI	11421.	5900.	113.7	39.1	1370898.	411269.	269
270	UK	SAAR	11645.	5200.	112.9	49.6	1464134.	439240.	270
271	USSR	IRAQ	13842.	2800.	31.7	122.3	610799.	183240.	271
272	USSR	ITAL	2684.	2400.	258.1	5.8	2347004.	704101.	272
273	USSR	JORD	2231.	2100.	3.7	3.1	33049.	9915.	273
274	USSR	PAKI	13162.	4650.	32.8	66.2	478219.	143466.	274
275	USSR	SWIT	2684.	2400.	12.3	5.8	112722.	33817.	275
276	USSR	SYRI	2161.	1900.	25.6	6.6	236597.	70979.	276
277	USSR	YUGO	[illegible]	2000.	169.3	13.0	1657299.	497190.	277
278	YUGO	IRAN	12474.	2350.	7.7	130.4	153737.	46121.	278
279	YUGO	[illegible]	12374.	1850.	3.4	158.6	76202.	22861.	279
280	YUGO	PAKI	12010.	4100.	23.2	71.2	344101.	103230.	280
281	YUGO	USSR	2552.	2000.	207.0	13.0	2026350.	607905.	281

should be interpreted as optimistic estimates. Actual cost data per ton-mile as well as the sensitivity of trade due to transit time reductions are not available. However, the most pessimistic estimate of actual trade increases should not be less than 30 percent of the optimistic estimates given in Table 6.3. The last two columns of Table 6.3 give the estimated transit tonnage through Turkey. The optimistic estimate assumes that all trade will be diverted through Turkey, thus establishing a maximum potential. The pessimistic estimate assumes that only 30 percent of the trade is capable of being diverted through Turkey and therefore sets the transit tonnage potential on a more conservative level.

The pessimistic transit trade estimates give Turkey a good starting point to seek an active role as a transit service point in the intra-regional trade and to convince the member nations of the region to divert trade flows through Turkey.

6.4 Estimates of Transit Tonnage through Turkey

The optimistic and pessimistic transit trade estimates given in Table 6.3 were arrived at by using the weight-value analysis outlined in Section 4.3 of Chapter 4.

The pessimistic potential increase indicates that the total third country trade flows through the Turkish infrastructure is expected to be around 26.3 million metric tons per year. The total optimistic estimate is around 87.5 million metric tons. The infrastructural capacity of the Turkish transport network and its adequacy to handle this tonnage will be dealt with in Chapter 8.

The estimates of trade increases given in Section 6.3.3 and weight estimates given in this section are based on a decision rule which compares the 1968 distances, assuming that the Suez is closed, with distances through Turkey. It can be argued that the closing of the Suez is not a long-term proposition. Therefore, any attempt by Turkey to gear its transport infrastructure and investment to secondary external flows based on the assumption of the inability of the Suez is a speculation with little premise.

To make the value and weight estimates independent of the Suez, an answer must be provided to the following question: How much trade will continue moving through Turkey even when the Suez is open?

In order to answer this question, a decision rule similar to the one explained in the previous section was used with 1959 distances instead of 1968 distances. The expected increases in actual trade are given in Table 6.4. As will be noted the estimated increase in actual trade ranges from 1.5 percent to 83.3 percent. The optimistic estimate of total transit trade tonnage is 59.2 million metric tons. The number of potential secondary external flows has dropped from 281 to 263 when the Suez is assumed to be open. The latent potential for Turkey is still evident even when the Suez is open.

TABLE 6.4

POTENTIAL EFFECT OF TURKEYS TRANSIT SERVICE ON SECONDARY EXTERNAL FLOWS WHEN THE SUEZ IS OPEN

	TRADING COUNTRIES ORIGIN	DESTINATION	DISTANCE(MILES) PRESENT	THROUGH TURKEY	1968 ACTUAL TRADE(MILS)	TRADE INCREASE (PERCENT)	WEIGHT(TONS) OPTIMISTIC	PESSIMISTIC	
1	AFGH	FGER	7471.	5050.	11.4	21.6	120162.	36049.	1
2	AFGH	FRAN	5539.	5150.	.9	3.7	8089.	2427.	2
3	AFGH	ITAL	5294.	4850.	.6	4.5	5432.	1630.	3
4	AFGH	NETH	6962.	5450.	.2	13.0	1959.	588.	4
5	AFGH	SWIT	5294.	4850.	1.8	4.5	16297.	4889.	5
6	AUST	AFGH	5221.	4450.	.2	6.3	1877.	563.	6
7	AUST	IRAN	5227.	2650.	12.3	40.4	149702.	44911.	7
8	AUST	IRAQ	5127.	2100.	4.5	50.3	60933.	18280.	8
9	AUST	ISRA	1747.	1650.	6.2	2.9	55286.	16586.	9
10	AUST	JORD	1946.	1600.	.8	10.3	7646.	2294.	10
11	AUST	LEBA	1746.	1500.	6.8	7.9	63578.	19073.	11
12	AUST	PAKI	4821.	4050.	1.6	9.1	15128.	4538.	12
13	AUST	SYRI	1844.	1400.	4.3	14.8	42766.	12830.	13
14	BELG	IRAN	7015.	3400.	23.6	43.6	293768.	88131.	14
15	BELG	IRAQ	6915.	2850.	12.5	55.8	168734.	50620.	15
16	BELG	LEBA	3450.	2600.	13.0	15.2	129773.	38932.	16
17	BELG	PAKI	6036.	4800.	12.3	17.6	125330.	37599.	17
18	BELG	SAAR	4321.	3850.	16.6	5.9	152401.	45720.	18
19	BELG	SYRI	3745.	2250.	5.2	29.0	58138.	17441.	19
20	BULG	PAKI	4371.	3600.	3.9	10.2	37241.	11172.	20
21	CYPR	AUST	1665.	1550.	.4	3.6	3593.	1078.	21
22	CYPR	CZEC	1915.	1650.	.9	7.7	8402.	2521.	22
23	CYPR	DENM	3849.	2350.	.5	28.0	6654.	1996.	23
24	CYPR	EGER	4199.	1950.	1.1	46.7	13988.	4197.	24
25	CYPR	FGER	3819.	1950.	16.7	39.9	202532.	60759.	25
26	CYPR	FINL	4616.	3150.	.5	21.1	5245.	1574.	26
27	CYPR	NETH	3310.	2400.	4.8	17.4	48850.	14655.	27
28	CYPR	POLA	4249.	1850.	.7	51.6	9193.	2758.	28
29	CYPR	SWED	4595.	3100.	.5	21.7	6330.	1899.	29
30	CZEC	CYPR	1915.	1650.	1.9	7.7	17738.	5322.	30
31	CZEC	IRAN	3311.	2750.	13.9	9.7	132174.	39652.	31
32	CZEC	IRAQ	5277.	2200.	8.6	54.9	88582.	26575.	32
33	CZEC	ISRA	1897.	1750.	1.5	4.1	13534.	4060.	33
34	CZEC	JORD	2096.	1800.	2.2	7.9	20573.	6172.	34
35	CZEC	PAKI	4971.	4150.	4.5	9.4	42880.	12864.	35
36	CZEC	SYRI	1994.	1550.	32.9	13.4	323379.	97014.	36
37	DENM	CYPR	3849.	2350.	3.0	20.0	33272.	9982.	37
38	DENM	IRAN	7507.	3450.	11.9	47.5	152121.	45636.	38
39	DENM	IRAQ	7407.	2950.	3.8	58.5	52181.	15654.	39
40	DENM	ISRA	4029.	2650.	5.3	23.3	56633.	16990.	40
41	DENM	JORD	4142.	2700.	1.0	23.9	10734.	3220.	41
42	DENM	LEBA	3942.	2550.	6.4	24.3	68958.	20685.	42
43	DENM	PAKI	7101.	4850.	2.1	21.0	22020.	6606.	43
44	DENM	SAAR	4513.	3900.	6.4	11.1	61613.	18484.	44
45	DENM	SYRI	4037.	2350.	1.8	31.1	20445.	6133.	45
46	DENM	UAR	3985.	2900.	2.1	17.2	21336.	6401.	46
47	EGER	CYPR	4199.	1250.	.9	63.3	14295.	4288.	47
48	EGER	IRAN	7857.	3050.	2.0	50.3	27518.	8345.	48
49	EGER	IRAQ	7757.	2500.	3.4	70.1	51901.	15570.	49
50	EGER	JORD	3328.	2000.	.9	27.0	10061.	3018.	50
51	EGER	PAKI	7451.	4450.	.7	29.4	7850.	2355.	51
52	EGER	SYRI	4387.	1750.	4.7	58.3	64488.	19347.	52
53	EGER	UAR	4336.	2500.	29.2	31.7	333255.	99976.	53
54	FGER	AFGH	7421.	5050.	8.5	21.2	86284.	20485.	54

55	FGER	CYPR	3819.	1950.	11.4	39.9	138255.	41477.	55
56	FGER	IRAN	7477.	3050.	283.1	50.6	3841248.	1152374.	56
57	FGER	IRAQ	7377.	2500.	20.2	71.8	300705.	90211.	57
58	FGER	ISRA	3899.	1950.	120.0	41.4	1470480.	441144.	58
59	FGER	JORD	4142.	2000.	14.9	43.9	185821.	55746.	59
60	FGER	LEBA	3942.	1850.	51.4	40.0	650211.	195063.	60
61	FGER	PAKI	7071.	4450.	104.5	20.1	1141551.	342465.	61
62	FGER	SAAR	4783.	3500.	61.7	16.9	625058.	187517.	62
63	FGER	SYRI	4007.	1750.	22.1	51.3	289802.	86941.	63
64	FGER	UAR	3956.	2500.	66.0	25.8	719483.	215845.	64
65	FINL	CYPR	4616.	3150.	1.3	21.1	13638.	4091.	65
66	FINL	IRAN	8274.	4250.	84.0	39.5	1015690.	304707.	66
67	FINL	IRAQ	8174.	3750.	1.4	47.6	17912.	5374.	67
68	FINL	ISRA	4695.	3450.	7.4	16.7	74818.	22445.	68
69	FINL	LEBA	4709.	3350.	1.6	18.6	16439.	4932.	69
70	FINL	PAKI	7868.	5650.	.8	18.0	8181.	2454.	70
71	FINL	SYRI	4804.	3250.	.8	21.6	8429.	2529.	71
72	FINL	UAR	4753.	3700.	3.5	13.3	34377.	10313.	72
73	FRAN	ARGN	5539.	5150.	2.7	3.7	24266.	7280.	73
74	FRAN	IRAN	5545.	3400.	84.0	27.7	929625.	278888.	74
75	FRAN	IRAQ	5445.	2850.	20.1	38.2	240764.	72229.	75
76	FRAN	PAKI	5139.	4800.	47.1	3.5	422335.	126701.	76
77	GREE	IRAN	4368.	2250.	.5	39.3	6037.	1811.	77
78	GREE	IRAQ	4268.	1750.	1.5	56.2	20300.	6090.	78
79	HUNG	IRAN	5307.	2450.	8.4	47.2	107137.	32141.	79
80	HUNG	IRAQ	5107.	1900.	3.7	63.9	52569.	15771.	80
81	HUNG	ISRA	1797.	1350.	4.6	15.4	47992.	14398.	81
82	HUNG	JORD	1952.	1400.	1.0	18.1	10233.	3070.	82
83	HUNG	PAKI	4884.	3850.	3.7	12.6	36114.	10834.	83
84	HUNG	SYRI	1894.	1150.	2.9	28.3	32252.	9676.	84
85	IRAN	AUST	5227.	2650.	.9	40.4	10954.	3286.	85
86	IRAN	BELG	7015.	3400.	13.9	43.6	173025.	51907.	86
87	IRAN	CZEC	5377.	2750.	5.7	39.8	69071.	20721.	87
88	IRAN	DENM	7507.	3450.	7.5	47.5	95875.	28762.	88
89	IRAN	EGER	7857.	3050.	2.5	50.5	34773.	10432.	89
90	IRAN	FGER	7477.	3050.	42.4	50.6	575305.	172592.	90
91	IRAN	FINL	8274.	4250.	8.3	39.5	100360.	30108.	91
92	IRAN	FRAN	5545.	3400.	37.5	27.7	415013.	124504.	92
93	IRAN	GREE	4368.	2250.	5.8	39.3	70032.	21010.	93
94	IRAN	HUNG	5307.	2450.	4.7	47.2	59946.	17984.	94
95	IRAN	IREL	6807.	4920.	1.8	17.8	18348.	5504.	95
96	IRAN	ISRA	3842.	1750.	.7	48.2	8988.	2696.	96
97	IRAN	ITAL	5300.	3200.	35.7	28.7	409308.	122792.	97
98	IRAN	LEBA	3901.	1300.	4.8	73.2	72057.	21617.	98
99	IRAN	NETH	6965.	3450.	57.8	42.1	709391.	212817.	99
100	IRAN	NORW	7788.	4050.	4.9	38.7	58894.	17668.	100
101	IRAN	POLD	8015.	2950.	7.0	64.8	99990.	29997.	101
102	IRAN	PORT	6095.	3400.	.8	33.9	9283.	2785.	102
103	IRAN	SPAI	5571.	3200.	11.5	31.9	131495.	39448.	103
104	IRAN	SWED	8352.	3750.	10.4	49.2	134503.	40351.	104
105	IRAN	SWIT	5300.	3050.	7.2	31.8	82251.	24675.	105
106	IRAN	UK	7072.	4950.	322.3	19.5	3338470.	1001541.	106
107	IRAN	YUGO	5157.	2350.	5.9	48.1	70607.	21182.	107
108	IRAQ	BELG	6915.	2850.	45.9	55.8	614191.	184257.	108
109	IRAQ	CZEC	5277.	2200.	.8	54.9	8053.	2415.	109
110	IRAQ	EGER	7757.	2500.	.1	76.1	1525.	458.	110
111	IRAQ	FGER	7377.	2500.	35.4	71.8	525262.	157579.	111
112	IRAQ	FINL	8174.	3750.	.1	47.6	1279.	384.	112
113	IRAQ	FRAN	5445.	2850.	215.9	38.2	2622850.	786855.	113
114	IRAQ	GREE	4268.	1750.	22.8	56.2	305553.	92570.	114
115	IRAQ	IREL	6707.	4420.	[illegible]	23.2	138778.	41633.	115
116	IRAQ	ITAL	5200.	2700.	[illegible]	35.8	[illegible]	[illegible]	116
117	IRAQ	NETH	5865.	2350.	[illegible]	52.8	934451.	280335.	117
118	IRAQ	NORW	7688.	3550.	[illegible]	47.2	69271.	20781.	118
119	IRAQ	POLA	7415.	2450.	.8	79.7	12451.	3735.	119
120	IRAQ	PORT	5948.	2900.	18.1	43.8	225543.	67663.	120

121	IRAQ	SPAI	5471.	2700.	43.3	42.3	534144.	160243.	121
122	IRAQ	SWED	6252.	3250.	4.1	59.3	56551.	16965.	122
123	IRAQ	UK	6972.	4450.	47.2	25.2	511988.	153596.	123
124	IRAQ	USSR	5570.	2800.	4.3	41.0	52558.	15767.	124
125	IRAQ	YUGO	5057.	1850.	11.5	65.3	164770.	49431.	125
126	IREL	IRAN	6807.	4920.	.2	17.6	2039.	612.	126
127	IREL	IRAQ	6707.	4420.	.1	23.2	1068.	320.	127
128	ISRA	AUST	1747.	1650.	6.7	2.9	59745.	17923.	128
129	ISRA	CZEC	1897.	1750.	.1	4.1	902.	271.	129
130	ISRA	IRAN	3842.	1750.	10.6	40.2	213151.	63945.	130
131	ISRA	DENM	4029.	2650.	4.8	23.3	49153.	14746.	131
132	ISRA	FGER	3899.	1950.	57.9	41.4	709507.	212852.	132
133	ISRA	FINL	4695.	3450.	4.7	15.7	47519.	14256.	133
134	ISRA	HUNG	1747.	1350.	7.6	15.4	75987.	22796.	134
135	ISRA	NETH	3390.	2650.	32.2	13.1	315611.	94683.	135
136	ISRA	NORW	4208.	3050.	3.0	18.3	30754.	9226.	136
137	ISRA	SWED	4732.	3250.	9.5	20.7	99340.	29802.	137
138	ITAL	AFGH	5294.	4050.	1.4	4.5	12676.	3803.	138
139	ITAL	IRAN	5300.	3200.	76.1	28.7	848724.	254617.	139
140	ITAL	IRAQ	5200.	2700.	21.9	30.8	263380.	79014.	140
141	ITAL	PAKI	4894.	4450.	30.2	4.9	274459.	82338.	141
142	LEBA	AUST	1746.	1500.	1.4	7.9	13090.	3927.	142
143	LEBA	BELG	3450.	2600.	25.3	15.2	252559.	75768.	143
144	LEBA	DENM	3942.	2550.	2.4	24.3	25859.	7758.	144
145	LEBA	FGER	3412.	1850.	6.7	45.4	84432.	25330.	145
146	LEBA	FINL	4709.	3350.	.2	18.6	2055.	616.	146
147	LEBA	IRAN	3901.	1300.	4.7	73.2	70556.	21167.	147
148	LEBA	NETH	3402.	2500.	27.9	10.7	282046.	84614.	148
149	LEBA	NORW	4280.	2900.	.7	21.5	7370.	2211.	149
150	LEBA	SWED	4697.	3100.	2.2	23.0	23443.	7033.	150
151	NETH	AFGH	6962.	5450.	1.4	13.0	13712.	4114.	151
152	NETH	CYPR	3310.	2400.	4.7	17.4	47833.	14350.	152
153	NETH	IRAN	6968.	3450.	37.8	42.1	465538.	139661.	153
154	NETH	IRAQ	6868.	2950.	4.6	52.6	63469.	19041.	154
155	NETH	ISRA	3340.	2650.	29.7	13.1	291107.	87332.	155
156	NETH	JORD	3602.	2600.	4.3	17.7	43860.	13158.	156
157	NETH	LEBA	3402.	2500.	13.9	10.7	140518.	42155.	157
158	NETH	PAKI	6562.	5050.	12.5	14.0	123481.	37044.	158
159	NETH	SAAR	4274.	4100.	20.1	2.1	177844.	53353.	159
160	NETH	SYRI	3498.	2400.	6.0	20.7	62773.	18832.	160
161	NORW	CYPR	4130.	2900.	3.5	19.3	36196.	10859.	161
162	NORW	IRAN	7788.	4650.	3.4	38.7	40859.	12258.	162
163	NORW	IRAQ	7688.	3550.	1.0	47.2	12753.	3826.	163
164	NORW	ISRA	4268.	3050.	22.2	18.3	227580.	68274.	164
165	NORW	LEBA	4280.	2900.	.9	21.5	9475.	2843.	165
166	NORW	PAKI	7382.	5550.	.8	15.3	7998.	2399.	166
167	NORW	SAAR	5094.	4600.	.9	5.2	8208.	2462.	167
168	NORW	JAPA	4361.	3450.	1.1	12.4	10718.	3215.	168
169	PAKI	AUST	4821.	4050.	1.0	9.1	9455.	2836.	169
170	PAKI	BELG	6639.	4600.	26.1	17.6	260065.	78020.	170
171	PAKI	BULG	4371.	3600.	3.8	10.2	36286.	10886.	171
172	PAKI	CZEC	4971.	4150.	7.4	9.4	70186.	21056.	172
173	PAKI	DENM	7101.	4850.	1.3	21.0	13632.	4090.	173
174	PAKI	EGER	7451.	4450.	.3	29.4	3364.	1009.	174
175	PAKI	FGER	7071.	4450.	28.9	20.1	315702.	94711.	175
176	PAKI	FINL	7688.	5650.	.1	15.9	1023.	307.	176
177	PAKI	FRAN	5139.	4800.	20.8	3.5	186509.	55953.	177
178	PAKI	GREE	3762.	3650.	1.5	1.5	13197.	3959.	178
179	PAKI	HUNG	4584.	3650.	2.8	12.6	27330.	8199.	179
180	PAKI	IREL	6401.	5670.	2.7	4.4	24434.	7330.	180
181	PAKI	ITAL	4694.	4450.	19.3	4.9	175399.	52620.	181
182	PAKI	NETH	6562.	5050.	13.3	14.0	131394.	39418.	182
183	PAKI	NORW	7382.	5550.	.3	15.3	2998.	900.	183
184	PAKI	POLA	7609.	4450.	10.5	19.8	188976.	56693.	184
185	PAKI	PORT	3455.	4950.	5.4	8.9	50943.	15283.	185
186	PAKI	RUMA	4621.	3900.	5.5	8.9	51882.	15565.	186

187	PAKI	SPAI	5165.	4750.	8.6	4.3	19522.	23857.	187
188	PAKI	SWED	6811.	5750.	3.6	6.8	35840.	10752.	188
189	PAKI	SWIT	4894.	4550.	2.3	3.7	20672.	6201.	189
190	PAKI	UK	6665.	5900.	83.7	6.3	770936.	231281.	190
191	PAKI	USSR	5164.	4650.	14.0	5.4	127854.	38356.	191
192	PAKI	YUGO	4734.	4100.	8.4	7.5	78220.	23466.	192
193	POLA	CYPR	4249.	1650.	.6	51.6	7880.	2364.	193
194	POLA	IRAN	8015.	2950.	12.4	64.8	177126.	53138.	194
195	POLA	IRAQ	7915.	2450.	4.6	79.7	71650.	21495.	195
196	POLA	ISRA	4793.	1950.	.7	56.8	9510.	2853.	196
197	POLA	JORD	4906.	2000.	1.1	56.6	14930.	4479.	197
198	POLA	PAKI	7609.	4450.	24.1	30.8	273099.	81930.	198
199	POLA	SYRI	4801.	1700.	4.6	66.1	66991.	20097.	199
200	POLA	UAR	4750.	2350.	15.7	42.2	193433.	58030.	200
201	PORT	IRAN	6096.	3400.	.8	33.9	9283.	2785.	201
202	PORT	IRAQ	5996.	2900.	1.3	43.6	16199.	4860.	202
203	PORT	PAKI	5866.	4950.	1.0	6.9	9434.	2830.	203
204	ROMA	PAKI	4621.	3900.	5.4	8.9	50939.	15282.	204
205	ROMA	SYRI	1642.	1150.	7.9	19.5	81806.	24542.	205
206	SAAR	BELG	4321.	3850.	55.7	5.9	511370.	153411.	206
207	SAAR	DENM	4813.	3900.	13.9	11.1	133816.	40145.	207
208	SAAR	FGER	4783.	3500.	207.0	16.9	2097033.	629110.	208
209	SAAR	NETH	4274.	4100.	85.5	2.1	756502.	226951.	209
210	SAAR	NORW	5094.	4600.	10.6	5.2	96666.	29000.	210
211	SAAR	SWED	5558.	4800.	29.1	7.6	271363.	81409.	211
212	SPAI	IRAN	5571.	3200.	2.2	31.9	25156.	7547.	212
213	SPAI	IRAQ	5471.	2700.	1.3	42.3	16037.	4811.	213
214	SPAI	PAKI	5165.	4750.	.6	4.3	5422.	1627.	214
215	SWED	CYPR	4595.	3100.	4.2	21.7	44313.	13294.	215
216	SWED	IRAN	8252.	3750.	17.8	48.3	228825.	68647.	216
217	SWED	IRAQ	8152.	3250.	12.0	58.4	164599.	49410.	217
218	SWED	ISRA	4732.	3250.	13.8	20.7	144304.	43291.	218
219	SWED	JORD	4887.	3300.	2.0	21.7	21092.	6328.	219
220	SWED	LEBA	4687.	3100.	5.3	23.0	56476.	16943.	220
221	SWED	PAKI	6811.	5750.	6.9	8.8	65079.	19524.	221
222	SWED	SAAR	5558.	4800.	7.4	7.6	69006.	20702.	222
223	SWED	SYRI	4782.	3000.	3.6	26.3	39388.	11816.	223
224	SWED	UAR	4731.	3650.	7.2	13.8	71036.	21311.	224
225	SWIT	ARGN	5294.	4850.	2.7	4.5	24445.	7334.	225
226	SWIT	IRAN	5300.	3050.	26.5	31.8	302728.	90818.	226
227	SWIT	IRAQ	5200.	2550.	9.1	42.8	112814.	33784.	227
228	SWIT	PAKI	4894.	4550.	13.7	3.7	121130.	36339.	228
229	SWIT	SYRI	2139.	1800.	6.0	9.6	56681.	17004.	229
230	SWIT	USSR	2684.	2400.	27.2	5.8	249272.	74782.	230
231	SYRI	BELG	3745.	2250.	.8	29.0	8944.	2683.	231
232	SYRI	CZEC	1994.	1550.	1.6	13.4	15727.	4718.	232
233	SYRI	DENM	4037.	2450.	1.2	28.4	13349.	4005.	233
234	SYRI	EGER	4387.	1750.	1.0	58.1	13721.	4116.	234
235	SYRI	FGER	4007.	1750.	5.6	51.1	73434.	22030.	235
236	SYRI	HUNG	1694.	1150.	1.8	28.3	20019.	6006.	236
237	SYRI	IRAQ	4131.	1500.	.1	65.0	1438.	431.	237
238	SYRI	NETH	3498.	2400.	2.3	20.7	24063.	7219.	238
239	SYRI	POLA	4801.	1700.	4.1	65.1	62622.	18787.	239
240	SYRI	ROMA	1642.	1150.	3.2	19.5	33135.	9941.	240
241	SYRI	SWIT	2139.	1800.	.9	9.0	8502.	2551.	241
242	SYRI	USSR	2161.	1900.	19.6	6.6	181145.	54343.	242
243	UAR	DENM	3988.	2900.	1.4	17.2	14224.	4267.	243
244	UAR	EGER	4338.	2500.	22.8	31.7	257930.	77379.	244
245	UAR	FGER	3958.	2500.	24.3	25.9	258901.	77671.	245
246	UAR	FINL	4753.	3700.	2.6	13.3	25537.	7661.	246
247	UAR	NORW	4351.	3450.	.5	12.4	4872.	1461.	247
248	UAR	POLA	4750.	2350.	20.0	42.2	246412.	73924.	248
249	UAR	SWED	4731.	3650.	1.9	13.8	18746.	5624.	249
250	UK	IRAN	7072.	4950.	145.4	19.3	1516451.	454935.	250
251	UK	IRAQ	5972.	4450.	38.3	25.2	415447.	124634.	251
252	UK	PAKI	6665.	5900.	113.7	6.3	1047257.	314177.	252

253	USSR	IRAQ	5570.	2800.	31.7	41.0	387460.	116238.	253
254	USSR	ITAL	2684.	2400.	256.1	5.8	2347004.	704101.	254
255	USSR	JORD	2231.	2100.	3.7	3.1	33049.	9915.	255
256	USSR	PAKI	5164.	4650.	32.6	5.4	299543.	89863.	256
257	USSR	SWIT	2684.	2400.	12.3	5.8	112722.	33817.	257
258	USSR	SYRI	2161.	1900.	25.6	0.6	236597.	70979.	258
259	USSR	YUGO	2552.	2000.	169.3	13.0	1657249.	497190.	259
260	YUGO	IRAQ	5157.	2350.	7.7	48.1	98849.	29655.	260
261	YUGO	IRAN	3057.	1850.	3.4	65.3	48714.	14614.	261
262	YUGO	PAKI	4734.	4100.	23.2	7.5	216037.	64811.	262
263	YUGO	USSR	2552.	2000.	207.0	13.0	2026350.	607905.	263

6.5 Conclusion

In this Chapter it is concluded that a general trade policy for Turkey should be geared toward becoming a full member of the Common Market and other regional preferential trade systems, and to take an active role in becoming a transit point serving secondary external flows estimated to range from 26.3 to 87.5 million tons when the Suez is closed and from 17.7 to 59.2 million metric tons when it is open. Chapter 7 will review the Turkish national transport system and external economic relations. Chapter 8 will consider major problems and potentials in the Turkish national transport system.

CHAPTER 7: A REVIEW OF TURKISH NATIONAL TRANSPORT SYSTEM AND EXTERNAL ECONOMIC RELATIONS

7.1 Introduction

In order to study the implications of the results obtained so far on the Turkish national transport system and trade policies it is necessary to review briefly the historical development and the present situation of the transport system and trade policy. This Chapter is intended to provide some basic facts and information about the Turkish economy, planning, its targets, problems, and policies within the context of transport and trade policies.

7.2 Economy Description

Turkey is an industrializing country which relies on both private and public establishments in the development of economic activity. Table 7.1 shows the trend of economic and social development with respect to a selected set of criteria. Table 7.2 indicates a significant shift from an agriculturally based economic structure to that of industry and services. However, agriculture is still the dominant sector in the economy.

Table 7.1: Socio-Economic Trends in Turkey

Criteria	Years								
	1927	1935	1940	1945	1950	1955	1960	1965	1967
Population(Mil.)	13.6	16.1	17.8	18.8	20.9	24.1	27.8	31.4	33.0
Average annual rate of population growth(%)	1.8	1.9	16.	1.1	2.2	2.8	3.0	3.1	2.6
Rural population(%)	82.2	80.1	79.0	78.7	78.2	74.4	71.3	65.6	
Rate of literacy(%)	10.6	19.2	22.4	28.2	33.6	40.9	39.5	48.3	
Electricity/per capita(KWH)	5	7	22	33	38	43	101	157	187
GNP (1938=100)	53	100	98	77	121	213	226	276	321
Per capita income (1961 prices TL)					1,118		1,552	1,676	1,864
Investments/GNP (1961 prices %)					14.5		15.8	17.0	19.1
Foreign trade deficit(Mil.$)	36.1				22.3	184.3	147.5	118.1	162.0
General level of prices(1958=100)		11			48	73	126	154	170

Sources: Devlet Planlama Teskilati (State Planning Office) Birinci Bes Yillik Kalkinma Plani (First Five Year Development Plan) Ankara: Basbakanlik Devlet Matbaasi, 1963. Devlet Planlama Teskilati, Kalkinan Turkiye (Developing Turkey) Ankara: Milli Egitim Basimevi, 1969. Cillov, Haluk, Turkiye Ekonomisi Bunyesi (The Structure of Turkish Economy), Istanbul: Orhan Mete Matbaasi, 1967.

Table 7.2: Relative Importance of Sectors in GNP

Sectors	Years						
	1927	1938	1948	1950	1958	1961	1965
GNP (%)	100	100	100	100	100	100	100
Agriculture (%)	67	48	53	52	44	42	38
Industry (%)	10	16	14	16	22	23	27
Services (%)	23	36	33	32	34	35	35

Source: Devlet Planlama Teskilati (State Planning Office), Birinci Bes Yillik Kalkinan Plani (First Five Year Development Plan) Ankara: 1965, p. 2.

7.3 Planning in Turkey

Governmental interest in planned development in the history of the Turkish Republic took its comprehensive form in the early 1960's. When the Republic was founded in 1923 the new Turkish State set an example to under-developed countries in pursuing economic and social development. However, the planning efforts in the 1930's were mainly isolated to a few industrial sectors. Comprehensive planning encompassing all industrial and service sectors was first introduced immediately after the 1960 revolution.

Article 41 of the 1961 Constitution endorsed the democratic regulation of economic and social life:

> Economic and social life shall be regulated in a manner consistent with justice, and the principle of full employment, with the objective of assuring for everyone a standard of living befitting human dignity.
>
> It is the duty of the State to encourage economic, social, and cultural development by democratic processes and for this purpose . . . to draw up development projects.[1]

1/ State Planning Organization, Introducing Turkey's State Planning Organization, Publication No. 3, Ankara: 1963, p. 5.

Article 129 calls for a plan to achieve economic, social, and cultural development.

An interesting fact is that almost a year before the Constitutional referendum, the revolutionary government created the mechanism through which planning for development could take place by establishing the State Planning Organization on September 30, 1960, and detailing its functions, organization, and preparation of five-year plans and annual programs.

The First Development Plan embraced a five-year period from 1963 through 1967. The Second Five Year Development Plan's time perspective is the period 1968-1972. Both plans explicate economic and social objectives to be attained by implementing detailed annual programmes and projects.

7.4 Objectives, Targets, Problems

The Second Five Year Development Plan states the general economic objectives of Turkey as follows:

> . . . to achieve a rapid and sustained increase in per capita income, . . . to achieve a balanced development between various regions and income brackets, . . . and to attain an efficient and stable improvement in the . . . economic structure.[2]

One of the targets set in the Second Plan in order to attain the above economic objectives is a 7 percent annual growth in GNP. In addition, the Plan calls for an expansion in the industrial sector toward making it the leading sector of the economy.[3]

The Plan identifies three structural obstacles (problems) which restrict the attainment of these targets.[4] The first obstacle is insufficiency of domestic savings to meet increased investments in order to support the chosen growth rate. The second obstacle is entitled "institutional impediments restricting development"

2/ State Planning Organization, Second Five Year Development Plan: 1968-1972, Ankara: Central Bank of the Republic of Turkey, 1969, p. 13.

3/ Ibid., p. 75.

4/ Ibid., pp. 46 ff.

which groups problems facing agricultural and industrial organization and efficiency. The third obstacle is import capacity as a means of providing an ample supply of raw materials, component parts, and equipment from foreign sources. When the second target, industrialization, is considered, the importance of this obstacle can easily be appreciated: Import capacity must be increased to finance machinery, equipment, and raw material purchases from abroad, all of which are needed for the pursuit of industrialization. Import capacity falls within the general area of external economic imbalances within which chronic deficits in foreign trade and balance of payments drain investment capital (needed for purchases from abroad) which undermines industrialization and economic development.

In spite of the important role played by external trade and services in attaining the targets set, the long-run trend in this area is characterized by the fact that it did not increase parallel to the increase in national income. "Hence, its effect was to restrict rather than

to induce economic development"[5] For example, between the years 1962-1966, GNP increased by 29.5 percent, while the volume of foreign trade increased by 20.8 percent. As a result foreign loans were necessary. However, since Turkey has borrowed heavily in the past, 55 percent of loans secured from 1962 to 1966 was used for payment of the principal and interest of former debts. Therefore, aid in recent years was insufficient to remove the third obstacle, or to put it differently, to provide the necessary funds to increase the import capacity.

A vicious circle should be evident by now: to attain a rapid economic development, import capacity must be increased through increased savings and imports which is only possible through economic development. This phenomenon which is referred to as "vicious circles of poverty"[6] is characteristic of the pre- and post-takeoff

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5/ Ibid., p. 47.

6/ Gill, Richard T., Economic Development: Past and Present, Englewood Cliffs, N. J.: Prentice-Hall, 1963, p. 28.

stages in economic development.

It is discouraging to note that the stage of "takeoff" in Turkey started in 1937[7] and since then, in spite of various measures taken, Turkey is still trying to reach the stage of "self-sustaining growth." It took Great Britain 19 years, France 30, Belgium 27, U.S.A. 17, West Germany 23, Sweden 22, Japan 22, U.S.S.R. 24, and Canada 20 years to move from takeoff to self-sustaining growth.[8] The average period in the above cases was 22.5 years. Since 1937, although 36 long years have passed -- longer than any one of the above nations -- there is no hope that the "miracle" will occur in the near future.

7/ Rostow, W.W., The Process of Economic Growth, New York: Norton and Company, 1962, p. 282.
8/ *Ibid*.

7.5 Turkish Transport System

The transport sector in Turkey carries the characteristics of any mixed economy in which the private and public enterprises operate together in competition. While rail transport is performed by a state-owned enterprise, Turkish State Railways (TCDD), motor transport is generally done by very small private establishments. Water transport is done by both public and private lines. Air transport is the exclusive domain of Turkish Airlines (THY), a public enterprise.

The trend in highway and railway system mileage is given in Table 7.3. The slight decrease in highway mileage in 1962 is due to a reclassification of roads which resulted in a transfer of mileage from provincial to rural class. There is a minor amount of inland barge traffic interrupted during winter months. However, since three-fourths of Turkey is surrounded by water, domestic maritime transport is significant. The total inland water mileage is estimated around 8,000 kilometers.[9/] Forty-six

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9/ Cillov, Haluk, Turkiye Ekonomisi Bunyesi (The Structure of Turkish Economy), Istanbul: Orhan Mete Matbaasi, 1967, p. 10.

Table 7.3: Transport System Mileage-Historical

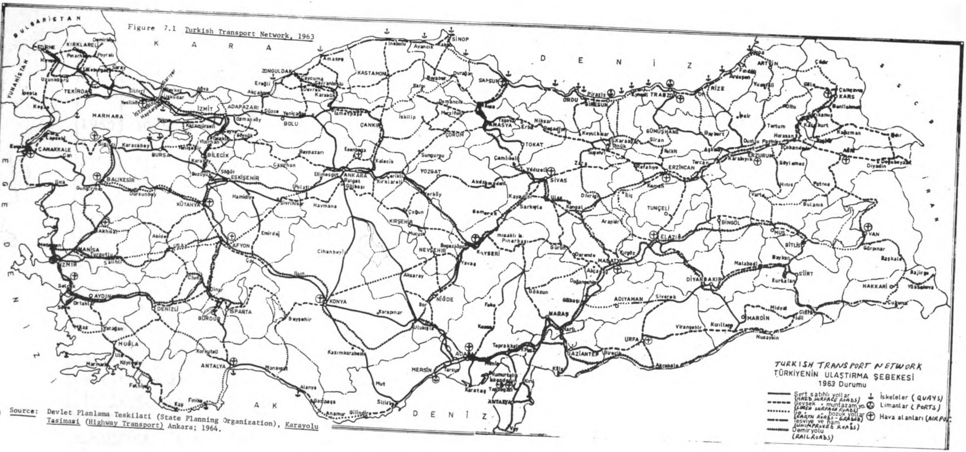
Year	State and Provincial Roads (Km)	Railroads (Km)
1923	18,335	3,756
1939	40,932	7,324
1950	47,080	7,671
1960	61,542	7,865
1961	60,818	7,886
1962	59,611	7,882
1963	58,451	7,911
1964	58,404	7,929
1965	58,792	8,008
1966	58,792	8,008
1967	58,792	8,008

Source: Devlet Planlama Teskilati (State Planning Organization), Kalkinan Turkiye (Developing Turkey), Ankara: Milli Egitim Basimevi, 1969, pp. 79, 82.

percent of railroad mileage was constructed during the late nineteenth and early twentieth century. For some strange reason the Ottoman Empire provided a premium per kilometer of railroad laid by the French and German builders in addition to other measures of encouragement such as exclusive mining and agriculture rights within a 10-kilometer area on both sides of the railroad. Since there were no controls on mileage, the railroads built during that time period show a continuous snake-like pattern even in the smoothest terrain. This mistake of the past is carried to the present, for operating a rail service on these lines cost much more than it would if the principle of shortest possible link were to be observed. Figure 7.1 gives a map of the Turkish transport network in 1963.

The distribution of transport system utilization by modes is given in Table 7.4. The motor mode has the highest share of passenger and cargo transport, with rail following in both. Passenger transport in water shows an insignificant level with minor fluctuations on a steady

Figure 7.1 Turkish Transport Network, 1963



Source: Devlet Planlama Teskilati (State Planning Organization), Karayolu Tasimasi (Highway Transport) Ankara; 1964.

Table 7.4: Transport System Utilization by Modes: 1950-1965

Year	Passenger - Kilometers (Mil.)					Ton - Kilometers (Mil.)				
	Air	Motor	Domestic Water	Rail	Total	Air	Motor	Domestic Water	Rail	Total
1950	30.5	2,957.3	389.0	2,515.5	5,892.3	.3	957.1	NA	2,552.6	-
1951	38.0	4,670.1	391.0	2,668.0	7,767.1	.4	1,167.1	NA	2,729.7	-
1952	43.6	6,369.6	369.2	3,144.7	9,927.1	.5	1,318.9	NA	3,293.3	-
1953	62.4	6,724.9	355.0	3,619.4	10,761.7	1.1	1,761.5	NA	3,026.7	-
1954	50.7	9,082.5	384.1	3,892.8	13,410.1	1.3	2,209.3	1,754.4	3,739.8	7,707.8
1955	68.6	10,830.9	361.9	3,917.3	15,178.7	1.2	2,405.2	1,626.5	3,906.5	7,939.4
1956	91.7	12,910.9	342.8	4,480.2	17,825.3	3.0	2,661.6	1,557.5	4,370.5	8,592.6
1957	130.3	8,905.1	377.1	5,040.6	14,453.1	11.7	2,234.2	1,702.2	4,875.5	8,823.6
1958	167.6	8,886.3	362.1	5,105.4	14,521.4	15.3	2,419.4	1,637.2	5,006.3	9,078.2
1959	165.4	9,969.2	337.6	4,588.8	15,061.0	15.6	3,253.6	1,638.1	4,799.3	9,706.6
1960	148.0	10,879.9	304.4	4,395.9	15,728.2	14.9	3,678.4	1,572.7	4,248.4	9,514.4
1961	151.6	11,726.8	NA	3,810.0	-	NA	3,927.1	NA	3,613.6	-
1962	169.9	12,590.9	470.0	4,166.5	17,397.3	10.0	4,319.8	1,680.0	4,091.9	10,051.7
1963	124.2	19,009.0	477.0	3,600.0	23,210.2	11.8	5,930.0	1,764.0	3,700.0	11,405.8
1964	133.2	21,935.0	492.0	3,500.0	26,060.2	12.9	6,824.0	1,900.0	4,900.0	13,636.9
1965	134.6	25,113.0	507.0	4,100.0	30,054.6	13.9	7,854.0	2,000.0	4,400.0	14,267.9

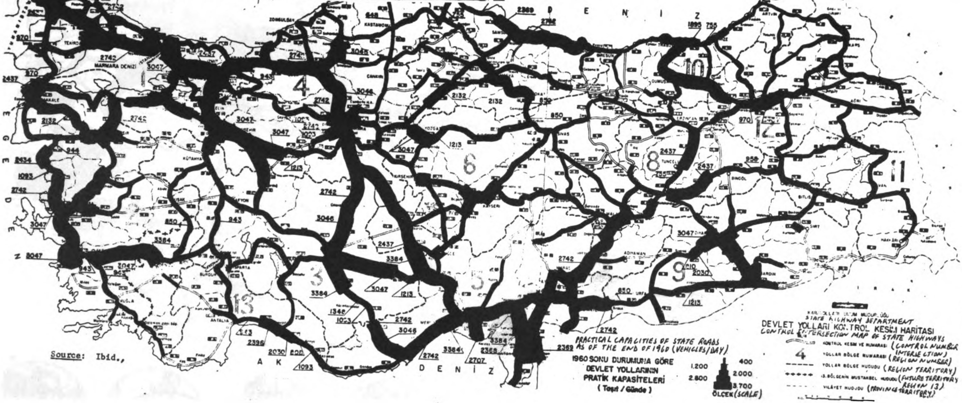
Sources: 1950-1962 data are from Devlet Planlama Teskilati (State Planning Office) Ulastirma (Transportation) Ankara: 1964, p. 7. 1963-1965 data are taken from State Planning Organization, Development Plan, First Five Year (1963-1967): 1965 Annual Programme, Ankara: 1964, p. 250.

trend. In domestic cargo transport, the water mode is the third highest. However, when international water traffic is added, the total waterborne ton-kilometers exceeds the motor mode. The air mode is the least important in passenger and cargo transport in absolute terms. However, the rate of growth in the air mode has been dramatic, especially in cargo transport.

The State Planning Organization estimates that the rate of infrastructural utilization never exceeds 20 percent and the utilization of vehicles is around 50 percent.[10] A review of Figure 7.2, Map of Practical Capacities of State Roads as of the End of 1960, and Figure 7.3, 1961 Highway Traffic Flow Map, reveals that the estimated infrastructural utilization rate is generally true with the exception of serious bottlenecks in and around the cities of Istanbul, Ankara, Izmir, and Antakya. Figure 7.3 also reveals interesting data on the concentration of flows and, therefore, economic activity in the Northwest and West.

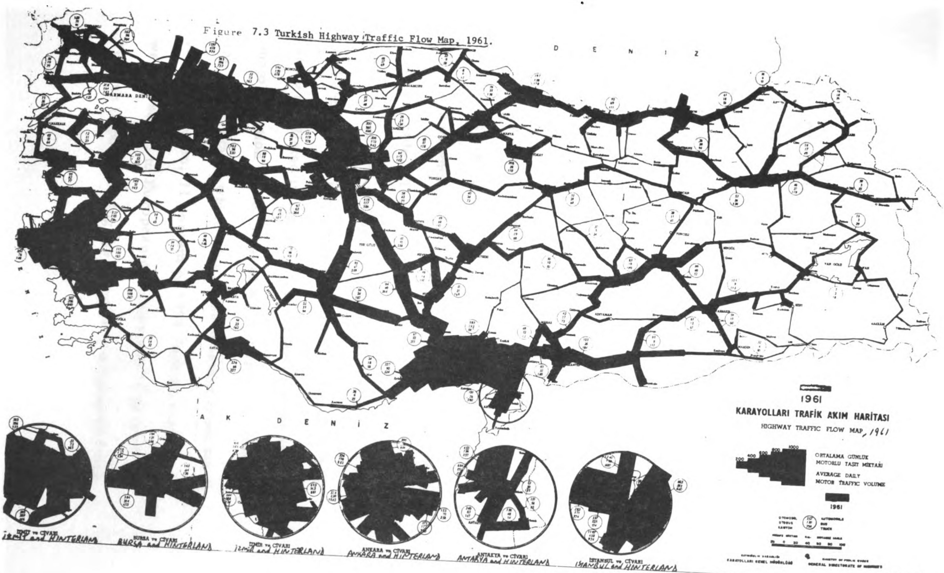
10/ Devlet Planlama Teskilati (State Planning Organization) Karayolu Tasimasi (Highway Transport) Ankara: 1964, p. 12.

Figure 7.2 Practical Capacities of State Roads as of the End of 1960. 143



Source: Ibid.,

Figure 7.3 Turkish Highway Traffic Flow Map, 1961.



7.6 Foreign Economic Relations

Turkey identifies itself with the West. Since the beginning of the 1923 Republic, the movement toward "Westernization" has accelerated in the social, cultural, and economic settings. This movement is demonstrated by associate membership in the European Economic Community, full memberships in NATO, OECD, CENTO, Council of Europe, World Bank, International Monetary Fund, GATT, etc., and charter membership in the UN and most of its specialized agencies. The Western orientation is also clearly evidenced in Turkish foreign trade. Table 7.5 gives a summary of Turkish exports and imports by destination and origin for 1959 and 1968. Only the countries within the region of this study are listed in the table. It should be noted that a major portion of the "Rest of World" entry is trade with the United States which adds to the Western trade total. As will be seen, 71 percent of 1959 Turkish exports were destined to European countries and 76 percent of Turkish imports during the same year originated from

Table 7.5: Survey of Turkish Foreign Trade by Origin and Destination, 1959 and 1968

Origin/Destination Country	1959				1968			
	Exports Mil. $	%	Imports Mil. $	%	Exports Mil. $	%	Imports Mil. $	%
EEC:	139.8	39.38	205.3	46.72	164.1	33.09	313.8	40.46
Belgium	7.5	2.11	11.0	2.48	16.5	3.33	18.5	2.42
Federal Germany	79.6	22.43	113.2	25.68	86.4	17.42	172.6	22.20
France	16.5	4.65	27.9	6.40	21.8	4.40	26.3	3.35
Italy	29.4	8.28	39.9	9.11	24.1	4.86	79.1	10.26
Netherlands	6.8	1.91	13.3	3.05	15.3	3.08	17.3	2.23
Scandinavia:	13.8	3.89	16.5	3.71	11.9	2.40	22.4	2.90
Denmark	4.4	1.24	3.3	.79	6.6	1.33	6.8	.88
Finland	7.8	2.20	1.6	.39	.4	.08	2.3	.30
Norway	.5	.14	1.4	.35	1.7	.34	2.6	.33
Sweden	1.1	.31	10.2	2.18	3.2	.65	10.7	1.39
Eastern Europe:	40.9	11.51	47.1	10.99	90.0	18.14	89.2	11.53
Bulgaria	1.2	.34	.7	.15	5.5	1.11	5.8	.77
Czechoslovakia	11.7	3.29	17.1	3.90	13.7	2.76	11.2	1.46
Eastern Germany	8.7	2.45	11.1	2.69	11.7	2.36	12.0	1.56
Hungary	6.5	1.83	5.4	1.29	12.3	2.48	16.9	2.28
Poland	7.5	2.11	5.9	1.37	7.8	1.57	7.8	1.00
Romania	.5	.14	1.3	.29	9.1	1.83	8.0	1.04
U.S.S.R.	4.8	1.35	5.6	1.30	29.9	6.03	27.5	3.51
Other Europe:	57.7	16.23	68.3	14.92	93.3	18.81	124.1	16.19
Austria	5.3	1.49	9.9	2.11	6.2	1.25	11.5	1.50
Greece	3.1	.87	.5	.16	3.7	.75	.4	.05

Table 7.5 Contd

Origin/Destination Country	1959 Exports Mil. $	%	Imports Mil. $	%	1968 Exports Mil. $	%	Imports Mil. $	%
Ireland	.4	.11	0	0	.9	.18	.2	.03
Portugal	0	0	.7	.24	6.7	1.35	3.3	.46
Spain	2.6	.73	1.5	.33	9.6	1.94	2.5	.32
Switzerland	8.7	2.45	8.8	1.76	26.8	5.40	18.3	2.38
United Kingdom	34.0	9.57	45.0	9.90	33.9	6.83	84.1	10.92
Yugoslavia	3.6	1.01	1.9	.42	5.5	1.11	3.8	.53
Middle East:	33.6	9.45	22.1	4.86	40.7	8.08	62.9	8.58
Cyprus	.4	.11	.3	.07	0	0	0	0
Iran	0	0	3.0	.69	7.3	1.47	0	0
Iraq	2.6	.73	0	0	.4	.08	28.6	3.71
Israel	8.9	2.51	9.0	1.97	5.1	1.03	3.6	.51
Jordan	1.6	.45	0	0	.4	.08	1.2	.16
Lebanon	13.7	3.86	.2	.04	23.8	4.68	4.6	.61
Libya	.4	.11	0	0	.8	.16	6.6	.91
Saudi Arabia	0	0	9.1	1.98	.1	.02	10.3	1.42
Syria	4.4	1.24	0	0	1.2	.24	7.3	1.15
U.A.R.	1.6	.45	.5	.11	1.6	.32	.7	.11
Asia:	0	0	.8	.16	.3	.06	5.0	.67
Afghanistan	0	0	0	0	0	0	0	0
Pakistan	0	0	.8	.16	.3	.06	5.0	.67
Rest of World	69.3	19.53	82.5	18.64	96.3	19.42	153.1	19.67
Total	355.1	100.00	442.6	100.00	496.6	100.00	770.5	100.00

Source: 1959 data from U.N., Direction of International Trade, Ser. T., Vol. XI, No. 9, New York, 1960. 1968 data from International Monetary Fund and International Bank for Reconstruction and Development. Direction of Trade. Annual 1964-68. Vol. 6.

Europe. The corresponding percentages for 1968 do not show a significant variation (exports to European countries 72 percent, and imports from Europe 71 percent). However, some shifts are noticeable in the distribution of trade within Europe. Notably, trade with the European Communist Bloc shows a gain at the cost of trade with the EEC. There is also a gain in imports from the Middle East, but the Western orientation in foreign trade is clearly evident.

Regarding the commodity composition of trade, from 1948 to 1965, on the average, 75 percent of Turkish exports were agricultural products, 20 percent capital goods, and 5 percent other commodities and services. Although a minor reduction is observed in the former percentage during recent years in favor of the latter two percentages, it can be generally said that agricultural products will continue to be the most important item of Turkish exports for many years to come.

Regarding imports, 36.6 percent of total imports in 1964 were capital goods, 55.6 percent raw materials, and only 7.8 percent consumption goods. In future years the percentage of capital goods will increase while the last two percentages, especially raw materials, will decrease.

Principal items of export are cotton, fruits and nuts, tobacco, minerals, or products derived from minerals. The fruit and nut market is concentrated in the United Kingdom, while cotton is exported mainly to the EEC countries. Some smuggling takes place along the Syrian, Iraqian, and Iranian borders in livestock, tobacco, and opium. The effect of smuggling on the balance of payments is not known.11/

On the import side, machinery is imported mainly from Federal Germany and the United States. The chief sources for crude oil and petroleum product imports are the United States, Saudi Arabia, Iraq, and the United Kingdom.12/ Federal Germany is the main supplier of

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11/ Roberts, Thomas D., et al., Area Handbook for the Republic of Turkey, Prepared for the American University by Systems Research Corporation, Washington, D.C.: U.S. Government Printing Office, 1970, p. 333.

12/ A pipeline agreement between Turkey and Iraq signed on August 27, 1973, provides a long-term source of crude oil from Iraq, which is an indication that imports from Western countries will be significantly reduced.

automotive equipment and parts, and railroad rolling stock. Since 1960 Eastern Europe's share of the Turkish import market in machinery and parts has steadily increased. Construction materials and machinery are mostly imported from the EEC. Recent progress in automotive and petroleum industries has reduced Turkey's dependence on imports of these items. Sixty percent of oil needs are now produced in Turkey and in 1967 Turkey started production of the first automobile at an initial annual rate of 6,000 units. In spite of recent strides to reduce imports of consumer goods, the need for imported industrial products for development purposes has increased sharply in parallel to the objectives of industrialization and a 7 percent annual growth in GNP.

Balance of Payments. The period 1923 through 1929 is characterized by excessive imports over exports resulting in deficits in the balance of trade and invisible items.

From 1930 to 1946 Turkey could maintain a trade surplus due to increased demand for agricultural commodities and minerals before and during World War II.

However, since 1947, exports fluctuated widely while imports have grown steadily, creating continuous deficits. Turkey's balance of payments for the period 1950-1968 is shown in Table 7.6. There are a number of reasons to explain Turkey's limited ability to export, thus circumscribing her import capacity:

1. The principal exports are agricultural commodities and minerals whose prices fluctuate considerably. The increasing deficit is attributable to the decreasing trend in the export price index and increasing trend in the import price index. Table 7.7 and Figure 7.4 show the import and export price indices from 1956 to 1965. As will be noted, there is a general decrease in the export price index and a general increase in the import price index mainly due to the trend displayed by the import of capital items. The price index for consumption goods shows a general decline, but since its importance in the total Turkish imports is very small, this decline

Table 7.6: Turkey's Balance of Payments, 1950-1968, in Mil.$

Year	Receipts			Expenditures			Balance
	Exports	Invisible Items	Total	Imports	Invisible Items	Total	(+) Surplus (-) Deficit
1950	263.4	18.9	282.3	251.5	72.8	324.3	- 42.0
1951	313.9	36.4	350.3	353.9	80.6	434.5	- 84.2
1952	362.9	42.5	405.4	488.7	99.2	587.9	-182.5
1953	396.0	35.2	431.2	468.3	104.2	572.5	-141.3
1954	334.7	30.2	364.9	421.2	102.8	524.0	-159.1
1955	313.3	82.8	396.1	437.9	88.5	526.4	-130.3
1956	305.0	104.5	409.5	358.5	94.6	453.1	- 43.6
1957	330.8	124.6	455.4	345.8	140.3	486.1	- 30.7
1958	249.2	88.9	338.1	284.2	138.0	422.2	- 84.1
1959	362.6	84.7	447.3	433.1	141.3	574.4	-127.1
1960	335.9	103.5	439.4	426.7	134.5	561.2	-121.8
1961	365.3	119.4	484.7	448.2	159.5	607.7	-123.0
1962	398.5	120.9	519.4	566.9	187.6	754.5	-235.1
1963	395.4	127.3	522.7	588.5	189.7	778.2	-255.5
1964	433.0	143.0	576.0	475.0	190.0	665.0	- 89.0
1965	479.0	202.0	681.0	505.0	206.0	711.0	- 30.0
1966	494.0	262.0	756.0	639.0	226.0	865.0	-109.0
1967	530.0	235.0	765.0	608.0	244.0	852.0	- 87.0
1968	530.0	130.0	660.0	780.0	68.0	848.0	-188.0

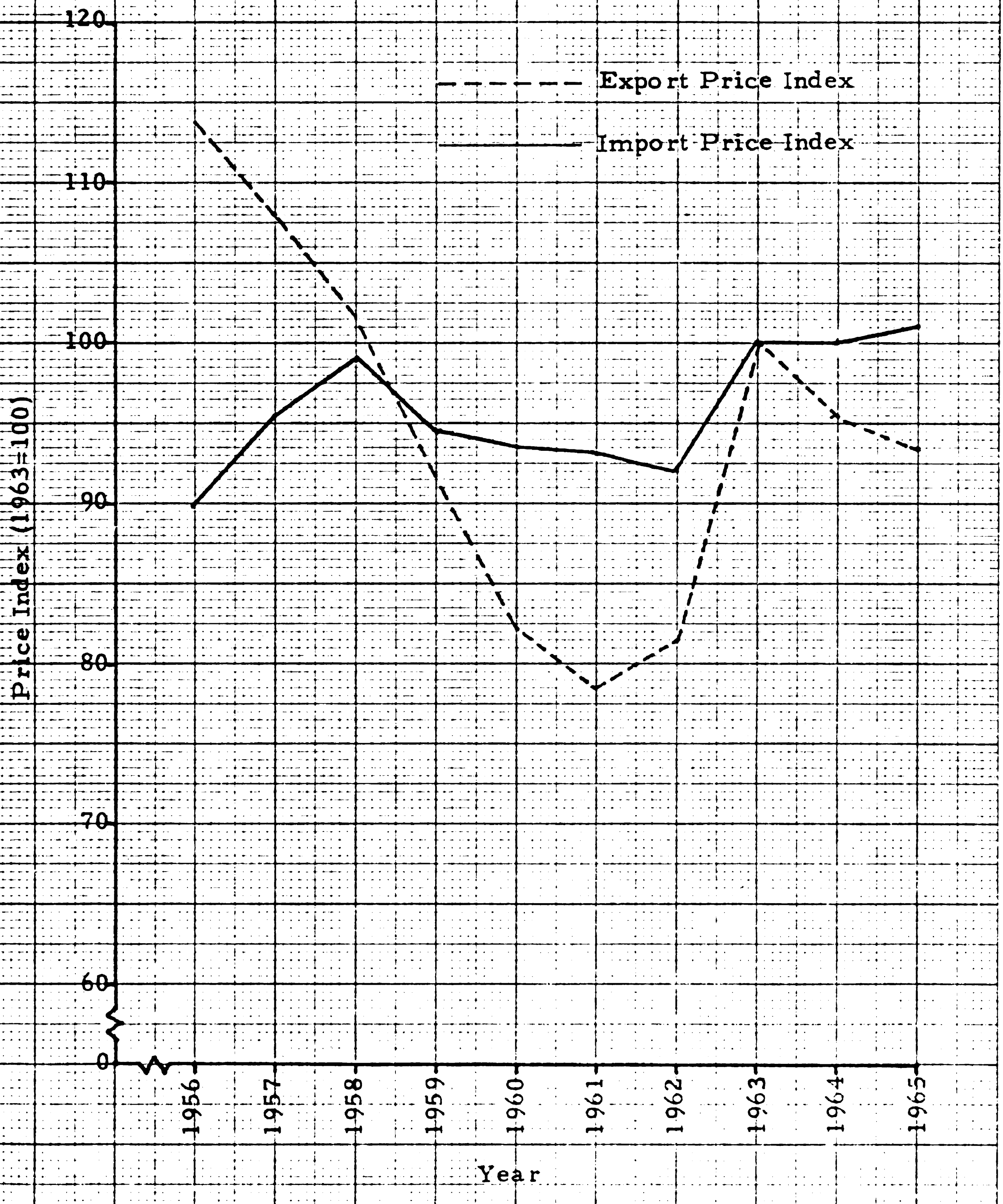
Source: 1950-1967 data are taken from International Monetary Fund's Balance of Payments Yearbooks. 1968 data are from Turkey, State Planning Organization, Ikinci Bes Yillik Kalkinam Plani: 1968-1972, 1969 Yili Programi (Second Five Year Development Plan: 1968-1972, 1969 Annual Programme), Ankara: T.C. Merkez Bankasi (Central Bank of the Republic of Turkey), 1969, p. 40.

Table 7.7: Turkish Import and Export Price Indices (Paasche), 1956-1965

Year	Price Indices (1963=100)					
	Exports	Imports				Foreign Trade Ratio
		Total Imports	Capital Goods	Raw Materials	Consumer Goods	
1956	113.7	89.8	77.7	99.9	104.1	126.6
1957	108.1	95.4	77.0	109.4	109.9	113.3
1958	101.7	99.0	90.3	105.6	105.1	102.7
1959	91.7	94.5	92.0	96.1	95.3	97.0
1960	82.3	93.4	88.1	98.8	92.1	88.1
1961	78.6	93.2	92.9	93.4	93.4	84.3
1962	81.6	91.9	88.6	93.9	94.9	88.8
1963	100.0	100.0	100.0	100.0	100.0	100.0
1964	95.4	100.0	102.6	98.8	97.1	95.4
1965	93.6	101.0	104.6	99.2	98.7	92.7

Source: Is Bankasi (Work Bank), Turkiyenin Dis Ticareti Makkinda Rapor (Report on Turkish Foreign Trade), Ankara: 1966, pp. 21-22.

Figure 7.4: Import and Export Price Indices (Paasche), 1956-1965



does not have a significant impact on the deficit balance. The real impact comes from the general decrease in export prices and a general increase in the prices of capital goods' imports, a significant item of total imports. This point will be clearer if the last column of Table 7.7 is carefully observed. Foreign trade ratios are found by dividing each year's export price index by the corresponding import price index. Even if the price index of exports were to remain constant, an increase in the price index of imports will necessitate a higher amount of exports for an unchanged amount of imports. Table 7.7 shows us that the ratio has continuously fallen from 1956 to 1961, increased in 1962 and 1963, and started to decrease again in 1964. This generally decreasing trend is mainly attributable to the continuous decrease in export prices rather than the general increase in import prices.

2. Another reason for the limited ability to export is

the lack of standardization in cotton production and a high rate of substitutability for cotton products by more durable, cheaper, standardized, and convenient synthetic fibers.

3. Mineral exports, notably chromium, have also been reduced due to increased use of synthetics and a decline in demand in the mid-1950's.

Foreign Debt. As of December 31, 1967, Turkey's external debt amounted to $1.8 billion of which $581 million was for accumulated interest and service charges. The principal creditors are the United States ($729 million), Federal Germany ($305 million), the United Kingdom ($115 million), OECD Consortium ($849 million), and Multilateral creditors such as the European Monetary Authority, European Investment Bank, IMF, and IBRD ($377 million).[13/] Since the total of exports and other invisible receipts falls short of total expenditures in the balance of payments,

13/ Organization for Economic Cooperation and Development, "Turkey's External Debt Position as of December 31, 1967," Internal Document Consortium, Turkey, Paris: 1968.

Turkey has to rely on foreign debt to finance purchases of capital goods from abroad in order to meet the objectives of industrialization and a 7 percent growth rate in GNP stipulated in the Five Year Development Plans. However, a good portion of newly secured foreign debt is used for repayment of earlier loans and interest. For example, of the $308 million borrowed in 1966, $174 million was used for debt repayment and interest. Only the remaining $134 million could be used to finance imports of capital goods for development projects.

CHAPTER 8: THE TURKISH NATIONAL TRANSPORT SYSTEM -- PROBLEMS AND ADJUSTMENTS

8.1 Introduction

The results outlined in Chapter 6 clearly indicate the potential role of Turkey in becoming a transit point in East-West trade which will be significant in mitigating the chronic balance of payments deficit and improving her import capacity. The present transport system is not geared to such service and would require a major overhaul to serve well. In order to realize this potential role, the planners in Turkey must overcome a number of existing difficulties. The first purpose of this Chapter is to describe the present system and identify problems of changing it. Another responsibility of the planners is to estimate the necessary investments in the infrastructure so that the transport system would be geared to external flows including gateway or secondary flows. This constitutes the second purpose of this Chapter, namely, (i) to identify major problems in trade routes and service facilities in order to make Turkey an active partner in the intra-regional trade, (ii) to point further areas of research, and (iii) to offer suggestions for implementation.

The next Chapter will conclude this study by offering a tentative program and timetable for implementation.

8.2 Some Problems in the National Transport System

8.2.1 The National Transportation System

1. Institutional Problems. The administrative structure of the present system can best be described as disorganized. The same subfunctions are performed by different agencies. Lack of coordination among the responsible agencies result in dysfunctional programs and projects. Table 8.1 gives the breakdown of functional responsibility by numerous agencies. It must be admitted that Table 8.1 understates the present problems of inter- and intra-modal coordination because it does not include other public agencies such as the State Planning Organization, Office of the Prime Ministry, Ministries of Finance, Industry, Customs and Monopolies, Commerce, and Energy and Natural Resources whose policies, programs and controls have a significant indirect effect on the transport system. In spite of this understatement the seriousness of the problem is readily apparent: coordination. In the motor mode, the infrastructural responsibility is divided among three Ministries --

Table 8.1: Breakdown of Functional Responsibility in the Turkish Transport System

Establishments	Transport Subsystems																																		
	Motor								Rail									Water									Air								
	Infrastructure			Vehicle			Traffic		Infrastructure				Vehicle			Traffic		Infrastructure				Vehicle			Traffic		Infrastructure				Vehicle			Traffic	
	Construction	Repair and Maintenance	Reconstruction & Redevelopment	Production	Repair and Maintenance	Operation	Licensing	Control	Construction	Repair and Maintenance	Reconstruction & Redevelopment	Operation	Production	Repair and Maintenance	Operation	Licensing	Control	Construction	Repair and Maintenance	Reconstruction & Redevelopment	Operation	Production	Repair and Maintenance	Operation	Licensing	Control	Construction	Repair and Maintenance.	Reconstruction & Redevelopment	Operation	Production	Repair and Maintenance	Operation	Licensing	Control
PUBLIC SECTOR																																			
1. Ministry of Transport:																																			
a) Ministry																									x	x									
b) State Airport Administration Office																												x	x	x					x
c) State Railways									x	x	x	x	x	x	x	x	x		x	x	x														
d) Maritime Bank, Inc.																			x	x	x	x	x	x		x									
e) Maritime Transport, Inc.																								x											
f) Turkish Air Lines																																x	x	x	
2. Ministry of Construction:																																			
a) Directorate of Railway and Waterway Construction									x	x	x							x	x	x															
b) Directorate of Airports and Fuel Facilities																											x	x	x						
c) State Highway Department	x	x	x				x	x																											
3. Ministry of Interior							x	x																											
4. Ministry of Rural Works	x	x	x																																
5. Ministry of Forestry	x	x	x																																
6. Provincial Governments	x	x	x	x	x	x													x	x	x														
PRIVATE ESTABLISHMENTS				x	x	x	x							x					x	x	x	x	x	x			x	x	x			x			

Source: Devlet Planlama Teskilati (State Planning Organization), Ulastirma Koordinasyon Proje Merkezi Müdürlügü (Directorate of Transportation Coordination Project Center), Kurulus ve Gelisme Raporu (Report on Establishment and Development), Ankara: 1971, p. 59.

Construction, Rural Works, and Forestry -- and nearly seventy provincial governments, each maintaining their own construction equipment, facilities, and crews. The same duplication is evident in the rail and air infrastructures between the Ministries of Transport and Construction. The situation in the water infrastructure is even worse. For example, 5 ports and 2 quays are operated by the State Railways, 4 ports and 6 quays by the State Maritime Bank, 2 ports by the State Coal Authority, 30 quays by municipalities and 4 quays by provincial governments. The problems of coordination have been admitted by the State Planning Organization ever since Turkey entered the era of planned development. The first Five Year Plan calls for a centralized and coordinated administration.[1/] The Second Five Year Plan repeats the issue by stating:

> Transportation services and the relevant activities are handled by numerous individuals and organizations, and consequently, coordination cannot be

1/ Devlet Planlama Teşkilati (State Planning Organization), Kalkinma Plani, Birinci Beş Yil: 1963-1967 (First Five Year Development Plan: 1963-1967), Ankara: 1963, p. 386.

> established. Liaison between the operational and constructional organizations could not be established.[2]

From the redundancy in the 1971 Annual Programme it is clear that the problem is not solved yet.[3]

There are three main reasons which account for the failure of efforts during the last nine years to bring about coordination among various agencies:

(a) The legal structure and institutional framework by which the construction, operating, and user agencies are governed are not conducive to the creation of an efficient and coordinated transport system.

(b) An information gathering system which would generate correct and useful data to promote coordination among many agencies does not exist.

2/ State Planning Organization, Second Five Year Development Plan: 1968-1972, Central Bank of the Republic of Turkey, Ankara: 1969, p. 606.

3/ Devlet Planlama Teşkilati (State Planning Organization), Ulaştirma Koordinasyon Proje Merkezi Müdürlüğü (Directorate of Transportation Coordination Project Center), Kurulus ve Gelişme Raporu (Report of Foundation and Development), Ankara: February 1971, p. 15.

(c) In addition, there is a serious lack of statistical data to enable analyses on transport costs, input-output balances, and cost/benefit relationships.

A solution found by the Turkish Government was the establishment of a Council of Transport Coordination in May 1970. As a matter of fact, this Council did not come into existence voluntarily, but is an outcome of an agreement on Transport Coordination and Railroad Survey Special Fund Project between the U.S. Agency for International Development and Turkey, enacted on March 3, 1969. In Section 4.14 of this agreement, the Turkish Government agreed to establish a unit for transport coordination within 14 months; otherwise, the U.S. Government was empowered to cancel aid from the Special Fund.[4/] Comparing the enactment date of the Agreement (March 1969) with the establishment date of

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4/ Devlet Planlama Teşkilati, Ulaştirma Koordinasyon Proje Merkezi Müdürlüğü, *op. cit.*, p. 1.

the Coordination Council (May 1970), it is concluded that the Council is not formed voluntarily, but, rather, imposed upon the administrative structure just before the deadline in order to continue receiving aid from the Fund.

The Council reports to the Supreme Council of Planning and is chaired by the under-secretary of State Planning Organization. Its membership consists of under-secretaries of Finance, Transportation, Construction, and Interior; Directors of Planning in the Ministries of Transportation and Construction; and four Divisional Directors of the State Planning Organization. From the Supreme Council of Planning it is understood that the Transport Coordination Council is purely advisory.[5/] An advisory council is far from meeting the challenges of transport coordination and, at best, is a short-run remedy. The only agency legally empowered to coordinate

5/ Yuksek Planlama Kurulu Raporu (Report of the Supreme Council of Planning) dated December 29, 1970, No. 100, on Transport Coordination Project, p. 1.

transport infrastructures and services is the Ministry of Transport. Historically, this understaffed Ministry failed to bring about the necessary coordination because of budgetary constraints. Unless measures are not taken to make the Ministry more viable, any advisory unit created elsewhere in the administrative structure will fail to provide a long-term remedy. Ever since the 1963 Annual Program, the planners recognized that the Ministry of Transport is the only agency legally empowered to coordinate the activities in the transport sector and that it lacks qualified staff and organization to meet the challenge. When the problem was diagnosed as such, it is inconceivable that the prognosis prescribed by establishing an advisory council will solve the problem.

The long-term solution should have started with a study of existing organizational problems and administrative needs of the Ministry. On the basis of this study an organizational redevelopment plan should have been outlined. The outcome would have been a Ministry of Transport capable of:

(a) Reviewing the legal, administrative, and economic environments surrounding the constructional, operational, and user agencies in order to:

(i) Identify areas of conflict and duplication, and loop holes.

(ii) Prepare transport reform bills and introduce them to the Parliament.

(iii) Design means for an orderly introduction of adopted laws to the system.

(iv) Study the impact of new laws on the performance and efficiency of the system which will serve as a feedback for further legal measures.

(b) Surveying the long-run transport needs of the nation by:

(i) Designing an information gathering system capable of generating accurate and timely economic and cost data.

(ii) Identifying transport system interactions with other systems to analyze transport costs and value added.

(iii) Analyzing trade-offs within the transport system and identifying major problems.

(iv) Preparing development alternatives for review and adoption by the Council of Ministers.

(v) Implementing the development alternative selected through coordination with agencies involved.

(vi) Evaluating results and preparing further plans of action.

2. Economic Problems. Due to lack of coordination among agencies responsible for the planning and construction of transport infrastructure and use of the transport system, the following economic problems are identified:

(a) Transport infrastructures are built parallel to existing infrastructures. Cases where highways are built parallel to railways or to waterways are abundant.

(b) Idle capacity in all modes is reaching serious proportions. Infrastructural utilization never exceeds 20 percent and the utilization of vehicles is around 50 percent.[6]

(c) There is no control over rates in motor, and water transport, and data to allow cost-based pricing in rail transport is non-existent.

(d) Users of highways do not participate adequately in the costs of infrastructural investments and maintenance and repairs, whereas the State Railroads fully participate in the total costs of rail infrastructure. This imbalance results in:

 (i) a high average cost for rail,

 (ii) an increasing use of motor transport even for hauls as long as 700-900 miles,

 (iii) a highly competitive system where price cutting is recognized as the only means to generate a higher vehicle utilization rate.

6/ Devlet Planlama Teskilati (State Planning Organization), Karayolu Tasimasi (Highway Transport), Ankara: 1964, p. 12.

However, past experience has shown that a higher vehicle utilization does not bring greater revenues because of the price inelasticity of transport demand.

(e) The rail rates and port charges are subject to approval by the Council of Ministers which is primarily politically oriented, rather than economic. Due to political considerations, some routes and services are charged at a level less than average costs. This may be proper when it is considered that present rail and port utilizations are not high enough to enable a level of operation where average costs are minimum. Therefore, pricing at lower than average costs may still be acceptable if prices are equal to or greater than marginal costs. However, due to parallel highways, a price reduction in rail is met with cutthroat competition. For instance, a 50 percent reduction in rail rates for goods in transit to Iran was immediately matched by the trucking establishments. Due to better transit time and more complete service, the motor mode is now generally used for this service for a distance of 800 miles at one-half the regular rate which in itself was established by cut-throat competition. Since most trucking is performed by owner-operators, trucks are able to compete with the railroad at rates sufficient to cover variable costs only. In short, a political motive by the Council of Ministers resulted in an unbearable waste of existing transport capacity.

(f) There are no restrictions on the entry to motor transport. No licenses, fees, or certifications are required. Individual ownership and operation of vehicles is most common. Lack of technical and managerial know-how among many owner-operators compounds the economic problems identified.

The ultimate responsibility for remedying these problems rests with the Ministry of Transport. To accomplish reform, the Ministry of Transport must immediately undertake a study for the purposes of:

(a) Gathering, analyzing, and interpreting cost data on each mode.

(b) Determining equitable levels of participation in infrastructural construction and maintenance costs by users in each mode.

(c) Detailing a long-run plan of action to:

  (i) Abandon the practice of building parallel infrastructures.

  (ii) Isolate the most economic and effective mode along a specific route for each commodity group.

  (iii) Establish minimum tariffs for each mode so that an equitable use among modes can be realized and an optimum commodity service by each mode can be achieved.

  (iv) Increase infrastructural and vehicle utilizations.

  (v) Transfer the authority of rate making for rail transport and port services from the Council of Ministers to their managements.

(vi) Introduce a system of control in road transport through licensing and certification.

(vii) Assure an input of greater technical knowledge and managerial expertise to the users by offering regular trade conferences, seminars, publications, and encouraging the establishment of a greater number of company-operated trucking firms as opposed to owner-operated units.

3. International Problems. In this section the problems identified with respect to motor, water and air transport will be dealt with.

(A) Motor Transport. The share of Turkish trucking firms in the transport of goods in foreign trade is extremely low. Of the 928,000 tons of Turkish exports by motor mode in 1968, only 2,000 tons were transported by Turkish trucking firms. In the same year 1,545,000 tons were imported into Turkey by motor, of which only

3,000 tons were carried by Turkish firms.7/ The motorborne traffic is mainly with European countries with minor movements across the Eastern and Southeastern borders. Although there are no accurate figures available for the deficit of transport services due to the motor mode, one can make a rough estimate as follows:

Total Motor Mode Movement (Tons).......... 2,473,000
Export 928,000
Import 1,545,000

Total Freight Bill (Paid in foreign currency)
2,473,000 tons @ $50/ton (Average)......$123,650,000

Less: Total Direct Expenses in Turkey(1).... 49,460,000
(a) Operating Expenses:
2,473,000 tons x 500 miles average distance passed in Turkey=1,236.5 Mil. ton-miles

1,236.5 Mil. ton-miles @ $.03(2) ton-mile $37,095,000

(b) Administrative Expenses and Commissions:
10% of Total Freight Bill...12,365,000

Deficit of Motor Transport Services.........$ 74,190,000

(1) This item attempts to estimate the money left in Turkey by foreign operators.
(2) This is an estimate of direct operating costs related to operating a foreign vehicle within Turkey.

7/ Gezen, Asil, Turkish Foreign Trade and National Transport Policy, Unpublished paper, E. Lansing, Michigan: May 1969, p. 16.

International Monetary Fund estimates a freight deficit of $52 million for 1966.[8/] If Turkish trucking firms could be encouraged to equally participate in the foreign trade movement, $37 million of this freight deficit would have been avoided.

In exploring the reasons why Turkish trucking firms are not encouraged to participate in the export and import tonnage, some factors which fall into two sets of broad restrictions will be covered: price restrictions and operational-legal restrictions.

a. Price Restrictions. It is obvious that one of the main reasons that prevent Turkish trucking firms from entering the foreign trade market is their inability to meet the competitive freight rates. Experience shows that this inability stems from the following two facts:

(i) Transit charges. Table 8.2 shows the transit charges assessed to Turkish trucks by various European countries. As will be seen, a

8/ International Monetary Fund, Balance of Payments Yearbook, Vol. 20, March 1969.

Table 8.2: Transit Charges Collected by Some European Countries from Turkish Trucks

Country	Transit Charge ($/Vehicle)	
	10-ton Vehicle	15-ton Vehicle
Bulgaria	37	49
Yugoslavia	104	145
Austria	16	20
Western Germany	20	23
Greece	30	40

Source: International Road Transport Union, Handbook of International Road Transport, 1966, 5th Ed., Geneva: 1966.

10-ton Turkish truck destined for Western Germany will pay a total of \$177 to the Bulgarian, Yugoslavian, Austrian, and Western German authorities at respective borders. If the truck is loaded to capacity (which is very seldom the case), the transit charge burden per ton for one trip is \$17.70. On the other hand, no transit charge is collected from any foreign truck in Turkey. We are not in a position to judge the questionable political advantages that could be gained by this generosity of the government, but the economic implication of this is exploitation, in its purest sense, of the limited resources of the nation. Not only is it illogical insofar as participation of foreign operators in the construction and upkeep costs of Turkish highways due to wear caused by them, but also, it nonsensically eliminates equal grounds of competition between Turkish and foreign trucks.

The Ministry of Transport must immediately initiate a survey of existing practices and prepare a transit charge system on the basis of reciprocity for the review and approval of the Council of Ministers.

(ii) High Investment Base. Turkish export and import tonnage by motor mode is mainly shared by Greek, Yugoslavian, Bulgarian, and Western German trucks. Western Germany is a producer of trucks and trailers. Yugoslavia and Bulgaria do not produce trucks but purchase them from other communist countries, such as Czechoslovakia and Russia, in exchange for exports or with long-term credit and without any customs duty. Greece imports trucks from the free world with a 60 percent customs duty on CIF price. Trucking firms in Greece, however, are granted long-term government credit with very favorable terms. In Turkey, on the other hand, a small assembly plant manufactures 2,000 small trucks every year which costs as much as an imported Western counterpart. This is about 10 percent of the annual need. Most of Turkey's trucks are imported from Western Europe and the U.S.A. with a customs duty of 100 percent on CIF price. In addition, there is no long-term credit or any other government program to encourage financing. The picture should be clear by now: A $10,000 truck in Western Germany costs about the same to the government subsidized trucking firms in Yugoslavia and Bulgaria, about $16,000 to a trucker in Greece who can get very favorable long-term credit to finance the investment, and about $20,000 cash to a Turkish trucking firm. Nothing more need be said on this matter, except to remind that one of the important cost elements in trucking, or, for that matter, in any business, is depreciation. In cooperation with the Ministry of Finance, the Ministry of Transport must determine means of reducing the investment costs on vehicles and/or providing long-term financing possibilities.

b. Operational-Legal Restrictions

(i) TIR Convention. On January 15, 1959, the following 21 European nations agreed upon a customs convention on the international transport of goods under cover of TIR carnets: Austria, Belgium, Bulgaria, Switzerland, Federal Germany, Czechoslovakia, Denmark, Spain, France, Great Britain, Greece, Hungary, Italy, Luxemburg, Norway, the Netherlands, Poland, Romania, Sweden, Finland, and Yugoslavia. Article 2 of this Convention reads:

> This convention shall apply to the transport of goods without intermediate reloading across one or more frontiers between

> a Customs office of departure or one Contracting Party and a Customs office of destination of another Contracting Party, in road vehicles or in containers carried on such vehicles, notwithstanding that such vehicles are carried on another means of transport for part of the journey between the offices of departure and destination.9/

Chapter III of the Convention provides provisions concerning transport in sealed road vehicles or sealed containers in which Article 4 states:

> . . . goods carried in sealed road vehicles or in sealed containers on road vehicles a) shall not be subjected to the payment or deposit of import or export duties and taxes at Customs offices _en route_; and b) shall not, as a general rule, be subjected to Customs examination at such offices.10/

Turkey became a full member of the TIR Convention in August 1967. Since 1968, the Turkish trucking firms gradually started to participate in the export and import tonnage

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9/ International Road Transport Union, _Handbook of International Road Transport: 1966, 5th Ed._, Geneva: 1966, p. 262.

10/ _Ibid_.

distribution. However, the recent increasing trend of this participation leaves much to be desired. For example, in 1971 only 25,000 tons of primary external flows and 2,300 tons of secondary external flows (between Iran and Europe) were hauled by Turkish trucking firms. The total number of individual trips amounted to 2,556. In the same year, 32 Turkish trucking firms were authorized to transport goods under the TIR Carnet with a total fleet of 214 semi-trailers and 64 trucks designated for this purpose. The hauling capacity of this fleet was 3,154 tons for semi-trailers and 640 tons for trucks.11/ These figures indicate that:

1. The average number of vehicles per trucking firm is less than 9 units.

11/ Devlet Planlama Teşkilati (State Planning Organization), Karayolu Ulastirmasi Özel Ihtisas Komisyonu Raporu (Report of the Special Committee on Road Transport), Ankara: December 1971, pp. 138 ff.

2. The average tonnage hauled per trucking firm is 853 tons.

3. The average load per trip is little over 10 tons, compared to the average loading capacity of 15 tons for semi-trailers and 10 tons for trucks.

4. The average yearly tonnage carried per vehicle is less than 100 tons.

The first two items above indicate an urgent need for consolidating the managerial efforts of numerous trucking firms in order to eliminate wasteful duplications and achieve a greater economy of scale. The Ministry of Transport is urged to study the trend and the possibilities of establishing an association of trucking firms to handle international transport of goods by road. The third item shows a good load factor, but when compared with the fourth item, it indicates an extremely low utilization ratio per vehicle per year. Even the third item indicates room for improvement when the load factor per trip is considered separately for the Turkish imports. In 1969 a total of 1,411 import trips carried 8,490 tons, or an average of 6 tons per trip.[12/] Again, this ratio indicates an urgent need to consolidate the capacity of trucking firms under one administration.

(ii) Customs Bond Transport. Any foreign truck that applies for customs bond transportation privilege between the Turkish border and any point in Turkey can be granted this privilege automatically. The only requirement is to present a bank guarantee letter of \$12,000 to the border customs office.[13/] No other taxes, fees, licenses, or permits are required other than this deposit. For a Turkish trucking firm to obtain the same

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12/ *Ibid.*, p. 141.
13/ International Road Transport Union, *op. cit.*, p. 224.

privilege the requirement is a bank guarantee letter to the Ministry of Customs in the amount of $200,000 in addition to approximately one year of red tape. This problem can be eliminated by reducing the requirements asked of Turkish trucking firms to an equitable level. The Ministry of Transport in cooperation with the Ministry of Customs and Monopoly must take the necessary steps to reduce the guarantee letter requirements from Turkish truckers to a more equitable level and reduce red tape.

(iii) Foreign Exchange Accountability. According to the foreign exchange regulations enforced in Turkey, any person who goes abroad and for that purpose purchases foreign currency from the Turkish Central Bank must furnish detailed evidence of expenses abroad and return the unspent currency to the bank within 15 days after his arrival in Turkey.

A lucky person will be able to conclude the formalities and return the unspent amount in two days. The relevance of this red tape is that any formality related with foreign exchange purchases and returns cannot be followed by an authorized representative who has an appropriate power of attorney.

In other words, the Turkish driver must personally purchase the currency and return it upon his arrival; i.e., he will spend as much time in following endless formalities as performing his main function of driving. The foreign exchange regulations must be changed to allow purchase or return of foreign currencies by persons having a power of attorney. The Ministries of Transport and Finance must work together in this direction.

(iv) International Agreements. Turkey is not a member of the following multilateral agreements or conventions in force which are

closely related to international road transport:[14/]

- Convention on the Contract for the International Carriage of Goods by Road (CMR), signed at Geneva on May 19, 1956. Member countries are Austria, Belgium, Denmark, Federal Germany, France, Italy, Luxemburg, Netherlands, Poland, and Yugoslavia.
- Convention on the Taxation of Road Vehicles Engaged in International Goods Transport, signed at Geneva on December 15, 1956, by the following participating countries: Austria, Czechoslovakia, Ireland, Luxemburg, Norway, Sweden, and Yugoslavia.
- Protocol on Road Signs and Signals signed at Geneva on September 19, 1949. The contracting parties are Austria, Belgium,

14/ *Ibid.*, p. 309.

Bulgaria, Czechoslovakia, Denmark, Finland, France, Greece, Hungary, Italy, Luxemburg, Netherlands, Poland, Portugal, Romania, Spain, Sweden, and Yugoslavia. A European Agreement supplementing the 1949 Protocol on Road Signs and Signals was signed at Geneva on September 16, 1950, by Austria, Belgium, France, Greece, Hungary, Italy, Luxemburg, Netherlands, Poland, Spain, and Yugoslavia.

- Customs Convention on the Temporary Importation of Commercial Road Vehicles, signed at Geneva on May 18, 1956, by Austria, Belgium, Bulgaria, Denmark, Federal Germany, France, Greece, Hungary, Ireland, Italy, Luxemburg, Netherlands, Poland, Romania, Spain, Sweden, Switzerland, United Kingdom, and Yugoslavia.

- Customs Convention on Containers, signed at Geneva on May 18, 1956. The participating nations are Austria, Belgium, Bulgaria, Czechoslovakia, Denmark, Federal Germany, Finland, France, Greece, Hungary, Italy, Luxemburg, Norway, Netherlands, Poland, Portugal, Spain, Sweden, Switzerland, United Kingdom, and Yugoslavia.
- European Convention on Customs Treatment of Pallets Used in International Transport, signed at Geneva on December 9, 1960, by Austria, Belgium, Bulgaria, Czechoslovakia, Denmark, Federal Germany, France, Hungary, Luxemburg, Norway, Netherlands, Romania, Sweden, Switzerland, United Kingdom, and Yugoslavia.

It is strongly recommended that the above documents be studied by the Ministries of

Transport and Foreign Affairs, and that the steps necessary for Turkish participation in all (with appropriate exceptions on applicability) be initiated.

(B) Water Transport. Table 8.3 shows the general cargo transport of Turkish foreign trade carried by Turkish flag vessels from 1950 to 1960. Import and export percentages broken by Turkish and foreign flag are given in Table 8.4. On the average, one-third of Turkish waterborne foreign trade is carried by Turkish flag. The capacity of Turkish fleet operating in international trade is estimated around 40.4 billion ton-kilometers in 1960. Only one-third of this capacity was utilized in 1960, which indicates room for improvement in the Turkish flag share. The average distance traveled was 6,500 kilometers.15/ An increase of Turkish flag share to 50 percent means an approximate reduction of $17.0 million in the balance of payments deficit computed as follows:

15/ Devlet Planlama Teşkilati (State Planning Organization), Deniz Ulaştirmasi (Water Transport), Ankara: 1964, p. 18.

Table 8.3: Turkish Foreign Trade Carried by Turkish Flag (General Cargo)

Year	Metric Tons (10^3)	Ton-Kilometers (10^6)
1950	1,064	6,915
1951	1,338	8,701
1952	2,006	13,560
1953	1,280	8,321
1954	1,490	9,687
1955	2,122	13,792
1956	1,696	11,024
1957	2,029	13,189
1958	1,398	9,086
1959	1,641	10,667
1960	2,012	13,081

Source: Devlet Planlama Teskilati (State Planning Organization) Deniz Ulastirmasi (Water Transport), Ankara: 1964, p. 13.

Table 8.4: Turkish and Foreign Flag Shares(%) of Turkish Imports and Exports by Water (General Cargo)

Year	Imports		Exports		Total	
	Turkish	Foreign	Turkish	Foreign	Turkish	Foreign
1953	33	67	13	87	23	77
1954	41	59	20	80	31	69
1955	39	61	40	60	36	64
1956	36	64	35	65	35	65
1957	37	63	43	57	39	61
1958	36	64	27	73	32	68
1959	42	58	22	78	30	70
1960	38	62	34	64	36	64

Source: Devlet Planlama Teskilati (State Planning Organization), Deniz Ulastirmasi (Water Transport), Ankara: 1964, p. 14.

$(.50-.35)(.36.1\times10^9$ ton-kilometers)	$= 5.42\times10^9$ ton-kilometers
$5.42\times10^9 \div 6{,}500$ kilometers	= 830,000 tons
Revenue per ton:	
6,500 kilometers @ \$.007 per kilometer	= \$45.50 per ton
Total Revenue:	
830,000 tons x \$45.50 per ton	= \$37.8 million
Less:	
Operating costs abroad (830,000 tons x \$25 per ton)	= \$20.8 million
Net Benefit:	= \$17.0 million

In order to increase Turkish flag participation, the Ministry of Transport must undertake the necessary steps with:

(i) The Ministries of Foreign Affairs and External Trade to include a provision in bilateral trade agreements to the effect that an equitable share of Turkish flag tonnage will be provided.

(ii) The Ministries of Foreign Affairs and Finance to include a similar provision in aid agreements.

(iii) The Ministry of Foreign Affairs to isolate Conference practices discriminating against the

Turkish flag and take the necessary steps to remove such practices.

(iv) The Ministry of External Trade to introduce increased practice of CIF selling and FOB purchasing to the Turkish exporters and importers, respectively.

Turkish ports are presently serviced by ten steamship conferences.16/ Some of these Conferences have already adopted a 50 percent Turkish flag share practice. One example is the Continent/Turkey/Continent Conference and Pool Agreement enacted on August 26, 1969, which operates between the Netherlands, Federal Germany, Belgium, on one hand, and Turkey, on the other.17/

As far as international conference agreements are concerned, it is concluded that Turkey adequately participates and is properly represented in 15 such agreements.

16/ Devlet Planlama Teşkilati (State Planning Organization), Türkiye 'de Deniz Ulaştirmasina Uygulanan Mevzuat (The Legal Structure of Turkish Water Transport), Ankara: July 1971, p. 15.

17/ Ibid., p. 18.

However, an average lag of 17 years occurred between the initial enactment of these agreements and Turkey's entry as a party, with the range being from 2 to 39 years. Every effort must be made to reduce this lag in future agreements.

(C) Air Transport. Air transport to/from international markets is negligible at the present. However, with the introduction of jumbo jets and other highly efficient vehicles and improved terminal operations, the reduced ton-mile costs coupled with transit time reductions will make the air mode increasingly attractive to the shippers. Turkey is a party to the Chicago Agreement enacted on December 7, 1944, and the Turkish Airlines is a member of International Air Transport Association. However, it is strongly recommended that the necessary measures be taken to make Turkey also a party to the following:18/

18/ Devlet Planlama Teşkilati (State Planning Organization), Türkiye 'de Sivil Havacilik Mevzuati (The Legal Structure of Civilian Air Transport in Turkey), Ankara: March 1971, p. 12.

(i) Tokyo Agreement enacted on September 14, 1963

(ii) Geneva Convention enacted on June 19, 1948

(iii) Warsaw Convention enacted on October 12, 1929

(iv) The Hague Protocol enacted on September 28, 1955.

8.2.2 Other Modal Problems

1. Motor Transport. In addition to the problems of the motor mode discussed in Section 8.2.1, other important problems will be covered in this section. One problem is a continuous reduction in truck utilization since 1954. Idle capacity encourages a destructive competition with other modes as well as within the mode. The rates charged by the railroad reflect a full cost pricing which includes depreciation of right of way, repair and maintenance, expenses of right of way, and a transport tax, none of which are cost elements in the motor mode. Table 8.5 gives a breakdown of user participation in highway expenses. As is clearly shown in Table 8.5, for all practical purposes the right of way in the motor mode is free to the users. A transit charge

Table 8.5: User Participation to Highway Expenses, 1950-1960

Year	Total User Charges (Mil. TL)	Total Expenditures (Mil. TL)	Ratio of User Charges to Total Expenditures
1950	36.9	55.7	66%
1951	44.4	84.1	53
1952	48.2	133.7	36
1953	52.5	148.1	35
1954	58.7	139.8	42
1955	57.2	240.8	24
1956	56.5	282.0	20
1957	45.7	376.2	12
1958	46.3	438.0	10
1959	88.1	627.2	14
1960	74.9	568.5	13

Source: Devlet Planlama Teskilati (State Planning Organization), Tasima Politikasi (Transport Policy), Ankara: 1963, p. 18.

system was established in 1967 which brought in $750,000 in revenues. For some strange reason all transit charges were abolished in 1968. It is strongly recommended that the Ministry of Transport undertake a study in order to:

(i) Assess user charges on the motor mode to achieve equitable conditions of competition with the rail mode, and

(ii) Re-establish a transit charge system on the basis of total mileage traversed within Turkey, so that any negotiation on reciprocity will enable the planners to compare benefits with costs on the basis of distances traversed in each country.

Another problem in the motor mode is the age of vehicles. Table 8.6 puts this problem in proper perspective. Although the percentage of newer trucks has been increasing, it should also be noted that the percentage of trucks older than 10 years has also been steadily rising. Also, approximately two-thirds of trucks are five or more years old. Based on State Planning Organization's estimate of an average 75,000 kilometers per vehicle

Table 8.6: Distribution of Trucks by Age

Year	Trucks							
	Older than 10 Years		5-10 Years Old		Less than 5 Years Old		Total*	
	Number	%	Number	%	Number	%	Number	%
1956	4,220	12	11,851	34	17,783	51	35,070	100
1958	7,082	18	20,627	52	11,453	29	39,721	100
1959	9,441	20	24,158	50	13,802	29	48,094	100
1960	13,080	23	24,351	42	19,263	34	57,460	100
1961	17,685	27	21,601	33	24,583	38	64,706	100

*Totals do not agree with the sum of individual age groups because of unknown models not incorporated into the table.

Source: Adapted from Devlet Planlama Teskilati (State Planning Organization), Karayolu Tasimasi (Motor Transport), Ankara: 1964, p. 14.

per year,[19] a five-year-old vehicle has a burden of 375,000 kilometers on it. It is staggering to note that 27 percent of trucks in 1961 had at least 750,000 kilometers on them. In 1961, a total of 1,581 trucks were older than 1941 and still operating. This fleet had at least 1.5 million kilometers on each vehicle. The continued operation of such an old fleet is beyond economic reasoning. When the fact that the Turkish trucking fleet is made up of various national products and numerous makes and models, the problems of keeping a ready stock of imported parts, and providing appropriate service facilities are beyond the reach of any imagination.

The problem of old vehicles is due to many factors, some of which are the following:

(a) Until recently all motor vehicles were imported into Turkey. Domestic assemblies dependent on imports of engines started in the mid-1960's.

19/ Devlet Planlama Teskilati (State Planning Organization), 1963-1968 Doneminde Karayollarini Kullananlardan Saglanan Kamu Gelirleri (The Receipts Generated from Highway Users in 1963-1968), Ankara: March 1971, p. 29.

Import quotas for trucks were never set at a level so as to encourage replacement of old units by newer ones.

(b) When domestic assemblies started, protectionist measures were introduced and import quotas were established. Due to the low capacity of domestic plants, a greater scarcity of vehicles became an inescapable consequence.

(c) As explained earlier, the first cost of transport vehicles in Turkey is abnormally high due to high customs duties and other taxes imposed on imported parts and vehicles. As shown in Table 8.7, the cost of customs dues and taxes on materials and components related to motor vehicles has increased substantially. On the other hand, very few trucking firms exist that are financially able to receive borrowed capital. It follows that a great majority of owner-operators cannot borrow to buy newer models.

(d) On the other hand, due to destructive competition

Table 8.7: Customs Dues and Other Taxes (% of CIF Value) on a Selected Sample of Imports

Item and SITC Number	Year					
	1963	1964	1965	1966	1967	1968
Trucks and Pickup Trucks (87.02.21 and 87.02.22)	48%	48%	48%	48%	76%	81%
Chassis with Engine (87.02.20-30)	36	36	36	36	45	50
Chassis w/out Engine (87.02.93-4)	31	31	31	31	39	44
Electrical parts (85.08; 85.09; 70.14.22; 90.27.10-20-30)	35	35	35	35	43	48
Body Works (87.05.00)	95	95	95	95	105	111
Body Parts (87.06.96-97-99)	61	61	61	61	69	74
Rubber (40.01.22)	54	54	54	54	70	76
Cords (51.04.11-12)	60	60	60	60	69	74
Synthetic Rubber (40.02.11)	54	54	54	54	62	67
Grease (27.10.50)	38	38	43	50	59	65
Engines (84.06)	31	31	31	31	73	77
Tires*	55	55	58			

*Importation prohibited in 1966.

Source: Devlet Planlama Teskilati (State Planning Organization), 1963-1968 Döneminde Karayollarini Kullananlardan Sağlanan Kamu Gelirleri (The Receipts Generated from Highway Users in 1963-1968), Ankara: March 1971, pp. 75-116.

and cut-throat pricing, profit margins are so low that no owner-operator can afford to purchase a new vehicle from retained earnings. Also operating an older and economically infeasible vehicle drains most of operating profits for repairs and maintenance which further reduces retained earnings and creates a dilemma. The present system offers a good example of a vicious circle: high repair and maintenance costs reduce retained earnings which in turn increase the inability to purchase new vehicles and achieve lower operating costs. This vicious circle can be broken by taking measures to eliminate cut-throat competition, and any one or a combination of the following measures:

(a) Reducing the initial costs of vehicles through customs tariff reduction and/or more efficient domestic production.

(b) Increasing the opportunities for owner-operators to obtain borrowed capital at low cost.

The Ministry of Transport must immediately outline a policy to mitigate this problem and present it to the Council of Ministers for final review and approval.

2. Water Transport. A review of the study made by the State Planning Organization[20] revealed that as of July 1971 a total of 120 legal documents make up the legal structure of domestic water transport. A synopsis of this structure is provided in Table 8.8. If 15 international agreements, 10 conferences and 6 international organizations in which Turkey has full membership are added to Table 8.8, the problems of coordination, fractional coverage, and confusion will be better understood. The problem will be further compounded when 14 other legal documents and 8 international ship classification institutes concerned with shipbuilding are added to the already lengthy list.

20/ Devlet Planlama Teşkilati (State Planning Organization), Türkiye 'de Deniz Ulaştirmasina Uygulanan Mevzuat, op. cit.

Table 8.8: Number of Legal Documents Connected with Domestic Water Transport, as of July 1971

Type of Document	Number
Directly Related Laws	25
Indirectly Related Laws	33
Regulations	24
Council of Ministers' Orders	9
Directives	14
Decrees	15
TOTAL	120

Source: Devlet Planlama Teşkilati (State Planning Organization), Türkiye 'de Deniz Nakliyatinda Uygulanan Mevzuat (The Legal Structure of Turkish Water Transport), Ankara: July 1971, pp. 3-12.

Some of the legal documents are inherited from the Ottoman Empire and many old documents have been amended so many times that only a few articles remain in force. The Ministry of Transport should immediately undertake a review of legal documents in water transport and shipbuilding so that a comprehensive law is created in accord with a coordinated water transport policy.

One of the important laws in water transport is the Law Establishing the Ministry of Transport. This law creates a very powerful and viable Directorate of Ports and Waterways within the Ministry. However, this Directorate has not functioned as expected due to lack of qualified personnel. Every effort must be made to staff this unit with experts qualified to bring about the desired coordination of agencies directly involved in water transport and infrastructure.

About 40 percent of international transport by Turkish flag is performed by two state-owned enterprises. The remaining portion is done by a number of privately owned shipowners. The state-owned enterprises are also empowered to deal with banking, insurance, freight forwarding, domestic transport of mail and passengers, port administration, warehousing, ferry-boat services, hotel and restaruant management, etc. The activities are so diverse that managerial attention is thinly divided among various functions with resultant chronic losses and subsidies. The Ministry of Transport must immediately formulate a plan to free state-owned shipping enterprises from burdens unrelated to maritime transport and reorganize them into a more efficient and effective operation.

The administration of ports and quays is a complete chaos. Some ports are operated by State Railways, some by the State Maritime Lines, a few are operated by local governments, and still some by the State Coal Authority. All ports must be administered by one centralized authority with autonomous directorates at each port.

There are no free trade zones in Turkey. In the 1963 Annual Programme, the State Planning Organization recognized the need for such zones for the development of Turkish transit trade and to attract small-scale industries to a concentrated area. However, nothing is done so far toward the establishment of free trade zones. The ports of Iskenderun and Trabzon have great potential for becoming the entry/exit points for waterborne secondary external flows in transit through Turkey. The Ministry of Transport must study the potential of these ports with respect to transit trade and perform cost/benefit analyses to determine the feasibility of free trade zones in these ports.

3. Shipbuilding. The historical development of the merchant fleet made up of publicly and privately operated units used in both intercoastal and foreign trade is given in Table 8.9. The table reveals that the trend has been steady with a phenomenal growth in tankers. Also, during the twenty-year period, the average capacity doubled from 160 to 320 gross tons. However, the age distribution of the merchant fleet leaves much to be desired. Table 8.10 gives the distribution of the 2,722

Table 8.9: The Development of Turkish Merchant Fleet, 1940-1960

Year	Cargo Ships		Passenger Ships		Tankers		Total	
	Number	Gross Tons (000)	Number	Gross Tons (000)	Number	Gross Tons (000)	Number	Gross Tons (000)
1940	1,624	144.7	117	119.5	5	4.4	1,746	268.6
1941	1,657	144.3	118	132.6	5	4.4	1,780	281.3
1942	1,679	143.3	119	135.6	5	4.4	1,803	283.3
1943	1,806	171.6	116	131.5	5	4.4	1,927	307.5
1944	1,871	181.8	115	128.9	5	4.4	1,991	315.1
1945	1,910	185.6	115	128.9	5	4.4	2,030	318.9
1946	1,950	192.5	114	125.4	5	4.4	2,069	322.3
1947	1,986	209.5	116	130.2	6	5.0	2,108	344.7
1948	2,022	225.6	123	149.1	7	5.4	2,152	380.1
1949	2,071	288.4	128	151.8	7	5.4	2,206	445.6
1950	2,055	348.7	129	178.7	13	7.4	2,197	534.8
1951	2,090	360.5	132	201.2	13	15.2	2,235	576.9
1952	2,137	387.9	137	213.7	13	15.2	2,287	616.8
1953	2,242	405.1	133	196.3	15	24.7	2,390	668.7
1954	2,352	448.3	134	195.7	15	24.7	2,501	738.4
1955	2,470	508.3	143	201.9	18	28.2	2,631	738.4
1956	2,535	520.5	147	227.0	22	42.8	2,704	790.3
1957	2,553	506.3	153	228.9	24	42.9	2,730	778.1
1958	2,630	511.0	158	228.7	24	42.9	2,812	782.6
1959	2,505	528.2	147	214.5	27	56.3	2,679	799.0
1960	2,541	556.5	150	213.4	31	64.2	2,722	834.1

Note: Only ships of 18 or more gross tons are included in this table.

Source: Devlet Planlama Teskilati (State Planning Organization), Deniz Ulastirmasi (Water Transport), Ankara: 1964, p. 8.

[illegible]

Table 8. 10: Distribution of Turkish Merchant Fleet by Age, 1960

Age (years)	Number of Ships	Gross Tons	Percent of Ships	Percent of Gross Tons
51 or older	131	101,667	5	12
31-50	448	191,445	16	23
11-30	1,035	299,171	38	36
4-10	703	173,711	26	21
3 or less	317	51,411	12	6
Unknown	88	16,751	3	2
TOTAL	2,722	834,156	100	100

Source: Devlet Planlama Teskilati (State Planning Organization), Deniz Ulastirmasi (Water Transport), Ankara: 1964, pp. 9-10.

ships in 1960 by age. Nearly 60 percent of ships which make up more than 70 percent of the total capacity are in service for more than ten years. Also a comparison of the percent distribution of the number of ships with the gross ton percentages leads to the surprising conclusion that ships put to service recently are much smaller than their predecessors. The doubling of the average capacity is, then, not due to the greater capacity of new ships, but it is due to discarding older ships of smaller capacity and retaining the large older ships in service. These large older ships, especially the ones older than 50 years which have an average capacity of 770 gross tons (more than double the overall average capacity of 320 gross tons in 1960) must be replaced with newer and faster ships. The production capacity of the Turkish shipbuilding industry is adequate to meet the demand for small ships. However, because of the inadequacy of domestic shipyards, it has not been possible to meet the demand for ships of over 6,000 dwt and second-hand ships had to be imported.21/

21/ State Planning Organization, Second Five Year Development Plan: 1968-1972, Central Bank of the Republic of Turkey, Ankara: 1969, p. 574.

In order to meet the replacement and new demand for ships, a comprehensive shipbuilding plan must be initiated by the Ministry of Transport in cooperation with the Ministries of Industry, Commerce, External Economic Relations, and Finance. This plan, among other things, should outline means toward the elimination of the following bottlenecks and problems:

(a) The two naval shipyards, one of which is the largest and most modern shipbuilding facility in the country, are mostly idle. Every effort must be made to use these facilities for merchant shipbuilding when the yards are not used for naval shipbuilding purposes.

(b) The state-owned shipyards are not as productive as the privately owned yards. One possible reason for this low productivity is the lack of qualified personnel. As Table 8.11 indicates, the lack of engineers in each shipyard is critical. Another reason is due to lack of administrative know-how in dealing with problems of labor. One recent

Table 8.11: Capacity and Personnel of State-Owned and Operated Shipyards

Name	Annual Capacity (dwt)	Maximum Ship Size Produced (dwt)	Area (sq. meters)	No. of Workers	No. of Engineers	No. of Workers per Engineer
Camialti	30,000	20,000	30,000	1,200	37	32
Haliç	9,000	3,000	75,000	1,800	25	72
İstinye	3,000	1,500	26,000	1,000	6	167
Hasköy	1,500	1,700	N. A.	300	5	60
Alaybey	2,500	1,200	27,900	400	5	80

Source: Devlet Planlama Teşkilati (State Planning Organization), Türkiye 'de Gemi İnşa Endüstrisine Uygulanan Mevzuat (The Legal Structure of Turkish Shipbuilding Industry), Ankara: September 1971, pp. 9-10.

example, although not directly related to the shipyards, is the pay scale of dock workers in Izmir. In the recent labor contract, the sick leave pay is three times greater than the average earnings per day. According to the port authorities, on the average, 25 percent of dock workers in Izmir are "sick".22/

(c) Any foreign flag ship is subject to the customs quotas and endless formalities for imports of parts needed when at urgent repair in a shipyard. A free trade zone status is essential for some shipyards, if foreign ships are expected to be repaired without unnecessary delay in customs formalities.

(d) Frequent delays and work stoppages in shipyards are due to long customs formalities imposed upon the imports of engines and parts.

22/ Milletlerarasi Imar ve Kalkinma Bankasi (International Bank for Reconstruction and Development), Türkiye 'de Ulaştirma Koordinasyon Hizmetleri, Ara Rapora Ait Ekler (Transport Coordination Services in Turkey, Annexes to the Interim Report), Ankara: August 1970, p. 51.

(e) A new regulation passed on April 26, 1971, on the importation of engines, parts, and other accessories used in the shipbuilding industry requires the final permission of the Ministry of External Trade which is another addition to the already crowded list of Ministries and agencies to be coordinated.

(f) Another recent regulation dated February 27, 1971, on the importation of ships requires, among other things, that a ship must not be older than 3 years[23/] in order to be granted an import permit. When 88 percent of ships in service are older than 3 years, this requirement seems arbitrary and unjustified. The Second Five Year Development Plan justifies the importation of second-hand ships on the basis that "second-hand ships are less expensive compared to new ones."[24/] The new

23/ Devlet Planlama Teskilati (State Planning Organization), Türkiye 'de Gemi Inşa Endüstrisine Uygulanan Mevzuat (The Legal Structure of the Turkish Shipbuilding Industry), Ankara: September 1971, p. 19.

24/ State Planning Organization, op. cit., p. 575.

regulation apparently assumes a tremendous difference between the price of a brand new ship and a ship less than three years old. This assumption, however, is not supported.

(g) Measures of encouragement are not adequate in the shipbuilding industry. A credit fund earmarked for the shipbuilding industry is recently revoked. Any shipbuilder in Turkey now has to depend on his own savings and commercial credit in his shipbuilding or purchasing plans. An export tax refund of 35 percent was granted to the shipbuilding industry by a regulation which became effective on August 7, 1970. A week later the tax refund was reduced to 15 percent with no justification. Table 8.12 gives a synopsis of encouragement measures in the shipbuilding industry in selected countries. A review of the table indicates how little is offered to the Turkish shipbuilders in terms of encouragements.

Table 8.12: Measures of Encouragement in the Shipbuilding Industry at Selected Countries

Country	Direct Measures		Indirect Measures					Other Protective Measures	
	Ship-builders	Ship-owners	Investment Credit	Export Credit	Export Credit Insurance	Tax Deduction	Special Depreciation Allowances	Misc.	Research Grants
United Kingdom	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Japan	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
France	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
Italy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Federal Germany	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Netherlands	No	No	Yes	No	Yes	Yes	Yes	Yes	No
Sweden	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No
Norway	No	Yes	Yes	No	Yes	No	Yes	Yes	No
Denmark	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No
U.S.A.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Spain	Yes	No	Yes	Yes	No	Yes	Yes	Yes	No
Turkey	No	No	No	No	No	Yes	No	No	No

Source: Turkish data derived from Devlet Planlama Teşkilati (State Planning Organization, Türkiye 'de Gemi İnşa Endüstrinsine Uygulanan Mevzuat (The Legal Structure of Turkish Shipbuilding Industry), Ankara: September 1971, pp. 27-28. Data for other countries adapted from OECD, The Situation in Shipbuilding Industry, Paris: 1965.

4. Rail Transport. The State Railways Administration is continuously incurring operational deficits as a result of economic and legal drawbacks imposed in the system, the lack of an appropriate administrative structure, and the trend toward highway transport. The present full cost pricing of railroad services puts the State Railways out of the highly competitive market. As was shown in Table 8.5, the participation of highway users in the construction, repair, and maintenance costs is unjustifiably low; whereas, the State Railways are also responsible for constructing new rights of way, including foundation work, bridges, tunnels, port facilities, as well as repair and maintenance of railroads and rolling stock. In addition, the State Railways operate 91 repair and production facilities of varying sizes for the manufacture of rolling stock. Five ports and two quays are also operated by the State Railways. Due to an extremely high investment base, fixed costs are very high; whereas, variable costs are low. To meet the competition of owner-operated trucking units, marginal cost railroad pricing on routes

with heavy volume is justified on economic grounds. Full cost pricing on routes with low volume is possible due to lack of intermodal competition. However, due to social and political reasons, the State Railways are not allowed to practice marginal cost pricing. The Ministry of Transport must immediately initiate a cost/benefit study to evaluate the impact of political and social considerations on the economic performance of rail service. A comprehensive reorganization plan must be prepared to:

(a) Integrate rail services to the national transport system and policy.

(b) Isolate those activities which are related to, but beyond the scope of, rail transport.

(c) Create other economic units outside the State Railways Administration to deal with these isolated activities.

(d) Initiate measures to the end of creating a transport system enabling equal conditions of price and service competition among rail, water, and motor modes.

(e) Prevent the duplication resulting from different manufacturing units producing the same variety of rolling stock, and introduce specialization to manufacturing units.

(f) Ease import formalities of manufactured and semi-manufactured equipment and parts, the unavailability of which created production stoppages in the past.

(g) Replace old rolling stock with newer, larger, and more efficient units (As of the end of 1972, it is estimated that 3,796 cars, which constitute 16.8 percent of the total capacity and 23.7 percent of the total number of railcars will be in service for more than 50 years.[25/] In the same year, 111 locomotives out of a total of 858 will be older than 50 years.)

25/ State Planning Organization, op. cit., p. 565.

8.3 Problems Related to Potential Trade Routes

8.3.1 Infrastructural Problems

From the list of trade routes identified in Section 6.3.2 ofChapter 6, it can be observed that three ports are identified as potential transit and interface points. Two are located in the Black Sea: Trabzon offers immediate potential for motor connection; Samsun's potential is both immediate and future for rail. The third port, Iskenderun, is located in the Mediterranean Sea and offers both immediate and future potential. The maximum handling capacities of these ports based on three shifts are estimated as follows:[26]

Iskenderun:	5.51 million tons per year
Samsun:	2.49 million tons per year
Trabzon:	1.37 million tons per year

The capacities of these ports are not adequate to meet the demand of transit trade which is expected to be at least 17.7 million tons per year. Data on the warehousing

26/ Devlet Planlama Teşkilati (State Planning Organization), Deniz Ulaştirmasi (Water Transport), Ankara: 1964, p. 55.

spaces, loading and unloading equipment, berths, and other specifications on these ports are not available. The Ministry of Transport must initiate a survey of existing equipment and facilities at these ports in order to determine the type and nature of additional port infrastructure needed to accommodate transit trade.

Table 8.13 evaluates the 1960 capability of existing transport infrastructure serving the hinterlands of transit trade ports. Recent data on highway capacities and flows are not available. However, it appears that the highway infrastructure serving transit ports is not adequate. The Ministry of Transport must initiate a survey of existing capacities and flows, identify bottlenecks, and prepare a highway improvement program to accommodate expected transit trade tonnage.

From the designation of trade routes in Chapter 6, it can also be observed that the nation's busiest port, Istanbul, was avoided as much as possible. The port complex in Istanbul has an annual capacity of more than 11 million tons which is almost fully utilized in

Table 8.13: Potential Capacity of Highway Networks Serving the Hinterland of Transit Ports

(1) Transit Port	(2) Existing Capacity (Trucks/day)	(3) Existing Average Daily Flows (Trucks/day)	(4)=(2)-(3) Capacity Available for Transit Trade (Trucks/day)	(5)=(4)*10*365 Annual Transit Trade Capacity (Million tons)
Trabzon	1,200	134	1,066	3.89
Samsun	1,200	138	1,062	3.88
Iskenderun	1,200	189	1,011	3.69
TOTAL				11.46

Source: Column (2) from Figure 7.2.
Column (3) from Figure 7.3.

domestic and foreign shipping. The port as well as the city is seriously congested. The traffic congestion in the city is so serious that since 1965 trucks of over 5 tons are not allowed to operate in the city during working hours. This causes unnecessary delays for trucks involved in transit trade between Europe and Middle Eastern countries which are obliged to cross the Bosphorus by ferryboat. A bridge over the Bosphorus is under construction and is expected to open before 1974. However, it will be a mistake to expect that this bridge will solve the problem of long queues of transit trucks: The city is already congested by local traffic and no economic justification exists for concentrating transit trade in Istanbul. The situation in rail transit is equally serious. Every effort must be made to divert the transit trade away from Istanbul and partly relieve the city of the traffic congestion. One possible alternative is diverting the trade through the Dardanelles. The present highway between Edirne and Çanakkale is of loose surface in some parts which needs improvement.

The practical capacity is about 1,000 vehicles per day with an average utilization rate of 15 percent. Presently there is no rail link through Dardanelles. A 150-mile track can provide a link between Uzunköprü and Balikesir, thus providing a rail link between Europe and the Middle East through the Dardanelles.

The Ministry of Transport is strongly urged to initiate a feasibility study of diverting transit trade through the Dardanelles in light of:

(a) Benefits in terms of reduced traffic congestion in Istanbul, savings in transit time, and resultant increased trade potential.

(b) Costs associated with additional infrastructure, maintenance, repair, and operation.

8.3.2 International Problems

To increase the role of Turkey as a transit gateway between the East and West is a difficult task which requires a carefully designed and patiently implemented plan in the international arena. Shippers must be made aware of the transit time savings, reduced costs, and better

services; the top ranking officials of the centrally planned economies must be convinced of the potential benefits to be derived; shipping firms and freight forwarders must be educated on and properly oriented to the new role Turkey volunteers to play; the psychic barriers must be overcome; the Turkish officials and businessmen who will have a direct effect on Turkey's success or failure in this new role must be properly trained; and the Turkish diplomats, especially the commercial attaches, must be encouraged to take an active part in selling the service. This new role will not come about by following a stagnant foreign policy. A dynamic attempt must be made in the international relations arena in order to gain the confidence of foreign planners and other government officials, shippers, users, and shipping firms, and to convince them to adopt shipping plans and policies which reflect the use of Turkey as a transit gateway in reaching their distant customers. This new role for Turkey also requires a significant shift in emphasis for Turkish officials and foreign policy: Turkey must no more accept the role of being a Western-oriented country at the periphery of the West, but must see herself as an active partner in providing a bridge between East and West. The future of Turkey does not lie in how close Turkey replicates the industrialization of the West, but it lies in how well Turkey understands her potential in becoming a service center between East and West, and how well she can provide the service.

The starting point to meet the challenge demanded by this new role is to overcome the problems raised in this Chapter. A lot needs to be corrected and done within and at home before Turkey can actively involve herself in multinational deliberations and negotiations to become a transit point in East-West trade.

Once the problems are corrected and issues resolved, the next problem is from where to start the multinational efforts. One possible starting point is the Regional Cooperation for Development (RCD). Under the provisions of a Protocol signed in 1964, Turkey, Iran, and Pakistan have established RCD to ensure close cooperation in social, economic, and cultural development. The military counterpart of RCD is the Central Treaty Organization (CENTO).

The work of the RCD is now beginning to bear fruits. There is every indication that economic and trade relations between Turkey, Iran, and Pakistan will mark significant developments in the near future. Special committees established within the Organization are working on important industrial projects designed to create mass marketing possibilities for enterprises to be set up to meet the needs of the RCD countries. As of the beginning of 1970 more than 50 joint-purpose projects have been approved or agreed upon in principle. Of these, 20 will be realized in Turkey, 17 in Pakistan, and 13 in Iran.[27/] Following is a list of plants to be established in Turkey:

1. Craft paper and pulp
2. Organic pigments
3. Basic and chromium paints

27/ Boyacioglu, Rifki, "Regional Cooperation for Development Joint Purpose Investment Projects," Turkish Economic Review, Vol. XI, May-June 1970, pp. 46-48.

4. Borax and acid boric
5. Machinery for tea processing industry
6. Excavator (Mobile)
7. Tungsten-Carbide
8. Electronic equipment
9. Diesel engines
10. Electric bulbs
11. Diesel locomotives
12. Centrifugal and special filters for chemical industry
13. Boilers, pressure containers, and steam-operated heating systems
14. Pumps and compressors
15. High-tension insulators
16. Tetracycline
17. Iron and steel
18. Shipbuilding
19. Automobile dials and controls
20. Oil refineries

Some plants to be established in Iran are:

1. Aluminum
2. Naphtha dyers
3. Dump trucks
4. Revolving electrical machinery
5. Turbo-generators
6. Petroleum drilling and refining machinery
7. Carbon black
8. Capro-lactone

The plants to be established in Pakistan include the following:

1. Polyester fiber
2. Polybutadiene rubber
3. Polyacrino-nitrite fiber
4. Transformers
5. Reactive paints
6. Optical bleaching

7. Earth excavation equipment
8. Machinery and lathes
9. Gear boxes and differential assemblies
10. Aluminum sheets
11. Ultramarine
12. Jute
13. Roller bearings
14. Textile machinery
15. Sodium-hydroxide
16. Banknote paper

As should be clear, the joint-purpose projects are quite comprehensive. The cooperation and present friendly attitude of RCD partners toward each other are conducive to introducing the transit gateway services of Turkey for the trade of these plants with Europe.

Cooperation in shipping among RCD members has already started. On July 15, 1965, an RCD Shipping Services unit was established with the participation of three Turkish, three Pakistanese, and two Iranian shipping companies. One article in the Protocol states that it is the joint national policy of the governments of Iran, Pakistan, and Turkey to establish and reinforce modern, frequent, and regular transport services along main trade routes within the region as well as routes used for regional exports and imports.[28/] This article gives Turkey the diplomatic encouragement to seek the cooperation of Iran and Pakistan in using Turkey's transit potential.

28/ Devlet Planlama Teşkilati (State Planning Organization), Türkiye 'de Deniz Ulaştirmasina Uygulanan Mevzuat, op. cit., p. 20.

CHAPTER 9: A TENTATIVE PROGRAM OF IMPLEMENTATION

9.1 Introduction

The problems identified in Chapter 8 and other issues raised in prior chapters must be overcome in order to improve Turkey's transport system and service third country trade flows through Turkey. The overall responsibility to authorize further research, prepare plans of action, implement the planned measures and review the results rests with the Council of Ministers. The ministry directly involved in responding to this challenge is the Ministry of Transport. However, since the coordination of decision making agencies in transport planning and policy making is one of the major problems and since the Ministry of Transport presently lacks the qualified staff and the necessary preparation to undertake this dynamic role, it may be advisable to create a Transport and Trade Policy Board at the Cabinet level. As

opposed to the present advisory capacity of the existing Council of Transport Coordination, the Board must have the authority to decide on policy issues, plan transport and related commercial policy, and set in motion specific projects. One way to assure adequate coordination would be to have the Ministers of Transport, Foreign Affairs, Commerce, External Economic Relations, Finance, Customs and Monopolies, Construction, and the Undersecretary of the State Planning Organization as members of this Board. The State Planning Organization and the National Institute of Statistics would be directed to designate research units to aid the Board in gathering and analyzing data. The present Directorate of Transport Coordination Project Center under the State Planning Organization would be reorganized as a Transport Research Center and temporarily kept under the State Planning Organization until the Ministry of Transport is made ready to assume the overall responsibility of transport planning, policy making, and coordination.

In the long run, the Board's powers should gradually be transferred to the Ministry of Transport. To this end a major reorganization is needed in the Ministry. A plan of reorganization of the Ministry must be one of the initial concerns of the Board.

9.2 A Tentative Program of Implementation

On the basis of problems and remedies identified in Chapter 8, a tentative implementation program is presented in Figure 9.1 through 9.4. It should be noted that the long-run execution level is generally identified as the Ministry of Transport. This emphasis is an outcome of a long-run perspective of attaining centralized planning and policy making advantages in transport services. The frequent mention of the Ministry of Transport as a responsible unit for short-run action should not be interpreted to mean that the Ministry is presently capable of undertaking the prescribed work. The Ministry needs all the help it can get from the other agencies in undertaking research work and drawing up plans of action. The Ministry must be made an active participant in research and planning in the short run in order to develop the capability of becoming the executive implementing agency in the long run.

A timetable is not provided in the program of implementation presented in the Figures. However,

Figure 9.1: A Tentative Program of Transportation Development
(Issues Related to Institutional and Economic Problems of the Overall System)

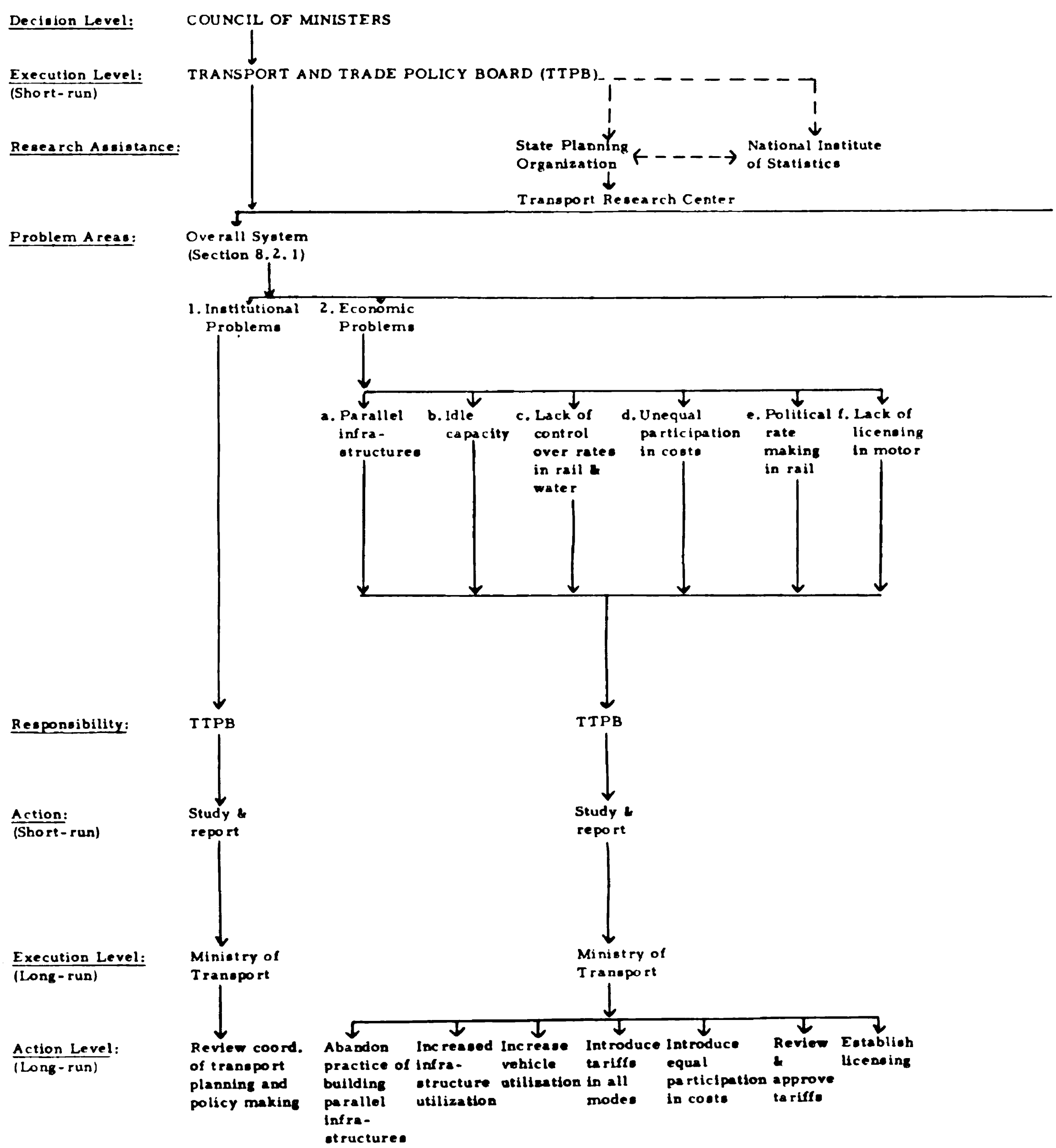


Figure 9.2: A Tentative Program of Transportation Development
(Issues Related to International Problems of the Overall System)

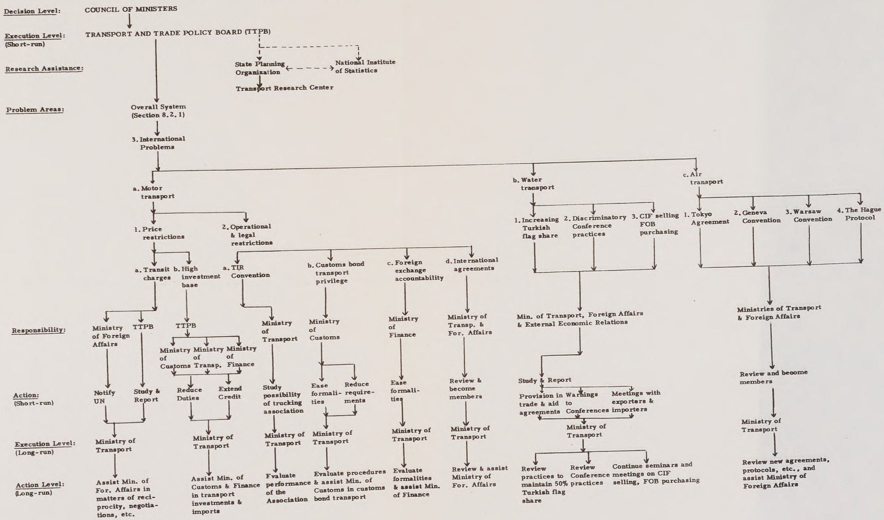


Figure 9.3: A Tentative Program of Transportation Development
(Issues Related to Other Modal Problems

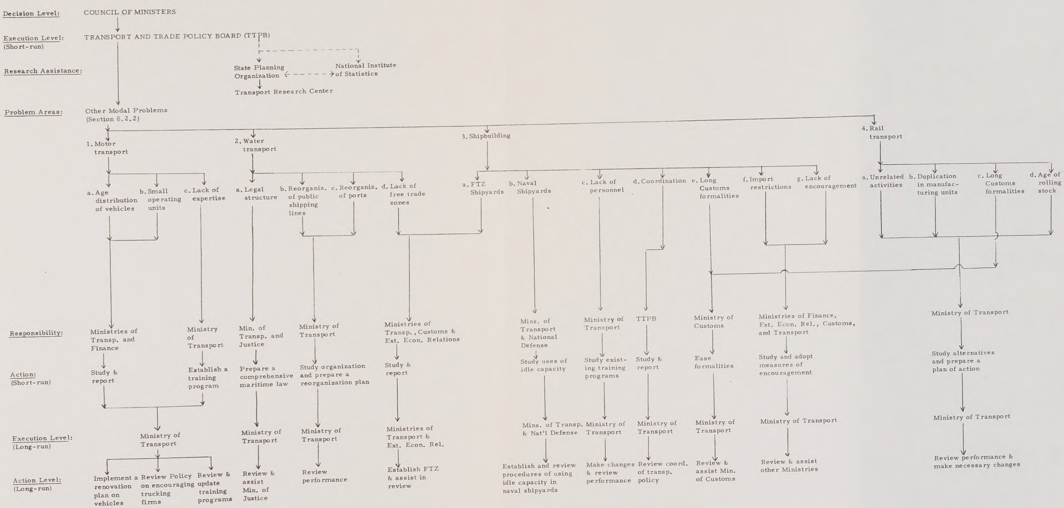
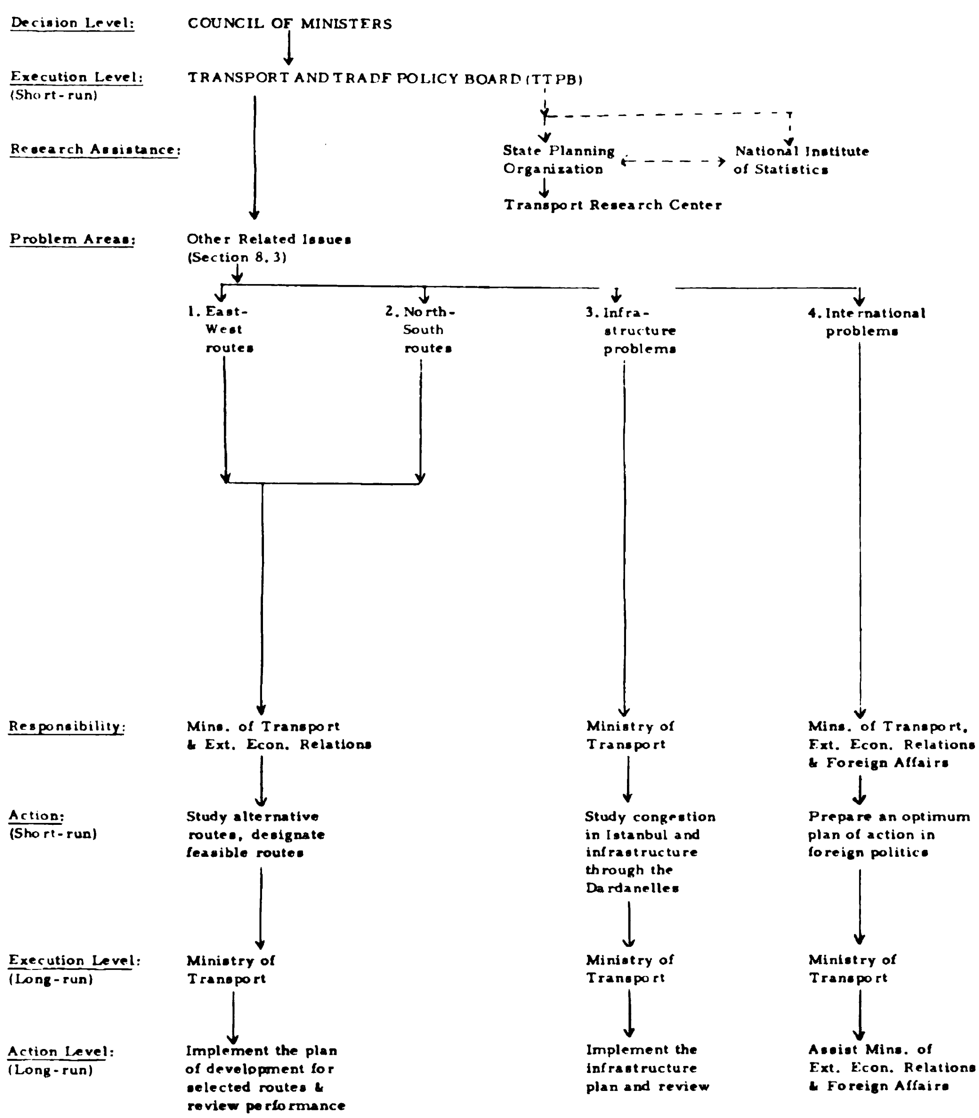


Figure 9.4: A Tentative Program of Transportation Development
(Other Related Issues)



many short-run actions indicated should not take more than three years to complete. The long-run action levels would generally take two to five years to reach.

9.3 Further Research

The major objectives of this research were to strengthen Turkey's participation in the regional trade and improve her trade position by contributing to the foreign trade balance of Turkey. Through the set of measures proposed in the transport system, Turkey's participation in the regional trade will undoubtedly increase. No attempt will be made to accurately determine the contributions made by the transit trade to the foreign trade balance, because such an estimate requires the levying of transit charges the optimum level of which is unknown at this point. Determining an equitable level of transit charges and estimating its contribution to the Turkish employment and income benefits and costs including balance of payments is a research by itself that must be undertaken as soon as possible. However, some rough estimates of total benefits to the Turkish balance of payments can be offered here in order to give an idea of the potential. Two major benefit groups can be identified and a number of "scenarios" can be developed:

(1) Primary flows. Rough estimates made in Section 8.2.1 of Chapter 8 show that if Turkish trucking firms and shiplines are encouraged to increase their participation in Turkish foreign trade movements to 50 percent, the net annual benefits would be \$74.2 million for highway and \$17.0 million for water transport.

(2) Secondary flows. Chapter 6 gives the following estimates of transit tonnage through Turkey:

The Suez is closed: 26.3 to 87.5 million tons/year

The Suez is open: 17.7 to 59.2 million tons/year

A major portion of this tonnage is expected to move by foreign operators. However, with proper inducement, Turkish operators are expected to participate in the transit trade. It is assumed that the rate of Turkish participation will range from 0 to 30 percent of total transit trade in increments of 5 percent. The net benefit to the Turkish balance of payments for transit tonnage moved by Turkish operators is assumed to be \$25 per ton.[1/]

The transit tonnage moved by foreign operators will be subject to transit fees and port handling tariffs. It is assumed that the transit fee will be \$1, \$2, and \$3 per ton and the port handling fees will be \$2 per ton. In addition, foreign operators will incur operating costs in Turkey (living expenses, gasoline, repairs, etc.) which are assumed to be \$.03 per ton-mile for an average distance of 500 miles.

Table 9.1 shows the total net benefits to the Turkish balance of payments under different levels of transit fees and Turkish operator participation in the transit trade when the Suez is open. The benefits shown in Table 9.1 also include increased participation by Turkish operators in the movement

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1/ The typical truck rate between Iran and West Germany is around \$50 per ton. It is assumed that 50 percent of this rate will be spent by Turkish operators outside Turkey as operating expenses, commissions, etc.

Table 9.1: Potential Net Balance of Payments Benefit When the Suez is Open ($ Million per Year)*

Transit Fee ($/ton)	Rate of Turkish Operator Participation in Transit Trade (%)						
	0	5	10	15	20	25	30
1.00	409	415	422	428	434	443	446
2.00	427	432	438	443	448	456	459
3.00	445	449	453	458	463	467	471

*Assuming the pessimistic transit trade tonnage of 17.7 million tons per year.

of primary flows. Table 9.2 shows the net benefits when the Suez is closed.

When the Suez is open the net benefit to the balance of payments is expected to range from \$409 to \$471 million per year, depending on the Turkish operator participation in transit trade and the level of transit fees. The benefit is expected to range between \$564 and \$656 million per year when the Suez remains closed. Undoubtedly, even under the most pessimistic assumptions about transit trade size, Turkish operator participation, transit fees, and the Suez, the chronic deficit in the balance of payments will be eliminated and a surplus position will be attained for the first time since 1946.

The lesson to be learned from this research is that a transport policy geared to external economic flows is capable of significantly contributing to the balance of payments position of Turkey. In order to correctly assess the direct and indirect benefits of having this

Table 9.2: Potential Net Balance of Payments Benefit When the Suez is Closed ($ Million per Year)*

Transit Fee ($/ton)	Rate of Turkish Operator Participation in Transit Trade (%)						
	0	5	10	15	20	25	30
1.00	564	573	582	592	601	610	619
2.00	590	598	606	614	622	630	638
3.00	617	623	630	636	643	649	656

*Assuming the pessimistic transit trade tonnage of 26.3 million tons per year.

external orientation in transport planning and policy making on the Turkish balance of payments, further research is needed to get answers to the following:

1. The potential transit trade by major commodity groups that can be attracted through Turkey.
2. Price and transit time elasticities of traded commodities between countries which will benefit from reduced transport costs and improved transit time. This information is needed to adjust the crude potential transit trade estimates found in the first item above to reflect incremental trade due to market expansion and/or increased demand.
3. Comparative advantages of resource endowments in Turkey which can lend to in-transit processing industries and concentration-distribution centers.
4. The impact of these units on economic development, employment, and human ecology, as well as its environmental constraints.

5. Costs of transit service producing units versus total benefits derived as well as the distribution of benefits.

6. Savings due to decreases in commercial disservice to Turkish exports by foreign transport firms whose countries' agricultural produce compete with Turkish exports to European markets.

When future research efforts are directed toward these questions, a more accurate assessment of benefits and costs will be possible.

9.4 Integration of Marketing and Production

The increased use of Turkish transportation firms will be the stepping stone for an integration of production and marketing activities. The first thing the Turkish operator will do is to open liaison or branch offices in foreign cities in order to follow up the formalities related to their activities. As time goes by, these offices could serve the Turkish exporters as market facilitators, furnishing them timely and accurate information on market fluctuations and prices and a full range of distribution related services. At present there are no such Turkish offices; the goods are shipped to a certain destination based upon month-old data of demand and price; diversion and reconsignment are not practiced simply because of the lack of knowledge on the part of the exporter as to the conditions in other markets. What happens is that the shipment is delivered to a European intermediary at the original destination who accepts the shipment on a consignment basis. The intermediary does not have any concern for loss; therefore, he does not care if the shipment partly or wholly deteriorates. This explains why most Turkish perishables deteriorate at the destination city, even before being marketed, and, therefore, are thrown away without yielding any revenue to the exporter and the nation. Turkish branch offices in Europe will be at the disposal of the exporter in providing him the necessary market information so that he can divert or reconsign his shipment to other cities where demand and price are more favorable than at the original destination. Without Turkish liaison offices this integration of market realities with production capability seems impossible.

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