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ECLA/OAS JOINT TRANSPORT PROGRAMME

MARITIME FREIGHT RATES IN THE FOREIGN TRADE OF LATIN AMERICA

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Chapter I

INTRODUCTION AND CONCLUSIONS

Before 1929, Latin American economies formed part of a system of world trade as exporters of raw materials and importers of manufactured goods. Most of them enjoyed sizable surpluses in their international accounts, and it was generally thought that the question of maritime freight rates, although important, was unlikely to exercise any significant influence on their foreign trade possibilities. Except for one or two isolated attempts in general studies on maritime transport to point up the importance of these rates, the problem was virtually ignored at the governmental and international levels.

The 1929 depression and the Second World War radically changed the situation. In the post-war period, the Latin American countries often had debit balances in their foreign trade accounts and their internal development and capacity to import became of prime concern. In matters of world trade, the first attempts to improve the situation were naturally of the "macro-economic" kind. Hypotheses and policies were formulated for their external accounts as a whole, or more specifically for their exports and imports of goods and movements of capital. It is only during the last few years and particularly as a result of the establishment of the United Nations Conference on Trade and Development (UNCTAD) and of the studies and discussions associated with it, that international trade problems have begun to be studied in greater detail. More attention is now being paid to the so-called "invisible" items in the balance of payments, and in particular to maritime transport. The magnitude of Latin America's outgoings under that head amounted to 2,606.6 million dollars in 1965, with a deficit of 728.1 million,[1/] which indicated that many of the countries could improve their balances of payments considerably by taking steps to reduce this deficit.

1/ International Monetary Fund, Balance of Payments Yearbook, vols. 17 and 18. Cuba excluded.

/The question

The question of shipping, and of freight rates in particular, has been studied from various aspects in a number of international, governmental and private circles. Many of them believe that the level and structure of freight rates, and the way in which the conferences and other agreements relating to shipping activities operate, are unfavourable to developing countries. In this respect, a view has emerged in Latin American countries, which is reflected in various resolutions that they have adopted. For example the declaration on maritime, river and lake transport policy adopted by the Latin American Free Trade Association (LAFTA), and the LAFTA Convention on Waterborne Transportation, are the results of that policy. In the corresponding documents, these new requirements with respect to maritime freight rates are set forth. The establishment of regional freight conferences or other agreements is advocated so that rates and conditions of carriage can be fixed according to uniform rules for all Latin American countries. They also recommend government control of shipping activities so as to adapt them to each country's foreign trade policy, to ensure that the established conditions of carriage are respected and to prevent unfair competition among carriers and unjust discrimination against particular users.

The position implicit in these policy formulations is that current maritime transport practices are unfavourable to the Latin American countries and should be amended so that shipping services become an effective instrument for their internal development and the promotion of their foreign trade. These aims are clearly laid down in the Charter of Tequendama, which the countries of the region drew up as part of their preparatory work for the second session of UNCTAD at New Delhi. The relevant paragraphs of the Charter are as follows:

"2. Recommendations regarding freight rates

(a) The countries members of UNCTAD should be urged to co-operate with the secretariat in drawing up as soon as possible a programme of studies on maritime freight.

(b) It should be recommended that in fixing freight rates, consideration should be given to the need for placing the products of the developing countries on international markets under competitive conditions.

/(c) The

(c) The Latin American countries should express their grave concern at the fact that conference freight rates are not only continuing to rise, but are still discriminatory and restrictive vis-à-vis the developing countries.

(d) The widespread practice of fixing special freight rates for the transport of non-traditional products of the developing countries should be condemned.

(e) The application of incentive freight rates designed to promote the export from the developing countries of manufactures which they have produced with their own raw materials should be recommended. Such rates might be fixed at levels which would merely cover the marginal and supplementary costs involved in the transport of these goods.

(f) The UNCTAD secretariat should be urged to conclude its studies on the fixing of routes as soon as possible."

"3. Shipping conference practices

(a) Specific action should be taken at UNCTAD II with a view to abolishing those shipping conference practices which are detrimental to the developing countries, such as:

(i) the "closed" nature of many conferences;

(ii) the fact that the conferences are not effectively represented in a number of major ports of the developing countries;

(iii) the fact that shipping rates and other conditions of carriage are not published at all or are given insufficient publicity.

(b) In this connexion, UNCTAD II should be recommended to adopt the following principles:

(i) recognition of the fact that the developing countries are fully entitled to take part in any freight conference which affects their maritime traffic;

(ii) recognition of the right of shipowners in developing countries to take part in freight conferences on an equal footing with shipowners of the developed countries;

(iii) a freight conference concerned with the export traffic of a developing country should be represented in that country;

(iv) the right of the developing countries to be fully informed of the structure and fixing of freight rates and other shipping conditions of carriage applied to the products involved in their trade and also to be advised sufficiently in advance of any change in such rates and conditions."[2/]

This document indicates more clearly the Latin American countries' position with respect to maritime transport in that it points out that freight rates continue to increase, they are discriminatory and restrictive and they discourage the exports of non-traditional commodities of the developing countries.

This diagnosis forms the basis of the present shipping policy of the countries in the region. It consists essentially in promoting the development of regional merchant fleets to offset the presumably negative effects of extra-regional fleets. By strengthening its influence and participation they endeavour to remedy the existing discriminatory and restrictive practices and to adapt the services to the requirements of the Latin American countries.

Despite the resolution with which this policy was framed, the detailed studies supporting it are few in number and incomplete in coverage. There are only general studies, chiefly concerned with the adequacy of freight rates, and analyses of limited scope dealing with a small number of commodities or routes. As a result, several important hypotheses on the subject could not be proved or rejected definitively for want of adequate quantitative studies. However, the Inter-American Committee on the Alliance for Progress (CIAP) has been aware for some time of the need for a report on this question. Early in 1966 it already stressed the importance of making a study of maritime freight rates and insurance, since serious problems were being caused by the fact that

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2/ ECLA Charter of Tequendama, Information document N° 1, presented at the Meeting of Government Experts of the Developing Countries Members of the Commission, held at Santiago, Chile, from 11 to 15 December 1967.

improvements in the prices of export items were being cancelled out by the high cost of transportation, as many Latin American countries were unable to develop their own system of transport.3/ With this mandate, the ECLA/OAS Joint Programme launched its present study in 1967 and in June of that year it submitted a preliminary paper to the Fifth Annual Meeting of the Inter-American Economic and Social Council (IA-ECOSOC) at the Expert Level at Viña del Mar, Chile, reporting on the progress achieved thus far.4/ It was agreed at that meeting to continue with the studies initiated by the ECLA/OAS Transport Programme on the level and structure of ocean freight rates, in keeping with the principles, standards and objectives laid down in the LAFTA policy statement on maritime, river and lake transport (resolution 120-V) and in the Convention on Waterborne Transportation.5/ The aim of this study is to make a broad and far-reaching analysis of the level and structure of the freight rates prevailing in the foreign trade of Latin American countries so as to provide a sound basis for policy-making in this field. More specifically, its objectives are, first, to determine the factors which underlie the present level and structure of those freight rates and, secondly, to estimate the effect of the rates on the region's foreign trade. As a part of the second point, an endeavour will be made to determine how far the rate structure meets the requirements of the Latin American economies.

It is on quantification that emphasis is placed in the study. The aim is not to formulate general statements on the various aspects of the problem, but to assemble as much relevant information as possible in

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3/ Final report of the eighth session of the Inter-American Committee on the Alliance for Progress, Washington, D.C., 21-23 May 1966 "Estudio de tarifas de fletes y seguros de transportes marítimos de productos básicos", item F-16, CIES/966, Rev. 2 (document in the series OEA/Ser.H/XIV; CIAP/24).

4/ "Influencia de los fletes marítimos en el comercio exterior de América Latina", preliminary findings (OEA/Ser.H/X.11 CIES/1144) (23 May 1967).

5/ IA-ECOSOC, "Informe del Relator de la Comisión II" (OEA/Ser.H/X.11 CIES/1270) (21 June 1967), p.27.

order to measure with maximum precision certain aspects of the operation of maritime transport. This activity is so complex, in view of the countless combinations and types of services and the immense variety of commodities carried, that a conceptual framework is required for a rational analysis aimed at the two objectives mentioned above. Since this is the first over-all study on freight rates to be carried out on such lines, an entirely new methodology had to be devised. With the idea that this methodology may be of use in similar studies on other regions, discussion of it has been given an outstanding place in the text itself. The conceptual framework used in the present research consists of a considerable number of working hypotheses established in relation to the two objectives, and the study is constructed with a view to corroborating or disproving these hypotheses. The validity of the study and the degree to which it reflects the current maritime transport situation depend of course upon the fitness of said hypotheses. The selection of these in itself involved a decision as to which aspects of shipping activities have a bearing on the study of the level and structure of freight rates. Accordingly, existing studies and research on the subject were carefully reviewed, and the most important aspects of the problem were analysed in consultation with experts. The product of this preliminary research was the set of hypotheses which the present study is intended to test, and which are set out in detail in chapters IV and V.

The demarcation of exact fields of research, by means of hypotheses, is only the first stage in the design of the study. The area to be covered - Latin America's foreign trade - is decidedly broad and complex, and it could be concluded from the outset that a detailed over-all analysis was impracticable. A selection was therefore made of the routes and commodities to be included. In selecting the routes, a representative sample of existing conditions in Latin America's foreign trade was sought; commodities were selected with the aim of including all those currently of importance for the various countries and those whose future trade prospects, according to available information, were the most promising, in particular manufactured goods. In this way 193 routes (defined in terms of traffic between two countries) were selected, with points of

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origin in ten countries (Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Mexico, Peru, Uruguay and Venezuela) and points of destination in all the Latin American countries, the United States and Canada, Europe, and Japan. The selected export commodities numbered 133. (See Annex I.)

The crucial problem in a study of maritime freight rates is the compilation of data. As such large numbers of routes and commodities were being dealt with, the information required was considerable. A further complication was introduced by the fact that - as will be shown in detail later - a good many of the tariffs established and applied by the various freight conferences and under other agreements are confidential, and only in exceptional circumstances are they released for purposes distinct from those for which they were designed. The work done in this connexion, though a lengthy and delicate task, proved fruitful, since out of the 121 freight tariffs which were being applied in the region's foreign trade at the end of 1966 - the period to which the study relates - 99 were obtained, comprising those of greatest significance. Stress must be laid on the importance attaching to the availability of such information, collected in this way for the first time. It enabled a full picture of maritime freight rates to be given; this is set forth in detail in annex I to the present study, and, together with other data contained in the freight tariffs themselves, forms the basis of the analysis carried out in the ensuing chapters.

Another question which had to be taken into consideration was the various types of maritime transport services normally in operation. In the present study only liner services are analysed, i.e. those run by companies which operate on fixed routes with sailings at regular intervals throughout long periods.

Services of other types, such as those provided by tramps, time-chartered vessels, etc., are subject to rules and conditions different from those governing the operation of regular shipping lines. They are therefore referred to only when they have a bearing on specific aspects of the operation of liner services.

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When the factors determining the level and structure of freight rates are examined, attention has to be devoted to some of them (such as the value of the commodities carried, the tonnage moved, port costs, the structure of trade flows, the nature of the services, etc.) which are assumed in the light of existing information to exert significant influence, and concerning which several hypotheses are formulated in chapter IV. The inclusion of the factors in question involved several lines of research parallel to the study of the freight rates themselves, and accordingly some fairly complex studies of these factors are also presented here.

Furthermore, the incorporation of the factors under discussion into the vast body of information on freight rates already in existence made it necessary to design a multiple regression model which would allow several of the hypotheses established to be dealt with simultaneously, and the statistical data to be processed by means of computers. Otherwise the research would not have been feasible. This model and its scope are described in chapter IV.

If the scope of the present research is to be properly evaluated, it must be recognised as the first of its kind and therefore of an essentially exploratory nature. It is based on the existing framework of theory respecting maritime freight rates, which may or may not be suitable to the services of the Latin American countries. Its findings may be summed up as follows. Certain conclusions were reached which, to judge by the evaluation made and the breadth of the field covered, are reasonably sound. It was also possible to rectify the formulation of certain hypotheses, so as to make them susceptible of more logical interpretation. Lastly, the study itself gave rise to several new hypotheses which should be made the object of subsequent research.

The study consists of five chapters, the main conclusions being summarised in the present introduction (chapter I). Some general characteristics of maritime transport in the Latin American countries' foreign trade - such as the general cargo tonnage carried and the main trade flows, both intra-regional and extra-regional - are described in chapter II, in which a brief analysis of the quantity and quality of

/liner services

liner services is also presented. In chapter III the general features of freight conferences and other similar agreements are analysed, together with those of the freight tariffs applied in the trade under study.6/ Chapter IV contains the findings of the research undertaken to identify the factors determining the level and structure of maritime freight rates - the key topic of the study. Lastly, in chapter V some of the main effects of that level and structure on the region's foreign trade are discussed.

The study falls into two clearly differentiated parts. One, represented by the annexes, contains a compilation of most of the data available on the freight rates applied in the principal Latin American countries' export trade, together with other information relating to various aspects of the operation of the sector. This compilation is of particular importance because it is the first complete one of its kind to be made. The other part of the study - i.e. the text proper - reflects the data designed along specific lines to meet the objectives of the study. Of course, the data may serve as a basis for many other studies, depending on the ends pursued.

The nature of the hypotheses used as a basis for the quantitative analysis permits two major simplifications of the method of research adopted. The first is the possibility of making separate analyses of the structure and level of freight rates. The analysis of their structure relates to the reasons for the disparities between freight rates for different commodities on one and the same route, and the analysis of their level, to the reasons for the differences between freight rates for one and the same commodity on several routes. The second simplification consists in the possibility of simultaneously ratifying or invalidating several hypotheses for each of these two groups through the use of mathematical models, which was the procedure followed in the research.

6/ By "freight tariff" is meant the document which contains the whole list of freight rates for specific commodities or classes of commodities and the transport conditions applicable to any given route, and which is issued by a freight conference or under a similar agreement.

The model used for analysing the structure of freight rates gave highly satisfactory results. Possible determinants of the structure in question were considered to be the value of a commodity per ton, loading and discharging costs, risks of damage and deterioration of merchandise on the voyage, the proportion of total cargo represented by each commodity carried on any given route, and the stowage factors for each commodity.[7/] All these largely account for the variations in the freight rates per ton applicable to the different commodities on almost all the routes analysed in detail through the use of the model.

The results showed, however, that in many cases it is unnecessary to apply a model using all these explanatory factors, since two of them are sufficient to enable equally satisfactory results to be obtained. These are the value of the commodity and the stowage factor. The first reflects the demand situation and the second indirectly represents costs, and the two together afford an adequate explanation of the structure of freight rates. In some instances, the value of the commodity was sufficient to give satisfactory results.

Hence it can be deduced that not only the remaining factors included in the model, but also others that may not have been taken into consideration, would not appear to be of significant importance. This applies to handling costs, the risks of damage and pilferage and the tonnage carried. Up to a point, the insignificance of these factors may be due to strictly statistical difficulties in the research itself, but these are not believed to make any substantial difference to the results. This would suggest that the shipping companies pay little attention to these factors in determining the structure of freight rates, or take them into consideration through other factors.

The conclusions deriving from the model used in analysing the level of freight rates are not as clear-cut as those listed above. The determinants of this level incorporated in the model were the number of regular shipping lines serving a given route, the proportion of vessels over ten years old operating on each route, unbalanced trade flows,

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7/ The stowage factor is defined as the estimated number of cubic feet taken up by one ton of a given commodity in the holds of a vessel.

distances, port costs, and the tonnage of each commodity carried on a given route. In many cases this set of factors does not suffice to account for the differences between the freight rates per ton applicable to one and the same commodity on the various routes. This suggests that other important factors must come into play. With respect to many commodities, however, the factors mentioned afford a reasonable explanation of many of the discrepancies.

Three of these factors - the number of regular shipping lines serving a given route, distances and costs in port - consistently emerge as significant for most of the commodities to which the model was applied. In many instances they even provide a satisfactory explanation of the level of freight rates concerned. The first factor reflects the situation as regards competition, and the other two represent the cost situation. The significance of the number of shipping lines, in the sense that the more numerous they are the lower will be the level of freight rates, is an important finding. It implies that certain competitive conditions exist in maritime transport which freight conferences and other similar agreements were thought to have eliminated.

A special feature of the findings of the research on the level of freight rates consists in the differences between the various commodities in respect to the factors apparently used to determine the level of their freight rates, as against the definitely homogeneous result obtained for the structure of the rates in question. This is understandable, inasmuch as to analyse the determinants of the differences in freight rates per ton for various commodities on one and the same route is to analyse the action taken by a single decision-making centre - generally a freight conference - which establishes the structure concerned. Whereas analysing the level of freight rates - i.e. the freight rates for one and the same commodity on different routes - entails making a simultaneous study of the action taken by several decision-making centres. The lack of homogeneity in the results must be taken to mean that in the various branches of shipping the factors analysed are not given the same weighting, with the consequent implication that maritime transport is an activity in which operational conditions differ from one branch to another. To determine how far this is reasonable is a difficult task, calling for specific studies in depth.

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In this case it was also noted that some of the factors taken into account in the research - the age of the vessels serving a given route, imbalance in trade flows, and the tonnage of each commodity carried on any one route - did not appear to have a significant role, and that probably, therefore, the shipping companies did not take them directly into consideration in establishing the level of their freight rates. There are several reasons for this, which are discussed in detail in chapter IV.

The most striking feature of the conclusions reached with respect to the factors determining the level and structure of maritime freight rates is their relative simplicity. As a general rule, this problem has been regarded as one of exceptional complexity, since it has been assumed that the factors which may influence the determination of a freight rate in specific circumstances are too numerous to permit of any generalization on the subject. The conclusions of the present research prove the contrary, by showing that although there may be many factors that influence both the structure and the level of freight rates, a very few of them suffice to afford a reasonable explanation. This means that simple forms can be established to serve as a basis for freight policies which are uncomplicated and will have a chance of producing significant effects on the rates.

The findings of the research also make it possible to contribute important additional data to the study of the effects of freight rates on Latin America's foreign trade. In this connexion it was shown, for example, that although the freight rates charged for exports of manufactured goods and highly processed manufactures are heavier in absolute terms, the proportion of the value of the commodity that they represent is lower than in the case of less highly processed articles. Hence it is unlikely that the freight rate itself (excluding the other items that go to make up the total cost of transport) seriously curtails export possibilities.

A number of indicators were also established which show that the conferences wield a certain measure of monopolistic power. This means that generally speaking the level of freight rates is higher than it would be if competition were keener. The nature and scope of the present

/research precluded

research precluded a precise definition of the degree of monopolistic power embodied in the agreements concerned, since for that purpose detailed cost studies would be needed. There were signs, however, that it varies considerably from one to another of the different services that cover the region's foreign trade, and in some cases may be relatively slight.

Another of the effects of maritime freight rates on the Latin American economy derives from the systems of fixing the rates in question. Under these systems, extensive regions including several ports and even several countries are designated as areas of origin or of destination, so that in many cases the incentives to individual ports to improve their efficiency are greatly weakened, since the possible improvements are spread out among all the ports for which the same freight rates are in force. The existing system of special surcharges for some ports seems to offer a solution of this problem only when the surcharges are imposed temporarily because of inefficiency or unduly high costs.

Thanks to the detailed information obtained on most of the freight tariffs applied in Latin America's foreign trade, it was also possible to analyse some general characteristics of the freight conferences and other agreements, and of the tariffs themselves.

It was thus shown that a high proportion of the tariffs, with the exception of some relating to intra-regional trade, are established outside the region. This would suggest that freight agreements are controlled from outside Latin America itself. Confirmation of this is to be found in the minor part played by the region's shipping companies in the conferences and other agreements, except in certain agreements concerning intra-regional trade, in which they have the majority share. This is to some extent understandable, since of the 118 regular shipping lines that serve the region, only 17 operate under Latin American flags.

With regard to the general characteristics of the freight rates forming a tariff, the conferences have arrived at uniformity in some important respects, such as the monetary unit in which the rates are expressed (the United States dollar) and the system employed, under which they are generally shown per commodity, not per class of merchandise. The details of the tariffs vary considerably, according to the type of

/commodity concerned.

commodity concerned. There are specific freight rates for almost all raw materials on all routes, and the same is true, up to a point, of semi-manufactured commodities; for manufactures, however, the proportion of specific freight rates is notably smaller. In the case of simple manufactures, the proportion of commodities requiring the application of the freight rate for "cargo not otherwise specified" on the various routes is 28.5 per cent, while in that of highly processed manufactures it reaches 45.8 per cent.

In other respects, there is a lack of homogeneity among the various tariffs. For many commodities, the freight rate is expressed in terms of weight on some routes and of measurement on others, or the carrier is left free to charge by weight or measurement, according to which will give him the bigger profit. Furthermore, in respect of the surcharges applied to packages whose weight or length is considered excessive, more than 30 different systems are to be found in the 98 freight tariffs which were analysed in detail. Similarly, miscellaneous systems of measurement are used, and the decimal system is often combined with those in use in the United States and some European countries. There is no apparent reason for these discrepancies, and significant progress might be achieved if an attempt were made at simplification in this respect.

Another question which the conferences had not taken into consideration in their tariffs by 1966 was that of transport in containers. Only a few tariffs relating to trade with the United States and Canada, included provisions in this connexion, and most of these implied that transport in containers was more costly.

Generally speaking, the relations between the conclusions of the study and the statements formulated by the Latin American countries in the Charter of Tequendama are clear enough. Many of the statements in question were not analysed in detail, because this would have entailed additional studies, but it seems worthwhile to draw attention to a few points connected with the assertions made in the Charter.

In the first place, the conclusions confirm, to some extent, that freight rates for non-traditional exports are higher than would be necessary in a rational structure of freight rates, especially on account

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of the system of rates for cargo not otherwise specified which is often applied to commodities not customarily carried. These rates, as has been pointed out, are generally higher than the average. In this connexion, the systems of negotiation between exporters and shipping companies acquire special importance, since upon them depends the development of export possibilities if a reasonable freight rate is fixed.[8/] The probable adverse influence of the existing tariff structure on non-traditional exports could be averted by means of a suitable mechanism which would enable a specific freight rate to be established for every commodity in this position, before instead of after it begins to be exported in really significant quantities.

Secondly, since the level and structure of freight rates for imports were not analysed in detail, it is impossible to judge whether the conference tariffs involve a possible discrimination against Latin American commodities, apart from that indicated in the foregoing paragraph. For the time being, the possibilities of discrimination implicit in the use of the freight rates applicable to cargo not otherwise specified may also be taken to hold good for the commodities which Latin America imports. The essential difference must be sought in the discrepancies between the negotiation machinery of the two parties; in so far as exporters in the developed countries are able to obtain specific freight rates for their non-traditional commodities and exporters in the Latin American countries are not, some measure of discrimination against the latter may exist. Broadly speaking, a detailed analysis of the effects of maritime freight rates on the Latin American countries' export trade calls for a clear distinction between the position of the so-called traditional exports, which are usually shipped in large quantities, and that of non-traditional exports. With regard to the former, the process of negotiation of freight rates may be said to have been very long-drawn-out, despite the fact that the exporters were major commercial enterprises. It may be assumed that

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8/ Recently, as recommended by the United Nations Conference on Trade and Development (UNCTAD), Shippers' Councils have been formed in a number of countries to permit users to negotiate with the conferences on more equal terms.

the negative effects of freight rates deriving from a defective negotiation process have disappeared by now. In respect to non-traditional exports, the process in question has not yet been completed, and in many cases has not even begun.

One question which does not fall within the scope of the present research, but which should be considered in a broad programme of studies on the maritime transport facilities available to the Latin American countries, is the assessment of the effects produced on freight rate levels by the possible excess transport capacity offered by carriers and by the inefficient organization of services (for example, too many ports of call). The higher costs implied by such conditions, and their impact on freight rates, may be much more significant than possible distortions in the structure of the rates.

The findings of the research gave rise to several new hypotheses, many of them relating to specific aspects of maritime transport and pointing to the need for additional studies aimed at securing fuller knowledge of operational conditions in this branch of activity. These new hypotheses are numerous, and are to be found scattered throughout the text. Some of them, however, are of particular importance for the preparation of future work programmes whose results will directly provide a basis for the formulation of policies. They relate to the following maritime transport problems:

(a) The vagueness of the information available on many of the factors that determine the level and structure of freight rates, besides making the analysis of these rates more difficult, means that some important problems of maritime transport are not clearly recognized. Outstanding among these is the matter of the expenditure incurred by vessels in port, on which only over-all data were available for the ports considered in the study. To judge by the peculiar results obtained when port costs were used as an explanatory variable to account for the level of freight rates, it seems necessary to analyse these costs in greater detail in order to obtain more exact knowledge of their level and structure.

/Other variables

Other variables which were used to explain the level and structure of freight rates were the composition of trade flows and the imbalance observable in the two-way movements taking place in specific geographic sectors. When these imbalances are viewed in the aggregate, i.e., as they affect all the commodities making up general cargo, they do not appear to exert a significant influence on the level of freight rates, although the reasons for this are as yet undiscovered. Research in greater depth on the movements in question, as well as on the proportion of the total which certain commodities may represent, would help to clarify the results obtained.

The importance of these and some other factors was of course foreseeable before the study was begun, and the findings merely confirm it. The additional research suggested above had already been included in the programme of basic economic studies in the field of maritime transport drawn up by the Joint ECLA/OAS Programme.

(b) To judge from the results of the application of the models used, the factors accounting for the differences in freight rates vary from one route to another, just as the factors determining the level of freight rates for one and the same commodity on different routes vary according to the commodity. In some cases satisfactory explanations of the disparities were discovered, but in most instances all that could be done was to formulate a few hypotheses. The definitive elucidation of these results calls for thorough studies of maritime transport conditions on the routes concerned, or with respect to the commodities in question. Such research should take the form of monographs dealing with individual routes or commodities.

(c) Many of the queries that remain unanswered in this study stem from inadequate knowledge of the operational conditions of freight conferences, their key motivations, their internal power structure, regional decentralization of decision-making, internal competition among member shipping lines, etc. Similarly, although the exercise of monopolistic power by the conferences was established, its extent could not be determined. A study of these questions in depth would clear away a great many of the existing doubts.

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(d) As has been pointed out, the research covered only liner services, and did not explicitly take into consideration those other services which have not the same basic characteristics. However, as non-regular services are important on some routes and for some commodities, it would be worthwhile to make a fairly detailed examination of their operational conditions in order to obtain a more complete over-all picture of Latin America's maritime transport services.

(e) Another point that should be studied in greater detail in order to clarify some aspects of the operation of maritime transport is the quality of the services themselves, considered both from the over-all standpoint and in relation to specific routes and services. What is meant by the quality of the services is the supply defined in precise terms of frequency of sailings, tonnage and types of vessels, loading gear, the nature and quality of services ancillary to maritime transport itself, etc.

(f) The study of the level and structure of freight rates, approached in general terms, entails going more deeply into some specific questions, such as, for example, the economic significance of the present complicated system of surcharges for packages of excessive weight and length. Much could also be done to simplify and standardize freight tariffs in such respects as the system of measurements used, the types of rebates granted, freight rates for transport in containers, surcharges for secondary ports, etc.

(g) One aspect of the influence exerted by freight rates on the region's foreign trade which was considered only indirectly in the research was the level and structure of freight rates for commodities imported by Latin America. In this connexion, the following were the two major problems that were not systematically analysed: whether the factors determining the level and structure of freight rates are the same for imports as for exports, and whether the level of freight rates for one and the same commodity is the same in both the import and the export trade. But a careful analysis of these two problems raises major methodological difficulties and calls for a mass of data which were not available for the purposes of the present study. This does not of course mean that the subject is not one of real importance or that it should not be tackled as soon as possible, once the indispensable background material has been obtained.

/Chapter II

Chapter II

GENERAL ASPECTS OF MARITIME TRANSPORT IN LATIN AMERICA'S FOREIGN TRADE

1. Movement of goods

Maritime transport is undoubtedly the most important form of transport for Latin America's foreign trade. In 1965 - the last year for which complete statistics are available - the foreign trade of the ten member countries of LAFTA amounted to 318.3 million tons, of which 308.1 million, or 97 per cent of the total, were transported by sea or by inland waterways (see table 1). This percentage reflects the figures for Venezuela, which include its huge quantity of petroleum exports that are always transported by sea. In 1965 this amounted to 191.3 million tons. If the figures for Venezuela are excluded, 92 per cent of the region's foreign trade was carried by sea and inland waterways.

Within this general picture, the situation varies from country to country. For Argentina, Brazil, Chile, Colombia, Ecuador, Peru and Venezuela, the proportion of sea-borne foreign trade ranges from 98 to 100 per cent. Paraguay and Uruguay form a special group, with a slightly lower percentage, because of the greater volume of over-land trade with neighbouring countries, which has begun to assume significant proportions in recent years, particularly in the case of Uruguay. Lastly, the proportion of 56 per cent for Mexico is much lower than for the rest of the Latin American countries, owing to its large volume of trade with the United States, which is conducted mainly by land.

More sophisticated results could be obtained if the total quantity of cargo transported is broken down into bulk cargo (including liquid fuels) and general cargo; available data would show that the percentage of general cargo carried by sea was always lower than that indicated for the countries listed in table 1. The reason is that the over-land trade of most countries consists mainly of general cargo, and the same is true of the small proportion that is currently transported by air. On the other hand, nearly all bulk cargo and liquid fuel is carried by sea.

/Table 1

Table 1

WATER-BORNE FOREIGN TRADE, 1963-65

(Millions of tons)

Country	1963			1964			1965		
	Total foreign trade	Water-borne foreign trade	Water-borne foreign trade as a percentage of total	Total foreign trade	Water-borne foreign trade	Water-borne foreign trade as a percentage of total	Total foreign trade	Water-borne foreign trade	Water-borne foreign trade as a percentage of total
Argentina	16.6	16.1	96	21.9	21.7	99	26.7	26.3	98
Brazil	31.8	31.5	99	32.8	32.4	99	36.3	35.8	99
Chile	12.5	12.3	98	14.5	14.4	99	16.1	16.0	99
Colombia	6.9	6.8	98	7.5	7.4	99	8.7	8.6	99
Ecuador	1.8	1.8	99	1.7	1.7	99	2.0	2.0	99
Mexico	16.2	7.7	48	18.0	10.0	56	20.0	11.2	56
Paraguay	0.6	0.6	94	0.7	0.7	94	0.8	0.8	94
Peru	11.2	11.2	99	11.9	11.9	99	13.7	13.6	99
Uruguay	1.4	1.4	97	2.6	2.5	96	2.7	2.5	94
Venezuela	175.2	175.2	100	187.2	187.2	100	191.3	191.3	100
Total	274.2	264.6	96	298.8	289.9	97	318.3	308.1	97

Source: Foreign trade yearbooks of the respective countries.

/As regards

As regards the actual structure of Latin American trade, tables 2 and 3 contain figures for total intra-regional trade and the traffic between Latin America and the United States and Canada, Europe and Japan. From a detailed analysis of these tables, it may be concluded that there are considerable disparities in the volume of this trade. Of the 544 possible trade flows between pairs of countries considered in the two tables,[1/] 233, or 42.8 per cent of the total, amounted to less than 2,500 tons of general cargo annually, which, if taken on its own, is negligible from the standpoint of a regular shipping service. In 1965 no cargo at all was transported between 95 of these pairs of countries, or 17.5 per cent of the total. Most of the flows with a movement of less than 2,500 tons each originated in or were destined for the Central American countries, which do very little trade with South America. Between the South American countries themselves, only 46 flows reflect trade figures below that level, most of them originating in or destined for Bolivia, Paraguay and Uruguay.

Moreover, intra-regional trade exceeded 50,000 tons between not more than 17 pairs of countries in 1965, of which only three were Central American. The largest flows, of course, were between Argentina and Brazil. This means that the bulk of intra-regional trade ranges essentially from 2,500 to 50,000 tons of general cargo annually, which at first sight represent a relatively small inter-Latin American market for maritime transport.

1/ It was impossible to obtain data on the tonnage imported in 1965 by the Dominican Republic, Guatemala, Haiti, and Trinidad and Tobago.

/Table 2

Table 2

TOTAL INTRA-REGIONAL TRADE AND EXPORTS TO THE UNITED STATES AND CANADA, EUROPE, AND JAPAN, 1965

(Tons)

Country of origin \ Destination	Type of cargo	Argentina	Bolivia	Brazil	Chile	Colombia	Ecuador	Mexico	Paraguay	Peru	Uruguay	Venezuela	Sub-total LAFTA
Argentina	Bulk cargo	-	18 317	1 365 239	98 033	30 000	-	1 559	78 331	370 797	65 886	15 827	2 044 589
	Liquid fuels	-	-	-	-	-	-	-	62 496	141 524	23 078	-	230 098
	General cargo	-	28 854	116 899	101 123	18 003	1 526	8 650	25 767	43 998	33 833	26 866	405 519
Bolivia	Bulk cargo	-	-	16 566	9 500	-	-	-	-	530	-	-	26 596
	Liquid fuels	-	-	-	-	-	-	-	-	-	-	-	-
	General cargo	59 469	-	-	-	-	-	-	-	-	-	-	59 469
Brazil	Bulk cargo	11 727	-	3 942	3 853	-	4	-	-	918	-	5	20 449
	General cargo	887 899	-	-	51 764	-	-	-	-	-	25 958	-	965 621
		1 101 446	5 446	-	27 422	6 326	89	12 640	3 917	86 951	75 740	6 579	1 326 556
Chile	Bulk cargo	314 900	920	39 283	-	-	-	-	-	-	-	-	355 103
	Liquid fuels	26 688	-	4 104	-	-	-	-	-	-	-	-	30 792
	General cargo	91 313	4 098	69 153	-	7 023	8 412	30 342	171	34 410	7 649	3 318	255 889
Colombia	Bulk cargo	-	-	-	-	-	-	-	-	-	-	-	-
	Liquid fuels	-	-	17 304	-	-	-	-	-	-	-	-	17 304
	General cargo	20 293	-	5 779	561	-	8 342	8 531		165 276	445	53 572	262 799
Ecuador a/	Bulk cargo	-	-	-	501	-	-	-	-	-	-	-	501
	Liquid fuels	16 511	-	-	-	-	-	-	-	-	-	-	16 511
	General cargo	711	16	29	29 965	13 612	-	3	1	13 449	22	34	57 842
Mexico	Bulk cargo	-	-	12 998	22 487	19 048	-	-	-	-	-	-	54 533
	Liquid fuels	-	-	-	-	-	-	-	-	-	-	-	-
	General cargo	16 641	528	22 125	28 531	9 779	2 843	-	82	6 102	2 055	18 112	105 798
Paraguay	General cargo	298 633	300	1 792	1 119	2	101	3	-	319	18 663	-	320 530
Peru	Bulk cargo	22 442	-	452	68 131	-	915	-	-	-	-	-	91 940
	Liquid fuels	80 243	-	94 147	67 008	707	-	-	-	-	1 918	-	244 023
	General cargo	35 628	2 703	13 411	22 458	22 693	4 261	36 783	33	-	3 121	22 953	164 044
Uruguay	Bulk cargo	4 800	-	66 073	-	-	-	-	-	-	-	-	70 873
	General cargo	8 423	1 109	37 194	5 186	4 031	53	146	525	2 578	-	26	59 271
Venezuela b/	Bulk cargo	-	-	20 761	-	-	-	-	-	-	-	-	20 761
	Liquid fuels	1 111 468	-	4 304 580	1 048 065	10 904	385 814	-	11 889	397 024	886 999	-	8 156 743
	General cargo	93 293	5	18 269	11 150	6 291	107	376	-	54 560	-	-	184 051
Sub-total LAFTA		4 201 528	62 896	6 230 100	1 596 857	148 419	412 467	99 033	183 212	1 221 434	1 145 367	147 292	15 448 605
	Bulk cargo	1 230 042	19 837	1 521 372	250 416	49 048	915	1 559	78 331	371 327	91 844	15 827	3 630 517
	Liquid fuels	1 294 379	-	4 420 135	1 115 073	11 611	385 814	-	74 385	411 548	911 995	-	8 654 940
	General cargo	1 677 108	43 059	288 593	231 368	87 760	25 738	97 474	30 496	408 559	141 528	131 465	3 163 148
Costa Rica	Bulk cargo	-	-	-	-	-	-	-	-	-	-	-	-
	General cargo	-	1	-	1	1 347	17	973	-	6 371	-	5	8 715
El Salvador	Bulk cargo	-	-	-	-	-	-	-	-	-	-	-	-
	Liquid fuels	-	-	-	-	-	-	-	-	-	-	-	-
	General cargo	-	-	1	2	-	14	3	-	3	-	8	31
Guatemala	Bulk cargo	-	-	-	-	-	-	-	-	-	-	-	-
	Liquid fuels	-	-	-	-	-	-	-	-	-	-	-	-
	General cargo	1	-	-	-	-	1	52	-	16	-	32	102
Honduras	Bulk cargo	-	-	-	-	-	-	-	-	-	-	-	-
	General cargo	-	-	-	-	15	-	1 561	-	407	-	810	2 793
Nicaragua	Bulk cargo	-	-	-	-	-	-	-	-	-	-	-	-
	General cargo	-	-	-	-	860	16	7	-	-	-	-	883
Panama	Bulk cargo	-	-	-	-	-	-	-	-	-	-	-	-
	Liquid fuels	-	-	-	-	-	-	-	-	-	-	-	-
	General cargo	-	-	-	-	2 500	14	-	-	-	-	301	3 588
Trinidad and Tobago	Bulk cargo	-	-	-	-	-	-	-	-	773	-	-	-
	Liquid fuels	-	-	35 728	83 875	490	-	-	-	-	-	20	120 113
	General cargo	80 283	-	119 986	5 395	2	-	3	-	470	-	305	206 484
Total		4 281 812	62 897	6 385 815	1 686 130	153 633	412 529	101 632	183 212	1 229 474	1 145 367	148 781	15 791 282
	Bulk cargo	1 230 042	19 837	1 521 372	250 416	49 048	915	1 559	78 331	371 327	91 844	15 827	3 630 517
	Liquid fuels	1 294 379	-	4 455 863	1 198 948	12 101	385 814	-	74 385	411 548	911 995	28	8 775 062
	General cargo	1 757 392	43 060	408 580	236 766	92 484	25 800	100 073	30 496	446 599	141 528	132 926	3 385 704

/Table 2 (concluded)

Table 2 (concluded)

Country of origin	Type of cargo	Costa Rica	Dominican Republic	El Salvador	Guatemala	Haiti	Honduras	Nicaragua	Panama	Trinidad and Tobago	Total Latin American	United Kingdom and northern Europe c/	Mediterranean d/	Japan	United States and Canada	Total
Argentina	Bulk cargo	-	4 139	-	-	-	-	-	-	1 143	2 049 931	3 040 984	3 168 620	251 437	77 903	8 638 875
	Liquid fuels	-	-	-	-	-	-	-	-	-	130 098	-	-	-	708 096	838 194
	General cargo	432	7 136	251	318	2	137	559	506	3 186	418 086	1 846 509	314 154	148 038	175 647	2 952 436
Bolivia	Bulk cargo	-	-	-	-	-	-	-	-	-	25 596	7 509	-	8 824	54 773	99 702
	Liquid fuels	-	-	-	-	-	-	-	-	-	59 469	-	-	-	-	59 469
	General cargo	4	-	-	-	-	-	-	-	-	20 449	61 622	15	2 300	26 100	111 486
Brazil	Bulk cargo	-	-	-	-	-	-	-	-	12 927	978 548	6 660 531	2 368 398	962 119	3 735 534	14 705 130
	General cargo	68	7	85	129	-	36	37	143	192	1 327 250	1 610 754	222 726	97 535	857 140	4 115 405
Chile	Bulk cargo	-	-	-	-	-	-	-	-	-	355 103	979 625	121 402	6 909 765	3 357 228	11 723 123
	Liquid fuels	-	-	-	-	-	-	-	-	-	30 792	-	-	-	-	30 792
	General cargo	77	2	82	112	54	10	10	2 397	93	258 726	518 642	51 211	57 450	245 581	1 152 210
Colombia	Bulk cargo	-	-	-	-	-	-	-	-	-	-	-	-	10 500	51 146	101 646
	Liquid fuels	-	-	-	-	-	-	-	128 466	1 637 980	1 783 750	1 312 332	334 726	-	2 118 463	5 549 271
	General cargo	36 764	10 259	6 854	4 852	-	702	2 493	41 798	48	366 609	458 645	48 482	21 267	785 854	1 684 855
Ecuador b/	Bulk cargo	-	-	-	-	-	-	-	-	-	501	8 946	-	-	52 401	62 848
	Liquid fuels	-	-	-	-	-	-	-	-	-	16 511	-	-	-	-	16 511
	General cargo	364	-	11	10	-	1	9	4 565	-	62 802	405 597	9 566	157 401	591 529	1 226 885
Mexico	Bulk cargo	5 371	500	18 528	-	-	-	4 210	63 260	-	146 402	1 668 936	808	1 046 304	3 761 668	6 621 710
	Liquid fuels	-	-	-	1 495	-	-	-	17 212	-	18 707	884	44 004	10 940	1 510 903	1 582 388
	General cargo	2 053	698	4 159	9 531	96	1 412	4 102	7 334	351	135 534	181 239	157 400	4 674 352	5 198 508
Paraguay	General cargo	-	-	-	-	-	-	-	10	-	320 940	49 956	11 172	546	47 793	430 407
Peru	Bulk cargo	-	-	-	-	-	-	-	-	-	91 940	1 876 881	266 469	4 579 140	1 403 235	8 217 665
	Liquid fuels	-	-	-	-	-	-	-	-	-	244 023	144 482	-	31 296	61	419 862
	General cargo	51	57	210	158	-	2	8	449	36	165 015	1 092 176	232 508	110 332	577 180	2 177 211
Uruguay	Bulk cargo	-	-	-	-	-	-	-	-	-	70 873	23 935	-	-	-	94 808
	General cargo	1	-	-	28	-	3	-	23	-	59 326	143 389	70 961	4 813	30 295	308 784
Venezuela b/	Bulk cargo	-	-	-	-	-	-	-	-	-	20 761	3 767 041	773 278	126 904	12 336 768	13 024 752
	Liquid fuels	96 248	97 400	416 340	443 453	16 880	4 824	224 278	1 325 995	6 787 030	17 568 191	25 697 230	3 839 199	1 376 212	64 565 940	111 874 772
	General cargo	14 120	1 260	19 443	12 014	-	16	8 853	-	8 272	248 029	924 161	28 331	25 853	1 984 781	3 211 755
Sub-total LAFTA		155 546	131 558	466 003	474 100	17 032	7 143	244 559	1 592 158	8 451 258	26 974 962	52 482 066	11 901 126	16 138 966	103 388 513	230 886 991
	Bulk cargo	5 371	4 699	18 528	-	-	-	4 210	63 260	14 070	3 740 655	18 034 448	6 698 167	13 535 983	24 672 056	67 081 309
	Liquid fuels	96 248	97 400	416 340	443 948	16 880	4 824	224 278	1 471 673	8 425 010	19 851 541	27 154 928	4 168 733	1 418 448	68 697 543	111 291 193
	General cargo	53 927	19 459	31 135	27 152	152	2 319	16 071	57 225	12 178	3 382 766	7 292 690	1 034 208	784 535	10 019 274	22 523 403
Costa Rica	Bulk cargo	-	-	-	-	-	-	-	-	-	-	-	-	-	37 959	37 959
	General cargo	-	-	14 384	13 371	-	5 793	21 421	11 885	-	75 569	48 086	7 089	1 789	331 516	464 049
El Salvador	Bulk cargo	-	-	-	5 565	-	7 390	485	-	-	13 440	-	-	-	8 125	21 565
	Liquid fuels	43 858	-	-	59 926	-	51 784	-	1 347	-	156 915	-	-	-	-	156 915
	General cargo	6 153	38	-	51 579	-	26 178	11 620	1 497	-	97 096	93 756	3 052	59 506	75 273	329 283
Guatemala	Bulk cargo	-	-	-	-	-	-	-	-	-	-	-	-	-	31 171	31 171
	General cargo	6 321	-	129 729	-	-	30 362	8 161	284	-	174 959	103 516	7 621	50 540	80 307	416 943
Honduras	Bulk cargo	-	-	55 444	13 559	-	-	2 539	-	-	71 542	-	-	-	35 350	106 892
	General cargo	5 603	-	114 954	16 286	-	-	7 583	4 921	-	152 140	147 839	9 405	26 097	514 565	850 046
Nicaragua	Bulk cargo	-	-	-	-	-	-	-	-	-	-	-	-	-	40 454	40 454
	General cargo	26 701	-	12 460	2 789	-	6 370	-	687	-	49 890	81 217	13 202	203 509	74 055	421 873
Panama	Bulk cargo	-	-	-	-	-	-	-	-	-	-	-	-	-	15 601	15 601
	Liquid fuels	666	-	-	-	-	-	-	-	-	666	160 087	-	65 096	557 790	783 639
	General cargo	1 476	212	6 008	89	-	284	378	-	-	12 027	54 445	6	4 669	349 010	420 175
Trinidad and Tobago	Bulk cargo	-	-	-	-	-	-	-	-	-	-	145 826	-	-	63 239	209 065
	Liquid fuels	4 570	7 526	-	5 796	2 179	15 399	1 190	3 622	-	160 403	5 084 854	431 308	13 882	6 703 990	12 396 427
	General cargo	3 101	450	-	1 009	3	9 251	2 789	75	-	223 122	125 310	2 114	3 398	402 490	756 774
Total		253 395	129 784	798 382	641 669	19 214	159 954	290 717	1 616 476	8 451 258	28 162 731	58 527 002	12 374 935	16 567 392	112 730 696	228 362 756
	Bulk cargo	5 371	4 699	73 972	19 124	-	7 390	7 234	63 260	14 070	3 825 637	18 180 274	6 698 167	13 535 983	24 913 553	67 504 014
	Liquid fuels	145 348	104 926	416 340	509 670	19 059	72 007	225 468	1 476 642	8 425 010	20 169 525	32 399 869	4 600 061	1 497 386	75 959 325	134 656 166
	General cargo	103 282	20 159	308 070	112 275	155	80 557	68 015	76 574	12 178	4 167 569	7 946 859	1 076 717	1 134 023	11 857 818	26 193 586

Source: Foreign trade yearbooks and statistical bulletins of the respective countries.

a/ Figures for 1960.

b/ There may be discrepancies in the figures as the foreign trade yearbook is almost illegible.

c/ Belgium, Czechoslovakia, Denmark, the Federal Republic of Germany, Finland, France, Iceland, Ireland, the Netherlands, Norway, Poland, Sweden, Switzerland and the United Kingdom.

d/ Austria, Greece, Italy, Portugal, Spain and Yugoslavia.

/Table 3

Table 3

TOTAL IMPORTS FROM THE UNITED STATES AND CANADA, EUROPE, AND JAPAN, 1965

(Tons)

Country of origin / Destination	Type of cargo	Argentina	Bolivia	Brazil	Chile	Colombia	Ecuador a/	Mexico	Paraguay	Peru	Uruguay b/	Venezuela	Subtotal LAFTA	Costa Rica	El Salvador	Honduras	Nicaragua a/	Panama	Total
United States and Canada	Bulk cargo	720 654	-	1 741 101	175 875	-	55 377	135 975	-	137 628	37 344	594 612	3 598 566	2 986	30 144	-	54 187	30 164	3 696 047
	Liquid fuels	50 807	-	-	49 510	-	-	41 403	-	-	-	-	141 720	590	684	14 484	51 225	-	208 703
	General cargo	650 821	155 450	925 863	945 131	580 068	115 738	4 515 951	39 022	506 843	72 353	1 114 364	9 621 604	246 339	142 965	145 095	117 295	162 538	10 435 886
United Kingdom and northern Europe																			
Belgium	Bulk cargo	-	-	600	-	-	-	-	-	-	-	-	600	-	-	-	-	-	600
	General cargo	59 949	6 497	47 438	46 971	24 296	28 923	20 554	2 529	64 755	22 685	132 650	457 247	24 524	37 168	11 269	25 249	21 438	577 477
Czechoslovakia	General cargo	4 393	2 648	21 598	1 400	2 489	1 721	2 900	-	5 916	1 240	14 039	58 344	2 092	548	1 491	1 170	-	63 644
Denmark	General cargo	1 484	1 279	31 403	22 035	2 732	1 348	5 337	-	4 748	594	16 902	87 862	561	1 941	954	1 331	-	92 649
Federal Republic of Germany	Bulk cargo	35 438	-	199 352	-	-	-	-	-	-	500	-	235 290	-	-	-	-	-	235 290
	General cargo	249 061	27 456	198 778	113 047	61 251	37 280	106 889	14 429	142 105	33 668	268 077	1 252 041	42 671	79 192	27 636	23 442	19 401	1 444 383
Finland	General cargo	142 745	249	29 013	5 403	42 381	1 193	24 115	-	23 074	5 201	11 632	285 006	684	941	709	58	-	287 378
France	Bulk cargo	-	-	-	-	-	-	-	-	12 659	-	11 209	23 868	-	-	-	-	-	23 868
	Liquid fuels	6 041	-	-	-	-	-	-	-	-	-	-	6 041	-	-	-	-	-	6 041
	General cargo	122 085	4 570	66 644	33 525	13 093	8 250	39 154	1 176	35 968	15 221	106 009	445 695	11 488	4 282	2 408	1 051	3 586	468 350
Iceland	General cargo	10	-	1 825	-	-	2	-	-	16	-	434	2 287	-	-	6	-	-	2 293
Ireland	General cargo	1	1	-	1	-	5	-	-	12	7	651	678	21	-	144	-	-	843
Netherlands	Bulk cargo	8 476	-	-	-	-	-	-	-	-	-	-	8 476	-	-	-	-	-	8 476
	Liquid fuels	1 458	-	8 965	53 220	-	-	-	-	-	-	-	63 643	-	-	-	-	-	63 643
	General cargo	62 394	9 292	55 609	37 556	16 807	5 548	31 418	551	41 474	11 730	47 610	319 989	21 473	29 430	10 051	12 043	17 351	410 337
Norway	General cargo	15 318	487	19 254	1 994	443	2 679	25 159	-	11 850	188	24 735	102 107	814	468	285	260	-	103 934
Poland	Bulk cargo	132 968	-	-	-	-	-	-	-	-	2 571	-	135 539	-	-	-	-	-	135 539
	General cargo	12 993	697	32 533	503	8 696	679	7 290	-	4	297	6 532	70 224	150	89	228	-	-	70 691
Sweden	General cargo	127 065	1 151	27 837	6 296	12 276	5 542	18 952	2 666	15 878	7 944	25 165	250 772	2 669	3 946	794	1 446	-	259 827
Switzerland	General cargo	159 977	683	3 163	2 449	2 005	986	17 517	-	5 362	791	6 128	55 061	663	371	252	391	318	56 356
United Kingdom	Bulk cargo	13 868	-	-	-	-	-	-	-	-	-	-	13 868	-	-	-	-	-	13 868
	Liquid fuels	-	-	1 175	-	-	-	-	-	-	-	-	1 175	-	-	-	-	-	1 175
	General cargo	193 718	16 310	44 591	58 824	29 185	10 079	62 966	6 254	54 409	31 048	105 701	613 085	8 275	9 444	4 465	6 880	9 880	652 969
Total imports from United Kingdom and northern Europe	Bulk cargo	190 750	-	199 952	-	-	-	-	-	12 659	3 071	11 209	417 641	-	-	-	-	-	417 641
	Liquid fuels	7 499	-	10 140	53 220	-	-	-	-	-	-	-	70 859	-	-	-	-	-	70 859
	General cargo	1 007 193	71 320	579 686	330 004	215 654	104 235	362 251	27 605	405 571	130 614	766 265	4 000 398	116 374	187 220	50 572	61 311	72 396	4 488 271
Mediterranean area																			
Austria	General cargo	21 910	207	2 756	4 844	657	1 673	1 262	-	2 439	1 192	12 350	49 290	640	204	477	797	-	51 398
Greece	General cargo	1 634	-	2 226	11	-	-	-	-	19	70	509	4 469	1	4	11	-	-	4 485
Italy	Bulk cargo	11 408	-	-	-	-	-	-	-	-	-	-	11 408	-	-	-	-	-	11 408
	Liquid fuels	14 628	-	-	-	-	-	-	-	-	-	-	14 628	-	-	-	-	-	14 628
	General cargo	140 339	1 713	31 277	9 202	4 487	3 377	24 735	-	14 124	9 177	67 721	306 152	2 756	4 269	866	13 647	2 870	329 760
Portugal	General cargo	7 576	119	6 385	178	142	234	6 461	-	1 002	580	3 995	26 672	2 440	14	11	23	-	29 160
Spain	Liquid fuels	80	-	-	-	-	-	-	-	-	-	-	80	-	-	-	-	-	80
	General cargo	14 186	363	17 761	9 034	10 398	759	16 158	662	2 366	2 066	12 509	86 262	2 587	418	191	139	-	89 597
Yugoslavia	General cargo	1 086	51	45 081	631	520	118	-	33	678	81	568	48 847	441	-	13	-	-	49 301
Total imports from the Mediterranean area	Bulk cargo	11 408	-	-	-	-	-	-	-	-	-	-	11 408	-	-	-	-	-	11 408
	Liquid fuels	14 708	-	-	-	-	-	-	-	-	-	-	14 708	-	-	-	-	-	14 708
	General cargo	186 731	2 453	105 486	23 900	16 204	6 161	48 636	695	20 628	13 166	97 652	521 692	8 865	4 909	1 559	14 606	2 870	553 841
Japan	General cargo	254 575	28 901	104 316	23 002	55 174	6 831	65 238	-	102 899	1 522	159 574	802 032	37 928	20 004	6 385	19 869	17 510	903 468

Sources: Foreign trade yearbooks of the respective countries.

Note: Figures for Dominican Republic, Guatemala, Haiti, and Trinidad and Tobago are not included.

a/ Figures for 1964.

b/ Estimated imports of machinery in general, electrical articles, tractors, motor vehicles and tools.

c/ Excluding alcoholic and non-alcoholic beverages.

/The largest

The largest volume of trade is conducted between the countries of the region and the United States and Canada, Europe, and occasionally Japan. Of the 144 flows of this kind recorded in tables 2 and 3, 64 - or 44.4 per cent of the total - represent more than 100,000 tons of general cargo annually. In several cases, such as the flows between Argentina and Europe, Brazil and Europe, Peru and Europe, and Venezuela and the United States and Canada, the quantity involved is over 1 million tons annually. This fact is especially significant, since it is clearly extra-regional trade on certain routes and not the intra-regional that carries the most weight in the structure of Latin America's maritime transport. With the possible exception of the flow between Argentina and Brazil, this structure is determined by trade between the various countries of the region and the United States and Europe.2/

The influence of trade with countries outside the region is more evident from an analysis, not only of the nature of the trade between the various countries considered, but also of the structure of the trade flows in the different geographical sections. A trade flow is understood to mean the intensity of the movement that takes place in a particular area, or which passes through it, independently of the points of origin or destination of that movement. Thus, the trade flow of 3,033,000 tons between the ports of Callao and Guayaquil in 1965 does

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2/ The method used in calculating the movement of general cargo between the various countries may have resulted in slightly underestimating the tonnage carried in some cases and overestimating it in others. The procedure followed was to subtract from the total tonnage transported between two countries those commodities which are not normally carried in liners but in tramps as complete shiploads, the balance being considered as general cargo. In some cases, however, this division is not so strict; although, as a rule, a specific commodity such as grains, is mainly transported in tramps, a varying proportion may often be carried in liners, and these quantities would have to be added to the total defined as general cargo. Conversely, a certain proportion of other commodities such as fish meal and bananas, which are usually transported by regular shipping lines, may form complete shipments. To clear up these points would entail detailed studies which are beyond the scope of this investigation. The figures in tables 2 and 3 should therefore be regarded as preliminary estimates.

not represent the quantity of cargo shipped from Callao to Guayaquil, but rather that passing by the two ports on the journey between the countries of origin and destination. In other words, the trade flow between two points may be described as the cargo carried during a certain period by the vessels passing by those two points.

Estimates of Latin America's total foreign trade flow of general cargo in 1965 are shown in figure 1 and annex 3.[3/]

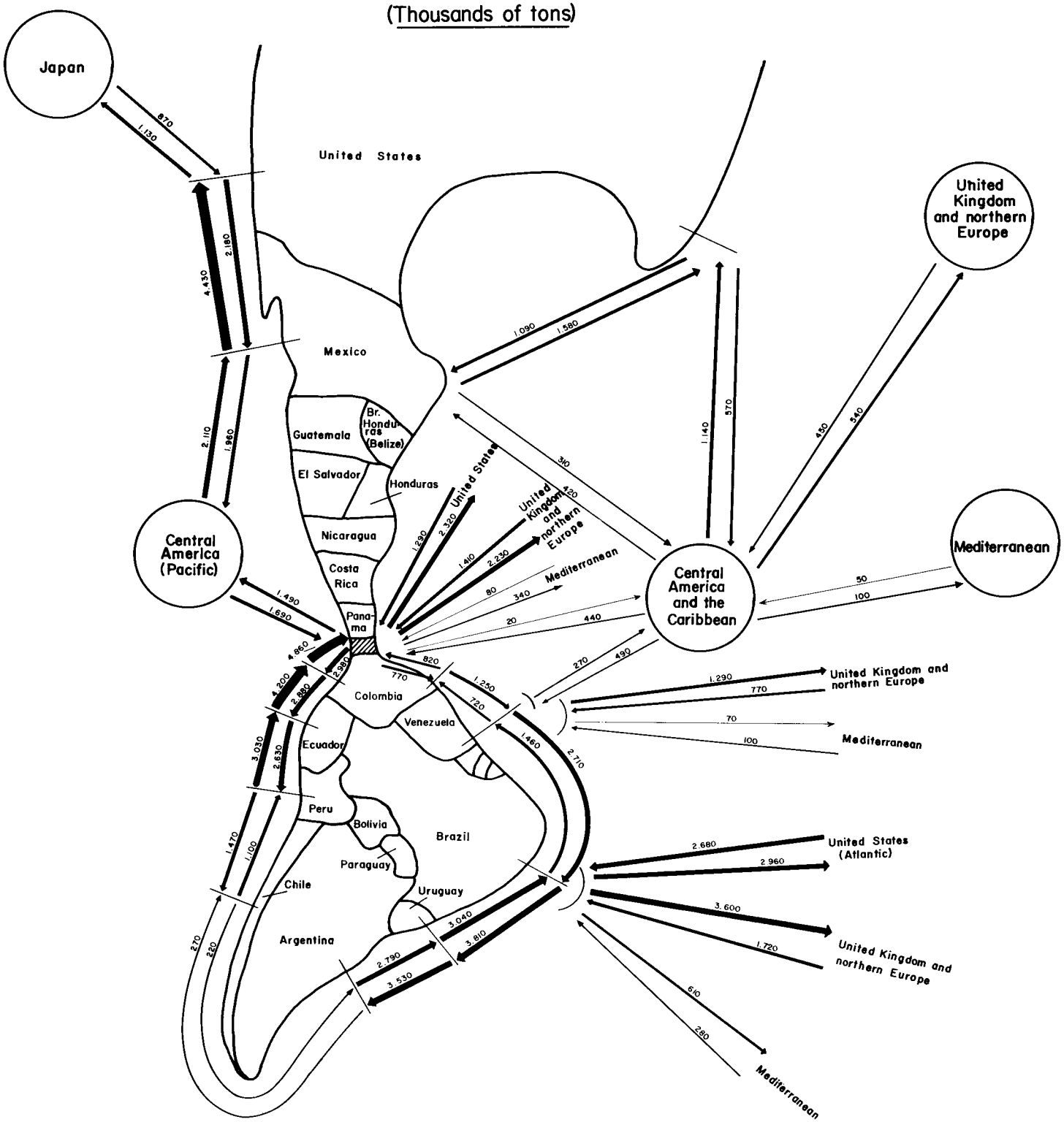
Two major groups of trade flows may be discerned clearly in this figure. The first relates to trade between the region and the United States and Europe, and the second to intra-regional trade, particularly in South America. In the first group, the movement was mainly northbound, i.e. from Latin America to the above mentioned areas. The only exception was the movement between Venezuela and the Mediterranean countries, in which the main flow was towards the region, although the tonnage involved was not very great. This over-all result was to be expected, given the nature of the trade between the two areas, in which the industrialized countries basically ship manufactures in comparatively small quantities, and the Latin American countries mainly export huge quantities of unprocessed or semi-processed commodities.

3/ To estimate the total trade flow is a fairly complex problem. The figures in tables 2 and 3, subject to the reservation indicated in footnote 2/, were taken as the statistical basis. The criterion followed in assigning the traffic between two countries to a specific route was, in general, to select the shortest route, taking into account the Panama Canal. This criterion was not strictly adhered to, however, since the structure of existing liner services was analysed at the same time. Wherever there were no direct services by the shortest route, the cargo was considered to have been transported by the existing liner services. In addition, estimates were prepared for countries whose trade is conducted on two coasts, such as Mexico, several of the Central American countries and Colombia. Accurate data on the subject were available in only a few cases, and for the rest the estimates had to be based on the existing incomplete data.

Figure I

ESTIMATES OF TOTAL FOREIGN TRADE FLOWS OF GENERAL CARGO – 1965

(Thousands of tons)



Source: Annex 3

In absolute terms, one of the most important trade flows was between Argentina and Brazil and northern Europe, with 3,600,000 tons of general cargo shipped to Europe, and imports from Europe totalling 1,720,000 tons. Trade between the same two Latin American countries and the United States (assuming that it was carried directly between Brazil and the United States Atlantic coast) was on much the same scale, but it was better balanced, since 2,960,000 tons were northbound and 2,680,000 tons southbound. The trade flows from the Pacific coast of South America to northern Europe and to the United States Atlantic coast were also significant, although the disparities in the volume of traffic were much more pronounced. In fact, between Panama and northern Europe, while exports to Europe amounted to 2,230,000 tons, imports totalled only 1,410,000 tons. Similarly, the traffic towards the United States Atlantic coast was 2,320,000 tons, compared with 1,290,000 tons towards Panama.

The imbalance between the traffic in the two directions in a specific geographical section and, in general, on a particular route, may play an important part in the establishment of freight rates for those sections or routes. The reason is that if, on a certain route, the tonnage carried from A to B exceeds that transported from B to A, the necessary shipping capacity will depend on the tonnage moved from A to B, with the result that there will be unused shipping capacity on the return journey. This means that for the return voyage only the marginal costs involved in transporting additional cargo have to be taken into account. The effects of such a situation on the structure of freight rates are quite clear: freight rates from A to B would be expected to be higher than those charged from B to A, up to the point where the quantity of cargo carried in both directions is equal.[4/] As indicated above, the present structure of the region's flow of foreign trade is

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4/ Of course, if the same weight or volume of cargo is carried in both directions, this combination does not necessarily mean the highest profits to shipowners, since that will also depend on the individual freight rates charged for the cargo transported in both directions.

/based on

based on its role as an exporter of raw materials and importer of manufactured goods. An additional advantage that might be obtained from diversifying the structure of its foreign trade by promoting exports of manufactures and even importing some raw materials might be to reduce these imbalances in the present traffic, with the resulting decrease in freights. This would be possible, of course, provided that the imbalance in the trade flows played a really important part in determining the structure of freight rates and that there was not idle capacity in both directions.

The general conclusion regarding the flow of extra-regional trade, in the sense that there is more northbound than southbound traffic, is also applicable to trade between the Latin American countries and the United States Pacific coast and Japan, in which the traffic is assumed to go from Panama northwards along the Pacific coast of the Central American countries and Mexico. The structure of this trade flow is affected by the trade between Mexico and the United States, which, although only a small proportion is carried by sea, is important enough to raise the tonnage transported in the geographical section concerned to 4,430,000 tons northbound and 2,180,000 in the opposite direction. Comparatively speaking, traffic in the section between the Pacific coast of the United States and Japan, which includes practically all the trade between Japan and Latin America, totals 1,130,000 tons towards Japan and 870,000 tons in the reverse direction.[5/]

The most important trade flows in the geographical sections within the region are those which circle South America.[6/] The first conclusion to be drawn from a study of figure 1 is that, except for the sections between Chile and Peru, and between the Atlantic coast of Colombia and

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5/ Trade between Japan and the United States has not been included, since it is not the subject of this study.

6/ Attention is drawn once again to the definition of trade flows. Those circling South America include the extra-regional trade of various countries in so far as it passes by one of these sections. Therefore, they should not be understood to comprise only intra-regional trade.

Panama, the heaviest movement is in a clockwise direction. In general, however, the imbalance in most sections is not very pronounced, and the lesser movement in one direction ranges from 53.9 to 93.9 per cent of the opposite flow. The largest differences are in the sections between Venezuela and Brazil (53.9 per cent) and between the Atlantic coast of Colombia and Venezuela (57.6 per cent). The exceptional situation in the Chile-Peru section is explained by the nature of Chile's northbound exports - copper, paper and wood pulp - which are mainly transported by liner, and by the nature of its imports, which include large quantities of agricultural commodities, particularly from tropical areas. The situation in the section between the Atlantic coast of Colombia and Panama is not so easily explained and calls for a closer study of the commodities involved.

In many cases, there is little difference between the two opposite flows. In fact, account should be taken of the problem described above regarding the definition adopted for general cargo in preparing these estimates, according to which it includes certain commodities that are only partly transported by liner, such as fish meal and bananas. This specially affects the trade flows along the Pacific coast north of Peru. Since in other cases some commodities have been considered as bulk cargo, although a large proportion of them is shipped by liner, it is felt that the proportions and imbalances in the trade flows present a fairly accurate picture of the real situation.

In absolute terms, the most important geographical sections are those between the Pacific coast of Colombia and Panama, with a total carried in both directions of 7,800,000 tons; between Ecuador and the Pacific coast of Colombia, with 7,100,000 tons; and between Brazil and Uruguay, with 6,900,000 tons. The section where the least movement is recorded is that between Chile and Argentina via the Strait of Magellan, with 490,000 tons.

In brief, the structure of Latin America's foreign trade flows of general cargo has two basic characteristics. First, in practically all the trade flows between the region and the United States and Canada, Europe, and Japan, the heavier movement is northbound. This imbalance, which varies on the different routes, depends upon the nature of

Latin America's imports and exports. Secondly, there are also imbalances, although less pronounced, in most of the geographical sections of South America's trade flows. In this case, intra-regional trade acts as a compensatory factor. The heavier movement, with only two exceptions, is in a clockwise direction.

With regard to the structure of trade flows of specific commodities, the tables in annex 1 contain basic data on the 133 commodities considered in this study, all of which are Latin American exports.

Tables 4 and 5 have been prepared in order to simplify the presentation of these data. For each of the ten countries covered by this study, table 4 presents the five major exports of general cargo transported to other Latin American countries, together with the main countries of destination. Table 5 contains the same information for trade between the region and the United States and Canada, Europe, and Japan.

As regards intra-regional trade, an analysis of the major commodities for the ten countries concerned shows that 11 were raw materials, 20 were semi-manufactures, 18 were simple manufactures and 1 was a highly processed manufacture.7/ The main trade flows of specific commodities considered as general cargo in intra-regional traffic involve apples from Argentina to Brazil (57,011 tons in 1965), pinewood, bananas and iron and steel sheets from Brazil to Argentina (425,116, 194,415 and 144,741 tons, respectively), Portland cement from Colombia to Costa Rica (38,591 tons), newsprint from Chile to Argentina (18,841 tons), bananas from Ecuador to Chile (22,508 tons), semi-refined sugar from Mexico to Chile (22,487 tons), cotton from Peru to Argentina (17,162 tons), and iron and steel bars from Venezuela to Argentina (54,018 tons).

7/ The classification used in this study for the commodities included in the sample comprises the four groups indicated here. The degree of processing was the criterion adopted for their classification. For details of this classification and the commodities included in each category, see annex 1.

/Table 4

Table 4

MAJOR EXPORTS CONSIDERED AS GENERAL CARGO IN INTRA-REGIONAL TRADE, 1965 a/

(Tons)

Country and commodity	Classification b/	Total exports	Main destination	Total exports to main destination
A. Argentina				
1. Apples	1	64 979	Brazil	57 011
2. Edible oils	3	29 440	Peru	13 577
3. Beef fat and tallow	2	18 971	Colombia	12 020
4. Quebracho extract	2	17 186	Chile	3 683
5. Iron or steel tubes	3	15 558	Venezuela	10 008
B. Brazil				
1. Sawn pine timber	2	442 046	Argentina	425 116
2. Bananas	1	211 927	Argentina	194 415
3. Iron or steel sheets	3	147 058	Argentina	144 741
4. Husked rice	2	76 535	Peru	76 532
5. Wood pulp	3	44 959	Argentina	42 869
C. Chile				
1. Newsprint	3	61 283	Argentina	18 841
2. Electrolytic copper	3	19 365	Argentina	10 814
3. Wood pulp	3	18 187	Argentina	15 982
4. Rough timber	2	12 381	Argentina	12 220
5. Sawn timber	2	11 164	Argentina	6 475
D. Colombia				
1. Portland cement	3	39 425	Costa Rica	38 591
2. Pitch or asphalt	2	30 163	Argentina	28 760
3. Logs	2	5 489	Mexico	5 485
4. Artificial textile fibres	4	2 237	Ecuador	1 122
5. Coffee	2	2 198	Argentina	1 979
E. Costa Rica				
1. Fertilizers	3	34 802	Guatemala	9 962
2. Live cattle	1	4 360	Peru	4 218
3. Cement	3	2 988	Nicaragua	2 934
4. Galvanized steel sheets	3	2 611	Nicaragua	2 208
5. Cocoa beans	2	2 068	Panama	982
F. Ecuador c/				
1. Bananas	1	30 414	Chile	22 508
2. Polished rice	2	10 570	Chile	5 184
3. Cocoa	2	10 495	Colombia	10 152
4. Citrus fruit	1	2 531	Peru	2 033
5. Live cattle	1	633	Peru	633

/Table 4 (conclusion)

Table 4 (conclusion)

Country and commodity	Classification b/	Total exports	Main destination	Total exports to main destination
G. Mexico				
1. Semi-refined sugar	2	22 487	Chile	22 487
2. Iron or steel tubes	3	17 660	Chile	9 311
3. Raw cotton	1	16 322	Chile	13 229
4. Crude sulphur	1	16 046	Brazil	12 998
5. Refined zinc	2	10 681	Brazil	4 654
H. Peru				
1. Ginned cotton	1	39 567	Argentina	17 162
2. Zinc	2	17 989	Brazil	11 207
3. Fish oil	2	12 865	Colombia	12 788
4. Lead bars	2	2 902	Chile	1 459
5. Canned fish or shellfish	3	1 184	Argentina	190
I. Uruguay				
1. Cement	3	36 698	Brazil	34 923
2. Rice	1	4 457	Chile	4 457
3. Greasy wool	1	3 375	Colombia	3 375
4. Malt barley	2	2 528	Brazil	2 528
5. Iron tubes	3	1 852	Argentina	1 852
J. Venezuela				
1. Lubricating oils	3	61 484	Argentina	39 439
2. Portland cement	3	58 925	Peru	51 158
3. Iron or steel bars	2	58 923	Argentina	54 018
4. Asphalt	2	57 217	Guatemala	11 409
5. Fertilizers/urea	3	1 010	Dominican Republic	1 010

Source: Annex I.

a/ Comprising the five major exports from each country to other countries of the region, on the basis of the sample of 133 commodities used in the study.

b/ 1 = raw materials, 2 = semi-manufactures, 3 = simple manufactures, 4 = highly processed manufactures.

c/ 1964.

/Table 5

Table 5

MAJOR EXPORTS CONSIDERED AS GENERAL CARGO TO THE UNITED STATES AND CANADA, EUROPE, AND JAPAN, 1965 a/

(Tons)

Country and commodity	Classification b/	Total exports	Main destination c/	Total exports to main destination
A. Argentina				
1. Beef	2	306 284	United Kingdon and northern Europe	190 094
2. Apples	1	187 413	idem	186 531
3. Edible oils	3	74 201	idem	74 062
4. Quebracho extract	2	69 431	idem	27 807
5. Greasy wool	1	64 428	idem	42 900
B. Brazil				
1. Coffee	2	729 568	United States and Canada	376 569
2. Sawn timber	2	218 906	United Kingdom and northern Europe	197 009
3. Raw cotton	1	145 990	idem	117 226
4. Citrus fruit	1	143 578	idem	141 040
5. Sisal fibre	1	117 242	idem	63 497
C. Chile				
1. Electrolytic copper	3	195 645	United Kingdom and northern Europe	158 591
2. Fish meal	3	66 730	idem	61 817
3. Copper wire	3	32 565	idem	17 289
4. Sawn timber	2	25 481	idem	25 481
5. Dried vegetables	2	14 424	idem	13 809
D. Colombia d/				
1. Coffee	2	385 013	United States and Canada	233 650
2. Bananas	1	171 413	United Kingdom and northern Europe	171 413
3. Sawn timber	2	56 539	United States and Canada	53 681
4. Logs	2	42 714	idem	37 748
5. Raw sugar	2	30 665	idem	30 665
E. Costa Rica				
1. Bananas	1	315 608	United States and Canada	294 547
2. Coffee	2	48 221	United Kingdom and northern Europe	26 726
3. Fertilizers	3	5 528	Mediterranean	5 068
4. Cocoa	2	4 649	United States and Canada	3 995
5. Beef	2	3 907	idem	3 907
F. Ecuador d/				
1. Bananas	1	1 054 155	United States and Canada	537 789
2. Raw sugar	2	58 041	idem	52 402
3. Coffee	2	24 303	idem	13 171
4. Cocoa	2	17 559	idem	7 783
5. Sawn timber	2	9 277	idem	7 752

/Table 5 (conclusion)

Table 5 (conclusion)

Country and commodity	Classification b/	Total exports	Main destination c/	Total exports to main destination
G. Mexico				
1. Raw cotton	1	346 788	Japan	153 618
2. Refined lead	2	95 691	United States and Canada	92 151
3. Citrus fruit	1	88 376	United Kingdom and northern Europe	48 316
4. Coffee beans	2	77 735	United States and Canada	68 639
5. Henequen fibre	1	42 294	idem	41 086
H. Peru				
1. Fish meal	3	1 048 591	United Kingdom and northern Europe	835 588
2. Refined lead	2	81 448	idem	27 968
3. Fish oil	2	69 533	idem	69 533
4. Cotton	1	64 093	idem	45 390
5. Electrolytic copper	3	36 222	United States and Canada	34 007
I. Uruguay				
1. Beef, frozen	2	43 798	United Kingdom and northern Europe	22 557
2. Greasy wool	1	43 746	idem	24 473
3. Canned meat	3	18 520	idem	11 242
4. Rice	1	11 385	idem	9 658
5. Wool tops	3	8 371	idem	5 459
J. Venezuela				
1. Asphalt	2	456 196	United States and Canada	453 218
2. Lubricating oils	3	149 656	United Kingdom and northern Europe	122 888
3. Cement	3	30 440	Mediterranean	27 954
4. Rice	1	20 000	United Kingdom and northern Europe	20 000
5. Coffee	2	18 245	United States and Canada	15 068

Source: Annex I.

a/ Comprising the five major exports from each country to the destinations indicated on the basis of the sample of 133 commodities used in the study.

b/ 1 = raw materials, 2 = semi-manufactures, 3 = simple manufactures, 4 = highly processed manufactures.

c/ For details of the countries included in each group, see table 3.

d/ 1964.

Raw materials and semi-manufactured commodities account for a much larger proportion of Latin America's exports to the rest of the world. In this case, of the 50 commodities included in table 5, 15 are raw materials, 24 are semi-manufactures and 11 are simple manufactures, none of them being highly processed manufactures. The main trade flows consist of beef from Argentina to northern Europe (190,094 tons), apples from Argentina to northern Europe (186,531 tons), coffee from Brazil to the United States (376,569 tons) and to northern Europe (286,772 tons),[8] sawnwood, citrus fruit and cotton from Brazil to northern Europe (197,009, 141,040 and 117,226 tons, respectively), coffee from Colombia to the United States (233,650 tons) and to northern Europe (128,365 tons), bananas from Colombia to northern Europe (171,413 tons), electrolytic copper from Chile to northern Europe (158,591 tons), bananas from Costa Rica to the United States (294,547 tons), bananas from Ecuador to the United States (537,789 tons), to northern Europe (359,414 tons) and to Japan (153,551 tons), cotton from Mexico to Japan (153,618 tons) and to the United States (117,942 tons), fish meal from Peru to northern Europe (835,588 tons) and to the United States (213,003 tons), asphalt from Venezuela to the United States (453,218 tons), and lubricating oils from Venezuela to northern Europe (122,888 tons).[9]

If the data on total trade flows analysed above are compared with the figures for these specific commodities, it will be seen that in many cases the trade flows are essentially determined by one or more of these commodities which are transported in huge quantities. Traffic on the Pacific coast of South America, for example, depends basically on exports of fish meal from Peru, bananas from Ecuador, Chilean copper and Colombian coffee. This is a very important fact which would require a special study in depth, but in any case, the demand for shipping services originating in

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8/ Data taken directly from annex 1.

9/ According to more recent information, a large proportion of Venezuela's asphalt exports to the United States is transported in bulk.

Latin America is largely dependent upon the movement of only a few commodities. In addition, experience has shown that the tonnage of these Latin American exports does not vary much from one year to another, but only over the longer term; prices do fluctuate, however, and this can affect the freight rates which the shipping companies are in a position to charge.[10/] Furthermore, as indicated above, many of the commodities representing a major part of the traffic on certain routes, although normally classified as general cargo, are likely to be transported on chartered vessels at the prevailing open market rates. This represents serious competition for the regular shipping lines, which are compelled to establish competitive freight rates for such cargo and try to compensate for this loss of income by raising the freight rates for other commodities.

This heavy concentration of export trade in a small number of commodities may also be analysed on the basis of the number of commodities covered by the study which are carried between the various countries. In the sample considered, a detailed analysis was made of 193 combinations of pairs of countries, which are defined as routes and comprise the intra-regional and extra-regional trade flows described earlier in this study. The following breakdown indicates the number of commodities included in the study which are carried on these routes.

10/ Practically no studies exist on the trends followed by the general level of freight rates in relation to Latin American trade in recent years, owing partly to methodological difficulties. The only research on the subject was conducted more than ten years ago by the Organization of American States (Economic Conference of the Organization of American States, "Report of the Ad Hoc Committee to Study the System of Establishing Freight and Insurance Rates in Inter-American Trade", document 9, July 1957). The conclusion drawn from this research was that freight rates changed slowly and remained stable for long periods. However, as unweighted averages were used for these freight rates, which means that the importance of each individual commodity was not taken into account, nor that of the freight rates applicable to it in Latin America's trade, it is impossible to know whether such stability applied to all commodities or only to a certain group.

/Number of

Number of commodities transported	Number of routes
None	34
1 to 5	58
6 to 10	35
11 to 15	20
16 to 20	11
More than 20	35
Total	193

This breakdown shows that on approximately 18 per cent of the routes considered none of the commodities included in the sample were transported. Most of these routes either originate or have their destination in the Central American countries. Fewer than 6 commodities were carried on 30 per cent of the routes, and fewer than 11 on 18 per cent, which confirms the above contention that shipping services depend to a great extent on the demand for a relatively small number of commodities, some of which are of exceptional importance. More than 15 of the commodities included in the study were transported on 24 per cent of the routes.

2. Structure of shipping services

As indicated earlier, there are different kinds of shipping services, but this study is concerned only with liner operation. There is no precise definition of liner services, however. Normally, it is assumed to include all services operating over a long period and at regular intervals on a fixed pre-determined route, with pre-established sailing and arrival dates. Such a definition leaves room for many possibilities; for example, frequencies may vary widely, and a shipping company with three or four sailings a year on a given route may be considered to be included. For this study, such a broad definition was not considered appropriate; liner services were assumed to be such only if they were prepared to carry any kind of general cargo with a frequency of at least one sailing a month on the route they were presumed to serve.

/According to

According to this definition, there would be 118 regular shipping lines serving Latin America, as described in annex 4.[11/] They vary widely in importance. Some of them serve practically the whole region, such as the Grace Line, Hamburg-Amerika Linie, Moore-McCormack Lines, Westfal-Larsen Line, "K" Line, ELMA, etc., and have weekly or fortnightly services. There is no information as to the proportion of general cargo carried by these big companies, but from the indirect data available on sailing frequency and size of vessels, and on the traffic they cover, it seems to be fairly considerable. At the other end of the scale, there are some small shipping lines serving a single route, with a frequency of one vessel a month, such as the Fabre Line, which operates exclusively between Mexico and the Mediterranean; the Birka Line, between Brazil and northern Europe; Djakarta Lloyd, between Mexico and Japan, etc. Some of these may be important international shipping companies, but their liner services in the region are limited.

Of these 118 shipping lines, only 17, or 14.4 per cent, are regional companies. This proportion may seem very low, considering the large number of Latin American shipping companies, particularly Argentine and Brazilian. However, since most of them fail to comply with this somewhat strict definition of liner services, they had to be excluded. A great many Argentine and Brazilian shipping companies are engaged in the transportation of Argentine wheat in bulk to Brazil, according to the requirements of the Banco do Brasil, the only wheat importer in that country. This means that different loading and discharging ports in Argentina and Brazil may be involved for each shipment. Moreover, the majority of these vessels return to Argentina with cargoes of timber or bananas, and relatively few of them specialize in general cargo. The proportion of regular shipping lines belonging to Latin American countries may, however, lead to somewhat underestimating their importance in the over-all provision of services; although some foreign lines provide considerable services, many of them do so on a smaller scale than the regional lines.

11/ In addition to these 118 shipping lines, the freight conferences and agreements relating to the region indicate the existence of a further 12 lines, whose frequency and schedules were unobtainable and which are also mentioned in annex 4.

/The geographical

The geographical distribution of services is a difficult task because of the widely differing criteria on which it may be based. Possibly the best criterion is the density of these services, measured by the number of lines serving each area and their operational frequency. However, the number of lines serving the various regions may be a first indicator of that distribution, assuming the same frequency for the services provided in the different areas. In table 6, the services are grouped according to the route they serve, with ten major routes considered for the purpose. The unit taken was not the shipping company itself, but the services it provided, so that if one company appears as operating on more than one of the major routes considered, it is counted as many times as the number of different routes it served.

The results show that the heaviest concentration of services is in the Caribbean area, Central America and Mexico, where services to the United States and Europe represent 29.1 and 20.6 per cent of the total, respectively. Moreover, as 4 per cent of the total is between this same area and Japan, practically 54 per cent of the total services are concentrated here. There are several explanations for this. First, in classifying the routes it was considered that if a shipping line operates, for example, between the Pacific coast of South America and Europe, its route must pass through the Caribbean; hence it must be counted as an additional service from the Caribbean to Europe, provided it calls at ports in this area. The second and most important reason is the large volume of trade carried from the Caribbean and Central American countries and Mexico to the United States and Europe. There is considerable traffic, for example, between Venezuela and the United States, as is partially evident from annex 1.

Other important services include 30 regular shipping lines, or 17.1 per cent of the total, operating between the Atlantic coast of South America and Europe. Of lesser importance are the services between both coasts of Latin America and Japan: 3 services in each case, provided by the same shipping companies.

/Table 6

Table 6

DISTRIBUTION OF REGULAR SHIPPING SERVICES, BY THE REGIONS THEY SERVE, 1966 a/

Geographical region	Number of services	Percentage of total
1. Latin America only	3	1.7
2. Between the Atlantic coast of South America and the United States and Canada	15	8.6
3. Between the Atlantic coast of South America and Europe	30	17.1
4. Between the Atlantic coast of South America and Japan	3	1.7
5. Between the Pacific coast of South America and the United States and Canada	12	6.9
6. Between the Pacific coast of South America and Europe	15	8.6
7. Between the Pacific coast of South America and Japan	3	1.7
8. Between the Caribbean b/ and the United States and Canada	51	29.1
9. Between the Caribbean and Europe	36	20.6
10. Between the Caribbean and Japan	7	4.0
Total	175	100.0

Source: Itineraries of shipping companies.

a/ Including 118 regular shipping lines. The unit in this classification is not the company itself but the services it provides; hence one shipping company may be counted more than once.

b/ Including Venezuela, the Atlantic coast of Colombia, Central America, and Mexico.

/Lastly, it

Lastly, it is interesting to note that only one enterprise, the Compañía Chilena de Navegación Interoceánica, operates a regular service exclusively within the region. This is highly significant and, although there is no clear-cut explanation, some possible reasons are suggested. First, during the last century and at the beginning of the present one, shipping services were provided almost entirely by extra-regional shipping companies, which have gradually adapted them in line with the changes in trade flows. These extra-regional companies operated basically as a link between the region and other parts of the world. Secondly, intra-regional trade was unimportant compared with extra-regional trade; therefore, it could easily be carried by the ships in extra-regional traffic, making use of space available on board between geographical areas in Latin America. There was no inducement to establish regular services on a purely regional basis; consequently, Latin American companies also began to provide services on the same extra-regional routes as the foreign companies, where most cargo was offered. This situation has changed somewhat in the last few years, and the existing companies have responded by increasing their frequency or their services within the region, but no new shipping companies have been established to operate regular lines exclusively in the region.

The structure of maritime transport services may be seen more clearly from an analysis of the number of shipping lines serving different geographical areas and operating between pairs of countries. As regards the first point, table 7, based on data contained in annex 4, presents the number of shipping lines serving certain geographical sections of key importance for regional trade. The most important section is between Argentina and Brazil, served by 37 regular shipping lines. Other important sections include those between Panama and the United States, with 26 regular shipping lines; between Peru and Chile, with 21; and between Ecuador and Peru, with 19.

/Table 7

Table 7

NUMBER OF REGULAR SHIPPING LINES SERVING THE GEOGRAPHICAL SECTIONS OF KEY IMPORTANCE IN THE REGION'S FOREIGN TRADE

Geographical section	Number of regular shipping lines
1. Argentina-Brazil	37
2. Brazil-Venezuela	1
3. Venezuela-Colombia (Atlantic)	12
4. Colombia (Atlantic)-Panama	9
5. Panama-Colombia (Pacific)	12
6. Colombia (Pacific)-Ecuador	17
7. Ecuador-Peru	19
8. Peru-Chile	21
9. Chile-Argentina	4
10. Brazil-United Kingdom and northern Europe	20
11. Brazil-Mediterranean	11
12. Brazil-Japan	2
13. Brazil-United States and Canada (Atlantic)	15
14. Venezuela-United Kingdom and northern Europe	9
15. Venezuela-United States and Canada (Atlantic)	18
16. Panama-United Kingdom and northern Europe	15
17. Panama-Mediterranean	5
18. Panama-United States and Canada (Atlantic)	26
19. Panama-Japan	5
20. Mexico (Atlantic)-United Kingdom and northern Europe	10
21. Mexico (Pacific)-Japan	4

Source: Annex 4.

Note: The number of shipping lines indicated for each geographical section serve the two countries concerned in the direction shown here. For example, the 37 lines on the Argentina-Brazil route need not be equal to the number of lines operating from Brazil to Argentina.

/As regards

As regards the second point, the following classification of 352 pairs of countries,[12/] showing the number of regular shipping lines operating between them, will be taken as an indicator.

Number of shipping lines	Number of pairs of countries (routes)	Percentages
None	45	12.8
1 to 5	184	52.3
6 to 10	57	16.2
11 to 15	28	8.0
16 to 20	24	6.8
21 to 25	4	1.1
26 to 30	6	1.7
More than 30	4	1.1
Total	352	100.0

The first point that stands out in this classification is the lack of direct liner services on a fairly large number of routes representing 12.8 per cent of the total. If these routes are analysed in detail, it will be seen that they are mainly links between several South American and Central American countries. This explains why, as noted in the previous section on the movement of cargo, in several of these cases no cargo at all was transported.

A large proportion of these routes (52.3 per cent) are served by a fairly small number of regular shipping lines (1 to 5). The above explanation also applies here, that is, the small volume of trade between certain countries makes it uneconomical to operate a larger number of regular services. Between many pairs of countries, however, the number of lines

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12/ These 352 pairs of countries have been arrived at by considering independently the trade flows in both directions. For example, the traffic from Chile to Peru has been considered independently of that from Peru to Chile. The pairs of countries concerned are based on the trade between the ten Latin American countries covered by the study and the rest of Latin America, the United States and Canada, Europe, and Japan.

/ranges from

ranges from 6 to 15, which indicates the existence of heavier traffic. Lastly, only 2.8 per cent of the total number of routes are served by more than 25 shipping lines.

As will be seen later, the above classification is useful in evaluating the level of the freight rates on many routes, since in many cases a fairly clear relationship was found between the number of shipping lines serving the trade conducted between two countries, and the level of freight rates applicable to those routes.

Another question that should be studied is the relationship between the tonnage carried on a particular route and the number of shipping lines serving it, which is an essential factor in duly interpreting the significance of the present structure of shipping services.

No exhaustive examination has been made of the actual quality of these services, since this question is outside the scope of the present study. Nevertheless, data are available on the age of the vessels owned by 90 of the 118 companies operating in the region. Of this sample comprising 870 vessels, 499 - or 57.4 per cent - were over ten years old in 1967. For the 9 Latin American companies included in the sample, the corresponding proportion is 61.5 per cent, or slightly more than the average. In absolute terms, those 9 companies owned 109 vessels, which represented 12.5 per cent of the sample.

Chapter III

THE CONFERENCE SYSTEM

This chapter presents a brief review of the structure of the special agreements among the shipping companies serving Latin American foreign trade, of which the most important are undoubtedly the freight conferences. There is a wealth of literature on this subject, and it is not the purpose of the present study to consider their general aspects, but rather to describe the features of the conferences as they apply to Latin American trade.

The freight conferences are formed by shipping companies serving particular routes, which have entered into formal agreements, with the purpose of establishing a common policy on freight rates. Their tariffs are applied by all conference members without distinction, and are designed to prevent price competition. This, in the past, led to "freight wars", which resulted in unstable freight rates and services and bankrupted shipping companies.

The conferences, however, are much more than simple rate agreements. Depending on their particular form of operation, they usually also regulate the quantity and quality of services. Companies participating in a conference may, for example, work out a sailing schedule in which they each have a share of traffic, and lay down the requirements for acceptable ships on certain routes and for their equipment. They may even lay down conditions governing the way in which clients should be treated, the ancillary services that shipping companies are allowed and not allowed to provide, etc. In some cases, the companies forming a conference act as an association with pooling agreements which provide for the apportionment of the income they receive.

Most of the freight conferences have a formal structure regulated by internal rules of procedure and administrative machinery which ensures compliance with the rules and conducts day-to-day business. They usually have an executive secretary who is responsible for running the conference. In order to facilitate operations, the larger conferences have, apart

/from their

from their headquarters, local committees in the countries served by participating lines, to which they delegate part of the administrative responsibility.

In addition to the freight conferences proper, there are also agreements among shipping companies to apply specific tariffs on certain routes. These, unlike the conferences, do not have formal institutional machinery. Moreover, some individual companies draw up and apply their own tariffs on routes on which competition is not a serious factor. Hence, freight rates may be fixed by conferences, agreements or individual companies.

The role of the conferences is more complex. Many of them operate on several routes at the same time or divide their sphere of influence among different routes, for which they agree upon rates and conditions of carriage and association that may differ. In Latin America there are several such "superconferences", such as the European/South Pacific and Magellan Conference, the Association of West India Transatlantic Steam Ship Lines, the Association of West Coast Steamship Companies, etc. Consequently, the unit discussed in most of the sections in this chapter will be the freight tariff and not the conference or agreement, although where a single tariff is issued, the two will, of course, coincide.

The research undertaken revealed that 48 freight conferences, 15 agreements among shipping companies and 18 individual tariffs are involved in the foreign trade of Latin America. Of these, 12 conferences, 8 agreements and 16 tariffs cover intra-regional trade; 16 conferences, 4 agreements and one tariff, trade between Latin America and Europe; 19 conferences and one agreement, trade between Latin America and the United States and Canada; 3 conferences and one agreement, trade between Latin America and Japan; and one conference, one agreement and one tariff, trade with other regions (see table 8).

As noted, many freight conferences issue different tariffs for different routes. This means that the conferences, agreements and tariffs combined use a total of 121 freight tariffs. Of this total, 47 apply to intra-regional trade, 31 to trade with Europe, 32 to trade with the United States and Canada, 4 to trade with Japan and 7 to trade with other regions.

/Table 8

Table 8

NUMBER OF FREIGHT CONFERENCES, AGREEMENTS AND TARIFFS APPLICABLE TO SEABORNE FOREIGN TRADE, 1966 a/

Trade covered	Conferences	Agreements	Tariffs
Intra-regional	12	8	16
With Europe	16	4	1
With the United States and Canada	19	1	
With Japan	3	1	
With other regions	1	1	1
Total	51	15	18

Source: Annex 5.

a/ Three conferences appear twice in the table.

For the purposes of this study, complete data was obtained on 41 freight conferences, 11 agreements and 13 individual tariffs covering the major part of Latin America's foreign trade, especially its exports. Annex 5 gives a detailed account of each of these conferences, agreements and tariffs and their main features. It also lists those for which no information was obtained. Most of the latter, as will be seen, cover marginal trade routes which the present study does not intend to examine in detail. Where the tariff itself was not available, specific freight rates for certain commodities on these routes were obtained individually.

The material studied covers a total of 98 freight tariffs and is the basis for the following analysis of the features of the freight tariffs used in Latin America's foreign trade, and of the individual freight rates. Of this total, 41 tariffs apply to intra-regional trade, 25 to trade with Europe, 28 to trade with the United States and Canada and 4 to trade with Japan (see table 9).

/Table 9

Table 9

FREIGHT TARIFFS APPLICABLE TO SEABORNE FOREIGN TRADE, BY PLACE OF ISSUE, 1966

Trade covered	Issued in the region	Issued in the region on extra-regional authority	Issued outside the region	No information	Total
Intra-regional	23	8	10		41
With Europe	2	2	20	1	25
With the United States and Canada	6		22		28
With Japan		1	3		4
Total	31	11	55	1	98

Source: Annex 5.

Even a very general look at the features of these tariffs shed light on several hypotheses regarding the method of operation of the various agreements, one of which is that most of them are controlled from outside the region. Table 9 examines the 98 tariffs by place of issue, with the idea that the place of issue represents the centre of power with respect to operations under the agreements. The tariffs were divided into three groups: those issued within the region, those issued outside it, and those issued within the region even though the headquarters of the conference or agreement is situated outside it.

Different results were obtained for intra-regional and extra-regional tariffs. For intra-regional trade, 23 of the 41 tariffs, or 56.1 per cent, were issued within the region. There were a further 8 for which the issuing authority was situated outside the region. It is interesting to note, however, that decisions are taken outside the region with respect to 10 freight tariffs relating exclusively to intra-regional trade. As will be seen below, the explanation for this is that the shipping companies making up these freight agreements are for the most part extra-regional,

/since the

since the tariffs established under agreements in which regional shipping lines are in the majority are generally issued within the region.

The situation is more extreme with respect to tariffs applicable to trade with Europe. A total of 20 of the 25 tariffs are issued and controlled from outside the region. A similar situation exists in trade with the United States and Canada, for 22 out of the 28 tariffs, and in trade with Japan, for 3 out of the 4 tariffs.

These figures, which clearly point to extra-regional control of the maritime transport services between the region and the major industrialized countries, are not, however, a sufficient basis for this conclusion. The fact that the headquarters of a conference and the place of issue of a tariff are in a country that is a traditional sea power does not mean that Latin American shippers or regional shipping companies have no influence in establishing the rates. In order to justify this conclusion it is necessary to know more about the way in which the various agreements work and their internal power structures.

Nevertheless, a further indicator would seem to support the argument of extra-regional control of maritime transport services, namely the number of regional lines participating in each conference or agreement or issuing individual tariffs. Table 10 shows their distribution, broken down not by specific freight tariffs but by conferences, agreements and individual tariffs, which in this instance are the logical units to consider.

The first point is that regional lines have a significant majority only in some agreements relating to intra-regional trade, and in a relatively small number of agreements and conferences mainly applying to the Atlantic Coast of South America. It is striking, however, that even among the arrangements covering intra-regional trade there are a conference, an agreement and five tariffs in which Latin American lines have no participation at all. In fact, it has a minority share in half the arrangements.

/Table 10

Table 10

PARTICIPATION OF REGIONAL LINES IN CONFERENCES, AGREEMENTS AND TARIFFS APPLICABLE TO SEABORNE FOREIGN TRADE, 1966

(Percentage of regional lines)

Trade covered	Type of arrangement	0	1 to 10	11 to 20	21 to 30	31 to 40	41 to 50	51 to 60	61 to 99	100	No information	Total
Intra-regional	Conferences	1		3		2	1			4		11
	Agreements	1		1			1			4		7
	Tariffs	5								7		12
With Europe	Conferences	1		6	1	2					2	12
	Agreements										3	3
With the United States and Canada	Conferences	2	1	4	5	3	2	1				18
With Japan	Conferences	1			2							3
	Agreements	1										1
	Total	12	1	14	8	7	4	1	-	15	5	67

Source: Annex 5.

/The situation

The situation with regard to conferences and agreements relating to trade with other regions is worse. In trade with Europe there is no conference or agreement in which the share of regional lines approaches 50 per cent; in trade with the United States and Canada, it does with one conference, and in trade with Japan all the conferences and agreements are dominated by extra-regional lines.

This indicator is also not enough in itself to define precisely the influence of regional circles on such arrangements. If it is taken together with the preceding indicator - the place of issue of the tariffs - it is unlikely, irrespective of the power structure within the conferences or agreements, that the regional position will prevail in the decisions taken.1/

With respect to the actual structure of the conferences, agreements and tariffs, table 11 shows the number of lines participating in each type of arrangement. The conclusions that can be drawn from the table, to some extent, bear out the definition of conference, agreement or individual tariffs used in this study. Generally a single company applies individual tariffs; only in one case are two companies involved. The number of companies participating in the agreements is relatively limited, between two and four, except for one agreement covering trade between Brazil and Argentina. The number of participants in the conferences is larger and more varied. At least three conferences have more than twenty-one members. Two cover intra-regional trade and one trade with Europe. Most of them, however, have a membership varying between six and thirteen. Some, especially those covering intra-regional trade and trade with Japan, have very few members, either three or four.

1/ At this stage, it may be appropriate to clear up a point relating to the oft-repeated assumption that the interests of the Latin American countries as a whole are in line with those of the regional shipping companies, and that such companies defend the interests of Latin America within the conferences. It may be assumed that private shipping companies will protect, in the first instance, their own interests and will protect regional interests only when they coincide with their own. It is only from state-owned or state-controlled companies that it is reasonable to expect specific action in a conference to protect the general interests of a country and even then only when they have received precise instructions from their governments to do so.

/Table 11

Table 11

NUMBER OF SHIPPING COMPANIES PARTICIPATING IN CONFERENCES, AGREEMENTS AND TARIFFS APPLICABLE TO SEABORNE FOREIGN TRADE, 1966

(Number of companies)

Trade covered	Type of arrangement	1	2	3	4	5	6	7	8	9	10	11	12	13	19	21	Over 21	No information	Total
Intra-regional	Conferences			1	2		1	1		1	1		1	1			2		11
	Agreements		4	1	1												1		7
	Tariffs	11	1																12
With Europe	Conferences				1	1	1			1	2	1	1		1		1	2	12
	Agreements																	3	3
With the United States and Canada	Conferences						7	1	1	3			1	4		1			18
With Japan	Conferences				2						1								3
	Agreements			1															1
	Total	11	5	3	6	1	9	2	1	5	4	1	3	5	1	1	4	5	67

Source: Annex 5.

/In order

In order to assess the significance of the number of companies in each conference, more detailed information is needed on the internal structure of each conference. It may be assumed, however, that where the number of member companies is greater than six, the stimulus to compete among themselves by providing better services will be greater than in the few cases where the number of participants is smaller. This point will be dealt with in more detail in the next chapter.

The purpose of the present study is not to make a detailed analysis of the structure of the agreements between the shipping companies, but of the structure of their freight tariffs,[2/] which in some respects are very dissimilar. The preceding section was designed to cover this point in a very general way. The basis for this analysis is the 98 tariffs referred to above.

In order to classify these tariffs several indicators may be used:

(a) The coverage of the tariff. This means the number of commodities carried on a given route for which there are specific freight rates, and those that must be carried at the rate for cargo not otherwise specified (n.o.s.). The latter is usually higher than most of the specific rates.[3/] Ideally, these proportions should be calculated from the total number of commodities carried on a given route. The present study, however, used only the 133 commodities forming the sample and for 33 of the routes considered. These are discussed in detail in the next chapter (see pages 88-89).

2/ It should be noted that tariff has been defined as the document containing all the freight rates for specific commodities and the conditions of carriage of the companies participating in the arrangement concerned.

3/ This point is discussed in more detail in other sections of this chapter, and in chapter IV, pages 112-115.

The results were as follows:

Proportion of commodities carried at the rate for cargo n.o.s. (Percentage)	Number of routes (Trade between two countries)
0	6
0.1 to 10	13
10.1 to 20	8
20.1 to 50	2
50.1 to 75	3
75.1 to 100	1
Total routes	33

In order to interpret these figures, it should be recalled that the sample used in this study includes the most important commodities of current trade as well as those which, while currently of little importance, may become important in the future. With this criterion in mind, the fact that in 19 of the 33 routes less than 10 per cent of the commodities had to be carried as cargo n.o.s., indicates that a considerable number of the tariffs is adequately detailed. Only in six cases is the proportion of commodities carried as cargo n.o.s. higher than 20 per cent.

(b) Another indicator of the characteristics of freight tariffs is the monetary unit and system of weight and measurement used. Table 12 shows the 98 tariffs by the different systems used.

It will be noted that there are eleven different combinations. With respect to monetary units, 85 per cent of the tariffs stipulate dollar rates and virtually all the rest use shillings (£ sterling). Only three tariffs in internal use between countries of the River Plate Basin, have rates expressed in local currency.

/Table 12

Table 12

MONETARY UNITS AND SYSTEMS OF WEIGHT AND MEASUREMENT USED IN FREIGHT TARIFFS APPLICABLE TO SEABORNE FOREIGN TRADE, 1966

	Intra-regional trade	Trade with Europe	Trade with the United States and Canada	Trade with Japan	Total
1. Dollars per 1 000 kg or cubic metre	20	16	3		39
2. Shillings per 1 000 kg or cubic metre		1			1
3. Dollars per 1 000 kg or 40 cubic feet	11	7	2		20
4. Shillings per 1 000 kg or 40 cubic feet		6			6
5. Dollars per 2 240 lbs or 40 cubic feet			4	2	6
6. Shillings per 2 240 lbs or 40 cubic feet		7			7
7. Dollars per 2 000 lbs or 40 cubic feet	8		18	2	28
8. Dollars per 100 lbs or cubic foot			1		1
9. Argentine and Uruguayan pesos per 1 000 kg or cubic metre	1				1
10. Guaranies per 1 000 kg or cubic metre	1				1
11. Guaranies and dollars per 1 000 kg or cubic metre	1				1
Total	42	37	28	4	111

Source: Annex 5.

Note: 13 tariffs are expressed in two currencies.

/What is

What is striking, however, is the great variety of units and combinations of weights and measurements used in the different tariffs. Rates are expressed per 1,000 kilogrammes or cubic metre, per 1,000 kilogrammes or 40 cubic feet, per long ton (2,240 pounds) or 40 cubic feet, per short ton (2,000 pounds) or 40 cubic feet, etc. It is impossible to determine a priori how useful it would be to devise a common system for use in all tariffs. This would basically depend on the system of weights and measurements used in marketing the goods normally carried on a given route. Nevertheless, this would still only justify using two systems throughout the world: one related to the metric system, and the other to the system of weights and measures still used in the United States and certain European countries. Rates expressed in different numbers of pounds, for example, only complicate matters, and in any case there seems to be no justification at all for combining the two systems, as happens with some rates which are actually expressed per 1,000 kilogrammes or 40 cubic feet.

Metric weights and measurements, however, are in the majority, especially in tariffs for intra-regional trade and trade with some parts of Europe. Tariffs for trade with the United States and Canada are normally expressed in pounds and cubic feet. This is reasonable in view of the systems used in those countries, although some tariffs are based on the metric system while others combine the two.

It is quite certain that a detailed study of this point would help a great deal to simplify the systems used, something which would benefit shippers as well as shipping companies and agencies.

(c) Freight rates are generally established for specific commodities or for groups of commodities (classes) or for both concurrently.[4/] Table 13 indicates this with respect to the tariffs studied. Of the 98 tariffs, 77 give rates for individual commodities, while 15 have a mixed system of commodity and class rates. Only four tariffs are exclusively based on classes, and these all apply to trade with Europe.

4/ A rate system based on classes, groups the commodities in classes. Hence rate differences are established for each class or group of commodities instead of for individual commodities.

/Table 13

Table 13

CLASSIFICATION OF FREIGHT RATES IN SEABORNE FOREIGN TRADE, 1966

Trade covered	Tariff by commodity	Tariff by class	Mixed tariffs by commodity and by class a/	No information	Total
Intra-regional	39		2		41
With Europe	16	4	4	1	25
With the United States and Canada	18		9	1	28
With Japan	4				4
Total	77	4	15	2	98

Source: Annex 5.

a/ The mixed tariffs by commodity and class are applied as follows: specific rates are fixed for most traditional commodities, while other commodities are assigned to a varying number of classes; specific rates prevail even if a commodity is also listed under a particular class.

The tendency to fix rates by commodity instead of by class can be interpreted as a method of establishing different rates for a larger number of commodities by taking various factors into account, especially the intrinsic value of the commodity concerned (see chapter IV). Rates by class must necessarily be more all-embracing than individual commodity rates, thus reducing, to a certain extent, the possibilities of more flexible rate policies.

The current trend towards unitizing cargo by means of containers and other systems, will certainly lead to changes in policy and in any case will bring tariffs closer to the system of classes.

(d) Rates for individual commodities are usually expressed by weight or by measurement, or sometimes the shipping company can choose between the two. This is due to the great variety of commodities carried. Some are small but heavy while others are large but light, and shipping companies

are, of course, interested in using the capacity of their ships to the maximum possible extent, i.e. "full and down". In some special cases, with the ad valorem rates, all or part of the freight charge is proportional to the value of the goods, normally between 1 and 3 per cent.

In this connexion, it may be assumed that on given routes the rate for a particular commodity should be established on the basis of either weight or measurement, or giving the shipping company the option in some cases to choose between the two, but not that different systems should be used on different routes.

In order to consider this point, which is particularly important in assessing the rationality and uniformity of the rate structure of regional foreign trade, a list was made of the ways in which rates are established for all the commodities considered in the study on the different routes over which they are carried. They were broken down into rates by weight, by measurement, by weight or measurement, and open rates. The list also shows the number of routes on which commodities are carried at the rate for cargo n.o.s. The results of this exercise are given in annex 2, and are summarised in table 14.

The first conclusion that emerges from a detailed analysis of this table is that treatment for all commodities is not as uniform as is generally supposed. Of the 125 commodities considered, the rates for only 16 were on the same basis on all the routes on which they were carried. To this should be added a further 23 commodities for which rates were established uniformly on all routes (W/M), although some commodities were carried as cargo n.o.s. - quite justifiably since the quantities involved were very small. This means that rates for a total of 39 commodities, or 31.2 per cent, can be considered to be uniform in treatment. The rates for all the remainder are expressed differently, depending on the route, and cover practically all the possible combinations of weight, measurement, weight or measurement, etc. Some of these combinations relate to a single commodity, but two of them - one in which rates are expressed in terms of weight, weight or measurement, and cargo n.o.s., and the other in which rates are expressed in terms of weight, measurement, weight or measurement, and cargo n.o.s. - relate to a larger number of commodities than the other combinations, and chiefly to those listed as simple manufactures.

/Table 14

Table 14

FREIGHT RATES APPLICABLE TO FOREIGN TRADE BROKEN DOWN BY WEIGHT, MEASUREMENT, WEIGHT OR MEASUREMENT, CARGO N.O.S., OR OPEN RATES a/

Groups of commodities	Raw materials		Semi-manufactures		Simple manufactures		Highly processed manufactures		Total	
	Notes	Percentage	Notes	Percentage	Notes	Percentage	Notes	Percentage	Notes	Percentage
Rate by weight (W)										
Intra-regional	108	63.9	198	73.6	308	47.0	45	10.4	659	43.2
Extra-regional	140	74.9	213	82.9	209	58.4	15	8.7	577	59.2
Total	248	69.7	411	78.1	517	51.0	60	9.9	1 236	49.4
Rate by measurement (M)										
Intra-regional	4	2.4	19	7.1	26	4.0	41	9.5	90	5.9
Extra-regional	10	5.3	19	7.4	29	8.1	11	6.4	69	7.1
Total	14	3.9	38	7.2	55	5.4	52	8.6	159	6.4
Rate by weight or measurement (W/M)										
Intra-regional	10	5.9	6	2.2	95	14.5	158	36.6	269	17.6
Extra-regional	7	3.7	6	2.3	49	13.7	58	33.5	120	12.3
Total	17	4.8	12	2.3	144	14.2	216	35.7	389	15.6
Rate for cargo n.o.s.										
Intra-regional	21	12.4	45	16.7	226	34.5	188	43.5	480	31.5
Extra-regional	8	4.3	12	4.7	63	17.6	89	51.4	172	17.6
Total	29	8.1	57	10.9	289	28.5	277	45.8	652	26.1
Open rate										
Intra-regional	26	15.4	1	0.4	0	0.0	0	0.0	27	1.8
Extra-regional	22	11.8	7	2.7	8	2.2	0	0.0	37	3.8
Total	48	13.5	8	1.5	8	0.9	0	0.0	64	2.5
Aggregate totals										
Intra-regional	169	100.0	269	100.0	655	100.0	432	100.0	1 525	100.0
Extra-regional	187	100.0	257	100.0	358	100.0	173	100.0	975	100.0
Total	356	100.0	526	100.0	1 013	100.0	605	100.0	2 500	100.0

Source: Annex 1.

a/ Each note corresponds to the rate for one commodity on one route. A total of 125 commodities were considered (26 raw materials, 25 semi-manufactures, 50 simple manufactures and 24 highly processed manufactures) and rates were recorded for such commodities on the routes on which they were actually carried, giving a total of 2 500 combinations.

/The aggregate

The aggregate figures shown in table 14 also yield some interesting conclusions. The table contains data on the 125 commodities mentioned on all the routes on which they were carried, i.e., for a total of 2,500 combinations. Of this total, 49.4 per cent of rates were charged by weight, 6.4 per cent by measurement, 15.6 per cent by weight or measurement, 26.1 per cent for cargo n.o.s. and 2.5 per cent were open rates. These figures, however, mark appreciable disparities for different types of commodities. A closer inspection shows that the proportion of rates by weight falls, relatively speaking, with increasing processing of the commodities: the highest percentage is for semi-manufactures and the lowest for highly processed manufactures. In rates by measurement there does not seem to be a clear relationship between the level of processing and the proportion of such rates in the total. This is of no great importance since comparatively few rates are expressed by measurement. In contrast, there is a very interesting relationship between rates expressed by weight or measurement and the proportion of the total trade to which the rate for cargo n.o.s. was applied. In both cases, the proportions rise as the level of processing of the commodities increases. The proportion of rates expressed by weight or measurement was 4.8 per cent for raw materials, rising to 35.7 per cent for highly processed manufactures; the corresponding figures for cargo n.o.s. were 8.1 and 45.8 per cent.

These results are significant. First of all, the relationship noted with respect to rates by weight or measurement is logical, judging by the nature of the commodities, since many manufactures are large in volume compared to their weight. This is not the case, however, with rates for cargo n.o.s. Although the relationship noted is in part a reflection of the fact that few manufactures are carried on most of the routes considered, it means that on many routes transport costs are higher than is reasonable for many of such manufactures, since it is found elsewhere in this study that rates for cargo n.o.s. are usually higher than the average rate on a given route.

Another significant feature is the difference between intra-regional and extra-regional seaborne trade. It was found that extra-regional trade has characteristics which give the impression that freight rates are

/comparatively more

comparatively more consolidated. This makes for greater simplicity in the rate structure, and means that a much lower proportion of commodities have to be carried at the rate for cargo n.o.s. The result of this - which is very important - is that in so far as the level and structure of rates are an appreciable impediment to increasing Latin American foreign trade, the impediment seems to be generally greater with respect to intra-regional than to extra-regional trade.

An exception to the above is the extremely high percentage (51.4) of rates for cargo n.o.s. in extra-regional trade in highly processed manufactures, which is higher than the corresponding percentage for intra-regional trade. Bearing in mind that the present study covers only Latin American exports, this means that transport conditions are unfavourable for exports of highly processed manufactures to countries outside the region. To some extent this may be due to the fact that so far extra-regional exports of such manufactures have been of little importance, while intra-regional trade in them has been comparatively large, which explains the small percentage in intra-regional trade. Nevertheless, in a detailed study of export possibilities for highly processed manufactures, this problem merits special analysis.

(e) The greatest degree of disparity between freight tariffs comes in the treatment of heavy lifts or extra lengths. Almost all tariffs define what is considered normal in terms of either weight or length and establish limits beyond which a surcharge is levied. In this respect, the situation may be considered quite frankly chaotic. All the various systems and surcharges warrant a detailed study of their own, since there are many possibilities of varying the freight by means of surcharges, especially in certain tariffs.

Tables 15 and 16 break down the 98 tariffs studied by the way in which they treat heavy lifts. Table 15 shows the maximum limits for "normal" weight above which there is a surcharge. Table 16 lists the various tariffs in terms of the amount of the surcharge for the first ton in excess. These two tables give a very incomplete idea of the complexity of the situation, since most tariffs contain lengthy tables setting out the way in which surcharges vary for increases in weight or measurement of cargo. Some of these tables are reproduced in annex 5.

/Table 15

Table 15

TREATMENT OF HEAVY LIFTS IN TARIFFS APPLICABLE TO SEABORNE FOREIGN TRADE. MAXIMUM WEIGHT PER INDIVIDUAL PACKAGE FOR WHICH NO SURCHARGE IS LEVIED, 1966

Trade covered	1 500 kg	2 000 kg	2 500 kg	3 000 kg	4 000 lbs	4 480 lbs	6 000 lbs	8 000 lbs	Not indicated	Total
Intra-regional	1	28	2	2	3				5	41
With Europe		14a/		8					3	25
With the United States and Canada		6		2	1	1	3	13	2	28
With Japan				3			1			4
Total	1	48	2	15	4	1	4	13	10	98

Source: Annex 5.

a/ Includes five tariffs in which the maximum is 2 032 kg.

/Table 16

Table 16

TREATMENT OF HEAVY LIFTS IN TARIFFS APPLICABLE TO SEABORNE FOREIGN TRADE. SURCHARGE PER INDIVIDUAL PACKAGE FOR THE FIRST TON EXCEEDING WHAT IS CONSIDERED NORMAL WEIGHT, 1966

(Dollars per freight ton)

Trade covered	0.90	1.25	1.50	1.75	2.00	2.10	2.24	2.25	2.40	2.50	2.65	2.80	3.00	3.15	3.20	3.30	3.50	3.60	3.80	4.40	6.00	7.00	7.50
Intra-regional	7	3			4		1		1				2	2		3	2			3		1	1
With Europe			2	3		4		5		1	1	1	2				1						
With the United States and Canada	2				5				2		3		2		2		3	1	3		3		
With Japan											1												
Total	2	3	2	3	9	4	1	5	3	1	5	1	6	2	2	3	6	1	3	3	3	1	1

/Table 16 (concluded)

Table 16 (concluded)

Trade covered	Dollars			10 shillings	25 shillings	12 per cent surcharge	15 per cent surcharge	25 per cent surcharge	36 dollars per package	Not indicated	Total
	8.00	8.25	8.80								
Intra-regional	1						1	1	1	7	41
With Europe				1	1					3	25
With the United States and Canada										2	28
With Japan		1	1			1					4
Total	1	1	1	1	1	1	1	1	1	12	98

Source: Annex 5.

Table 15 shows that there are eight different limits for what is considered "normal" weight in the 98 tariffs, ranging from 1,500 kilogrammes in a single tariff covering intra-regional trade to 8,000 pounds or 3,629 kilogrammes used in various tariffs applicable to trade with the United States. A considerable number of tariffs apply a limit of 2,000 kilogrammes, especially for intra-regional trade, and 8,000 pounds for trade with the United States. Tariffs for trade with Europe basically apply limits of 2,000 and 3,000 kilogrammes.

The greatest differences come, however, when analysing the heavy lift surcharges for the first ton above what is considered to be the limit of normal weight for a package or unit of cargo, for which there are thirty two different systems of basically two types. The most common is a surcharge expressed in dollars per ton, but there are three tariffs that apply percentage surcharges on the freight for each ton or fraction above the normal for each package. The variation in the surcharges is very great, ranging from 0.90 dollars in nine tariffs to 8.80 dollars in one tariff, with several surcharges above 6 dollars. Generally, the surcharge ranges between 2 and 4 dollars per ton (see table 16).

There are various explanations for some of these differences in surcharges. Possibly the most important is the difference in port facilities on the various routes which existed probably many years ago when the surcharges were first introduced. Other factors may also have been taken into account, for example the average size of the ships and the general capacity of their winches and booms. It is quite easy to visualise the problems of carrying a unit weighing twenty tons on a route on which neither the ship nor the port of discharge has the proper equipment to deal with it, and expensive floating cranes have to be rented. However, it is difficult to imagine that such problems are entirely responsible for the differences, or that they have even been considered, and there seem to be great possibilities for simplifying these systems of surcharges.5/

5/ This argument was borne out at a meeting held during the second half of 1967, when some European and Japanese conferences and European shippers' councils expressed special concern in the problem of standardising surcharges and the treatment of heavy lifts. It was agreed at the meeting that "as a general rule, and where practicable, shipping Conferences in ocean trades should apply heavy-lift charges only on individual packages of cargo exceeding five tons in weight". (Fairplay, N° 4,393, 2 November 1967).

/The situation

The situation with regard to extra lengths is similar. There are nine different maxima in the 98 tariffs, ranging from 6 metres in an intra-regional tariff to 40 feet, or 12.2 metres, in five tariffs (see table 17). In this connexion, it is interesting to note that 29 of the 98 tariffs make no provision for extra lengths. This is a much higher proportion than in the case of heavy lifts, for which only 10 tariffs made no provision.[6/] It may mean, either that practically no extra length cargo is carried on many routes, or that generally speaking the problem of extra lengths is not considered to be as important as that of heavy lifts. In any case, most of the tariffs not providing for extra length surcharges are intra-regional, and they account for 16 out of a total of 41 tariffs.

With respect to the length limits themselves, there seems to be a reasonable amount of uniformity in tariffs covering trade with the United States and Canada. Most of these have a limit of 35 feet (10.7 metres). Tariffs covering trade with Europe are not as uniform, the most common limits being 33 feet (10.1 metres) or 12 metres. The greatest variations are found in intra-regional tariffs and, while an appreciable number set 10 metres and 35 feet as limits, there are some which vary a great deal.

Table 18 shows the great variety of surcharges applied, a total of 24, ranging from 0.40 to 6.16 dollars per freight ton for the first unit of measurement in excess of the length limit.[7/] The reasons for these variations in surcharges are partly the same as in the case of heavy lifts, although again it is difficult to imagine that they are entirely responsible for the differences.

(f) It is well known that some shipping conferences grant rebates under certain circumstances. These may be deferred rebates, granted after a certain period of time if an exporter has proved his fidelity by shipping all his merchandise through a single company or by ships belonging to a given conference, or they may be the result of special contracts.

6/ Both these figures include tariffs for which such information was not obtained.

7/ In defining the first unit of measurement, one metre and 3 feet have been considered equivalent.

Table 17

TREATMENT OF EXTRA LENGTHS IN TARIFFS APPLICABLE TO SEABORNE FOREIGN TRADE. MAXIMUM LENGTH FOR WHICH NO SURCHARGE IS LEVIED, 1966

Trade covered	6 metres	10 metres	12 metres	20 feet	24 feet	30 feet	33 feet	35 feet	40 feet	Not indicated	Total
Intra-regional	1	10	1	2	2		1	7	1	16	41
With Europe			7				7	1	2	8	25
With the United States and Canada			3			3		15	2	5	28
With Japan	1							3			4
Total	2	10	11	2	2	3	8	26	5	29	98

Source: Annex 5.

/Table 18

Table 18

TREATMENT OF EXTRA LENGTHS IN TARIFFS APPLICABLE TO SEABORNE FOREIGN TRADE. SURCHARGE FOR THE FIRST UNIT OF MEASUREMENT (ONE METRE OR 3 FEET OR FRACTION THEREOF) EXCEEDING WHAT IS CONSIDERED NORMAL LENGTH, 1966

(Dollars per freight ton)

Trade covered	0.40	0.44	0.45	0.50	0.60	0.75	0.84	1.00	1.10	1.25	1.40	1.41	1.50	1.75	1.84	1.93	2.00	2.10	2.20	2.50	3.00	6.05	6.16	20 per cent surcharge	Not indicated
Intra-regional		1		3	2	2		2				1		4	2	3			2		2			1	16
With Europe				2			3	1			2	4	3				1	2							7
With the United States and Canada	1		2	3	1			3	1	2							5		2	1					7
With Japan									1													1	1	1	
Total	1	1	2	8	3	2	3	6	2	2	2	5	3	4	2	3	6	2	4	1	2	1	1	2	30

Source: Annex 5.

Table 19 shows the different types of rebate included in the 98 tariffs. It will be noted that none of the intra-regional tariffs have a rebate system. This may be in part due to the fact that many of them are private tariffs with a simple rate structure covering only certain commodities. In any case it would be worthwhile looking into the reasons in more detail.

The proportion of tariffs for extra-regional trade not formally offering any kind of rebate is very high, especially in trade with the United States. There the deferred rebate system is illegal, but contract or non-contract rates may be used either for all commodities, or for some of them. In contrast, rates for trade with Europe normally have a deferred rebate, usually amounting to 10 per cent. Only a few use the system of contract and non-contract rates.

The historical background of the rebate system is not known, and therefore it is difficult to interpret the results obtained with any great precision. The fact that there are no rebates in intra-regional trade may be taken as an indicator that there is a more powerful monopoly system on intra-regional routes than on extra-regional routes. The presence of "outsiders" - shipping companies operating on the same route, but not belonging to the respective conference - also plays a decisive role in the rebates granted. The bilateral agreements in existence between certain Latin American countries probably help to intensify the monopoly situation.

(g) The rates established for different commodities in the tariffs, refer to what they implicitly define as normal cargo. This is units of a pre-established maximum size or weight carried under specified conditions between ports specifically defined in each tariff. If cargo is carried on the route covered by a given tariff, from or to ports not specifically defined in the tariff, a surcharge is usually applied. These surcharges are based on the additional cost of calling at a port to load or discharge a quantity of cargo which in most cases is too small to justify the call; on the cost of trans-shipping cargo to another vessel; or on excessive port expenses, especially in small ports which do not have the necessary facilities. Moreover, in many cases, depending on the facilities of the port concerned, special surcharges are applied if it is considered that costs are excessive, or if loading or discharging is extremely slow. This point will be dealt with in full in chapter V.

/Table 19

Table 19

REBATES PROVIDED FOR IN TARIFFS APPLICABLE TO SEABORNE FOREIGN TRADE, 1966

Trade covered	Types of rebate				Total
	No rebate contemplated	10 per cent deferred rebate for some commodities	Contract and non-contract rates	Contract and non-contract rates for some commodities	
Intra-regional	41				41
With Europe	7	13	4	1	25
With the United States and Canada	13		14	1	28
With Japan	1	1	2		4
Total	62	14	20	2	98

Source: Annex 5.

/In view

In view of the above, it is reasonable to expect that in most cases tariffs will include some type of surcharge for a certain number of ports. If not, they will probably classify ports in order to vary freight rates according to the port of origin or destination. This is in fact the case, and of the 98 tariffs studied, 81 include surcharges of this type, while only 17 make no provision for them. The type of surcharge may vary, but it generally takes the form of a fixed amount per freight ton to be added to the basic rate.

(h) Lastly, it is interesting to observe how tariffs, at the end of 1966, reflected the trend to make more intensive use of new methods of unitising cargo, especially containers.

The situation in this respect was extremely confusing, and it is reasonable to say that shipowners had not yet given serious thought to a system which would provide appropriate treatment for containers. There were, however, some exceptions, particularly on the routes connecting the Caribbean with the United States (see table 20).

First of all, 59 of the 98 tariffs did not make any special provision for containers, and of these 38 covered intra-regional trade. Of the remaining tariffs which did make some provision for containers, 11 provided special rates only for returning empty containers, without mentioning unitised cargo as such. Adding these 11 to the 59 above, one finds that virtually 70 per cent of the tariffs made no provision for containerised cargo.

The remaining tariffs, for the most part covering trade with the United States, and to a lesser extent Europe, use many widely differing systems. The most common is, however, to charge the normal rate for the commodity carried, with a minimum occupancy factor. This is usually 85 per cent of the container capacity, which is the minimum charged for, even if not used. Other tariffs, stipulate the normal rate plus a surcharge. Two tariffs apply the total weight or measurement of the container to the highest rate chargeable for any commodity in the container, which means that the cost of carriage by container may be much more expensive than without it. Lastly, there is one extreme case of a tariff charging the rate for cargo n.o.s., which is usually one of the highest.

/Table 20

Table 20

TREATMENT OF CONTAINERISED CARGO IN TARIFFS APPLICABLE TO SEABORNE FOREIGN TRADE, 1966

Trade covered	Contains rates for returning empty containers	Applies highest rate chargeable for any goods in the container to total weight or measurement	Applies rate for cargo n.o.s.	Applies normal rate with surcharge	Various a/	Not indicated	No provision for containers	Total
Intra-regional	1		1			1	38	41
With Europe	5	2		6	3	2	7	25
With the United States and Canada	5				13		10	28
With Japan							4	4
Total	11	2	1	6	16	3	59	98

Source: Annex 5.

a/ Mainly apply the basic rate, but assume that container will be used at close to capacity. If not, charges for space not used.

/As can

As can be seen, none of these systems is an incentive to use these new methods of transport. With the exception of the systems charging the basic rate and requiring a minimum for occupancy of the container, all the other rates are higher than the basic one. This may have some justification since carrying containers on ships not properly equipped to handle them may lead to higher operating costs. If this is the case, it is one more point in favour of the argument that new methods of unitising cargo should be applied in a comprehensive manner, using specialised equipment and facilities at all stages. If this is not done, the total cost of transporting by container is usually higher than by using conventional methods.

Chapter IV

LEVEL AND STRUCTURE OF MARITIME FREIGHT RATES IN LATIN AMERICA'S FOREIGN TRADE AND FACTORS DETERMINING THEM

As pointed out in the introduction, one of the chief objectives of this study is to determine exactly what factors condition the structure and level of the freight rates applied to Latin America's foreign trade.

There are two main reasons for analysing these factors. One, to obtain a sound quantitative idea of this aspect of shipping so as to frame policies that will direct it towards a given end, and two, to draw up a theoretical framework for predicting as accurately as possible the variations that will take place in the level or structure of freight rates in response to changes in the factors that are presumed to govern them.

The scope of a study of this kind undoubtedly depends on its raison d'etre. If its purpose is to predict variations in the level or structure of specific freight rates, the statistical requirements will be greater than for the first objective, since the margin of error has to be kept as low as possible.

The object of this particular study, however, is to provide a sound basis for policy-making. So, while the statistical requirements may be less stringent in some respects, it is necessary in any case to establish just which factors determine the level and structure of freight rates, and their relative importance in general terms.

The methodology adopted for this study is to test a set of working hypotheses, which pretend to define certain aspects of the subject. This was done by applying a general model represented by a statistical function, which made it possible to quantify the relative influence of the factors which were thought to determine the level and structure of freight rates and which are examined in the working hypotheses.

Before these hypotheses can be formulated, it is necessary to understand the general working of the tariff system in maritime transport. Earlier studies on maritime freight rates have always devoted considerable

/time to

time to identifying the factors that condition their level and structure without attempting to quantify the influence exercised by each one. Surveys have been made, and long lists of factors which may be influential in certain circumstances have been drawn up on the basis of their findings. Although these factors may have had no direct effect on the level of freight rates, it was decided to consider them from a particular angle and to give them a specific weighting. It must be remembered that, in many cases, the initial steps for establishing a freight tariff may have been taken by the executives of the shipping companies who formed a conference or signed an agreement a long time ago when trade and transport conditions were different. The freight tariff or conditions of carriage for particular commodities were subsequently changed in some respects only, with the result that the set of rates eventually ceased to be a homogeneous unit governed by certain fixed principles. The problem of identifying the factors which have conditioned the establishment of a freight structure thus consists mainly in determining those which, in general, offer the best explanation for it.

There seems to be a consensus that the list prepared for the Inter-American Maritime Conference (1941) 1/ is the most exhaustive of all that have been drawn up so far, since it covers the factors mentioned in nearly all the other studies. There are twenty-seven of these factors:

1. Character of the cargo
2. Volume of cargo
3. Availability of cargo
4. Susceptibility to damage
5. Susceptibility to pilferage
6. Value of goods
7. Packing
8. Stowage
9. Relationship of weight to measure

1/ Inter-American Maritime Conference, Report of Delegates of the United States (Washington, Government Printing Office, 1941), pp. 25-28. Quoted in Robert T. Brown, Transport and the Economic Integration of South America (The Brookings Institution, 1966), p. 117.

10. Heavy lifts
11. Extra lengths
12. Competition with goods from other sources of supply
13. Cargo via competitive gateways
14. Competition from other carriers
15. Direct cost of operation
16. Distance
17. Cost of handling
18. Lighterage
19. Special deliveries or services
20. Fixed charges
21. Insurance
22. Port facilities
23. Port regulations
24. Port charges and dues
25. Canal tolls
26. Port location
27. Possibility of securing return cargoes.

Although this list seemingly covers all the factors of interest, it is inadequate as a basic working hypothesis for an empirical study of the subject, for at least three reasons. The first is that several factors reflect the same phenomenon so that in most cases it is sufficient to include only one of them in this study. The second is that the list includes factors relating to commodities whose carriage has characteristics that depart from the norm. Problems of stowage, the use of special piers and so forth, which would be inappropriate to include as general factors. Lastly, there are other factors which may be responsible for the present structure of freight rates in Latin America and ought to be included in the analysis.

This list of factors and the reasons for modifying it are considered in detail in annex 11. To illustrate the first reason, it should be pointed out that factors 4, 5, 7 and 21 (susceptibility to damage or pilferage, packing problems and insurance premiums) are closely related, although they vary from commodity to commodity, and concern the risks involved in carrying and

/handling the

handling the cargo. They could be represented by a single factor although the risks are twofold at least. Similarly, the factors of stowage (8) and cost of handling (17) both relate to the handling of different types of goods, while heavy lifts (10) and extra lengths (11) are subject to special surcharges in all freight tariffs and are not included in the basic rates. The last two should therefore be considered separately. The factors of port facilities (22), port regulations (23), port charges and dues (24) and port location (26) all refer to a common element, which is the level of costs incurred by a vessel in port.

The last reason for modifying the list is also worth mentioning. It is concerned with the need to group together some factors with a special bearing on the situation in Latin America. These include the rates fixed by certain conferences or agreements for purposes of promotion. There are several cases of shipping companies which have carried small quantities of commodities with a good export potential at fairly low rates over a certain period of time to help them gain a footing on the world market. Another factor, which may be of great importance and is not fully covered in the list, is connected with the over-all trade flows and the effect of imbalances in such flows on the structure of the freight tariff. The question of return cargoes is included in the list, but has not been broadened to cover the situation over a whole route, on which the use of transport capacity may vary from one section to another.

It would seem clear that the list cannot be taken as a basic working hypothesis for a survey of the factors that determine the level and structure of maritime freight rates. In order to have a list that included all the points of interest, it was necessary to make some additional preliminary investigations concerning the conduct of seaborne trade.

One aspect which complicates the question is the mixture of factors involved in the level and structure of freight rates. Clearly, they are often impossible to separate, as the same group of factors governs both level and structure. However, it is usually possible to find out which factors determine one and which the other. The list of 27 factors is a blend of both. The statistical basis available - freight rates per ton for a range of commodities and routes - is broad enough for the survey

/to be

to be divided into two parts, one devoted to the structure and the other to the level of freight rates. The analysis of the former is based on individual routes, and an attempt is made to determine the factors that underlie the differences in the rate per ton between the commodities carried on each route which are included in the sample. A comparison of routes and estimates of the relative importance of the different factors involved in all of them are also included in the study of the rate structure.

The analysis of the rate level will take a specific commodity as its starting-point, and try to identify the factors that would account for the variations in the rate per ton for the same commodity over different routes.

This simplifies matters considerably, since it enables the hypotheses to be treated in two groups. It is statistically more advantageous and enables a number of hypotheses to be examined concurrently in each case. Moreover, the differentiation between the factors connected with the rate level and those related with the structure is in itself useful in a number of respects. It also simplifies matters, since many problems relate to rate or structure only.

1. Structure of freight rates

As explained before, the term "rate structure" should be taken to mean the whole set of rates for a number of commodities, the unit of analysis being a specific route, defined as trade between two countries.[2/] Hence, a study of the rate structure combines the two main objectives set forth earlier. The first is to determine the factors that will account for the differences between the rates per ton for various commodities on the same route, and the second is to compare the relative importance of those factors over several routes.

The analysis of the structure of maritime freight rates in the foreign trade of Latin American countries was based on a test of various hypotheses, which are assumed to reflect the general opinions held about that structure. In order to make the basis of the investigation clear, the hypotheses will be stated below with a short explanation of each one.

2/ It will be remembered that the flow of trade between two countries in each direction has been considered as a route. Thus, Argentina to Brazil is not the same route as that from Brazil to Argentina.

1. "The freight rate per ton is equal to the average cost of carriage".

One possibility with regard to the rate structure is that the differences in the rates charged for the various commodities are insignificant, and that the rates can therefore be assumed to be basically related to the average cost of transport. Average cost is taken to mean the total cost of a ship's voyage, divided by the number of units of cargo carried, which can be expressed in tons.

The confirmation of this hypothesis would indicate that the rate structure is fairly simple and that the cost factors and the way in which carrying capacity is utilized play a particularly important part in it. The confirmation or rejection of this hypothesis also affords a useful yardstick for testing the following hypotheses, which are basically concerned with explaining the differences in rates without making any assumption as to their general level over a specific route, as in this case.

2. "On a specific route over which different commodities are carried, the freight rates for the commodities of greater intrinsic value will be higher than those for commodities of less value".

This hypothesis derives from the operating methods of maritime transport in which a single unit of production - the vessel - provides a number of services which actually differ among themselves, as does the carriage of different types of commodities. This implies the existence of common costs, which cannot be allotted to a particular cargo without a certain degree of arbitrariness.

It is clear from this that the only practical criterion for establishing a rate structure is to charge each commodity in accordance with "what the traffic will bear"; in other words, to charge a higher rate for commodities that can pay more and will continue using the ships (commodities for which demand is inelastic). As a rule the ability of a commodity to bear a higher rate is measured by its intrinsic value, since the higher this is, the higher will be the rate that can be charged, as the freight cost is usually a small proportion of the commodity's total value.

/3. "The

3. "The freight rate charged between two ports for a specific commodity will be higher the greater the proportion of the commodity at the port of destination that comes from a single source of supply".

This hypothesis presupposes that competition from different sources of supply can influence the level of freight rates for a commodity over a particular route. Let it be assumed, for instance, that there is only one real source of supply for a commodity in the world or in a particular region. In such a case the freight rate for carriage between that source of supply and any port of destination would tend to be higher than for commodities with various sources of supply, because of the possibility of exercising a monopoly. In the latter case, the freight rate becomes an important factor in determining the relative competitive power of each source of supply and is therefore likely to be lower.

However, the most common situation seems to be the intermediate type. For some commodities, one source of supply is more important than the others and represents a heavy proportion of the total supply going to a particular consumption centre. The hypothesis put forward attempts to cover the extreme and intermediate situations, in assuming that the higher the proportion of the total supply that stems from one supplier, the greater will be the possibility of exercising some degree of monopoly over the market and hence of raising the rates. It also adds a postulate with respect to the manner in which the other suppliers will act vis-à-vis the principal. While there are a number of conceivable ways, it has been assumed in the present hypothesis that the less important suppliers will follow the leader and tend to accept similar rate levels. If this hypothesis is confirmed, it may be concluded that they do behave in that way. If not, it will mean that the small suppliers are pressing the shipping companies to give them lower freight rates, so that they can obtain a bigger share of the market.

4. "The freight rate for a specific commodity will be lower if its quantity and nature are such that it may be carried as a full cargo by tramp".

The line of reasoning in this hypothesis is that, given the large quantities in which certain commodities are carried over certain routes and also because of their characteristics, they can be shipped in loads that are large enough to justify the use of an entire vessel. In these cases, liners have to face fierce competition from the tramps, which devote themselves

precisely to this kind of transportation. The result of this competition has often been rates that are a good deal lower than the average and also the existence of the so-called "open rates" in the freight tariffs.

5. "The higher the handling costs which can be directly assigned to each commodity, the higher will be the freight rates for such commodities carried over a particular route".

As suggested when commenting on hypothesis 2, a large proportion of the total operating costs of a vessel are common to the total cargo and cannot be imputed to a certain part of it. The cost of loading and discharging different types of cargo and some other handling charges can, however, be directly assigned to specific commodities. According to the hypothesis, the differences in the level of such costs for different types of commodities carried over a route will affect the level of the freight rates, which tend to be higher for the commodities which incur higher expenses.

6. "The longer-established and stable a conference or other agreement on freight rates, the larger will be the proportion of commodities carried at a specific rate and the smaller the proportion of specific rates clustered around the average".

The reasoning implicit in this hypothesis is that if a conference or agreement has been in force for a long time, the experience accumulated and the process of negotiation between the shipping companies and the users make it possible to refine the freight tariff more than would be feasible with a recently established agreement on freight rates or on new routes. An elaborate freight structure results in a larger number of specific commodity rates, since these can be fixed more precisely in the light of the experience acquired, thus reducing the number of cases in which the rate for cargo not otherwise specified has to be applied. This fact seems to indicate that the rates are more widely dispersed around a measure of central tendency.

7. "The freight rate for a commodity will be higher if it is specially liable to damage or pilferage, that may also affect other goods carried".

This hypothesis assumes that the risk of theft or damage will vary with the commodity carried, in accordance with its properties, the way in which it is packed and prepared for transport and so on. It is likewise

/assumed that

assumed that the shipping companies allow for this in fixing their rates and raise them when they run greater risks. This would reflect to some extent in the operating costs themselves and the responsibility accepted by the carrier in undertaking to transport the goods, since theft or damage may mean payment of an indemnity.

8. "The freight rate for a commodity will be higher when the commodity requires special installations on board."

When goods are perishable, for instance, they have to be carried in special conditions, and often require additional refrigeration or ventilating equipment. In such cases, space is lost in the holds, since care must be taken to stow the cargo in such a way as to allow air to circulate.

This factor is easy to take into account, and the freight rates for goods of this kind are usually higher. Some tariffs fix a definite percentage over and above the normal rates for refrigerated or frozen cargo.

9. "The shipping companies apply low rate policies to promote the carriage of commodities with export potential in which there is as yet little trade."

This hypothesis postulates the establishment of promotional freight rates by the shipping companies. An argument often put forward in support of the carriers is that they have encouraged trade in certain commodities by granting special rates.

It is rather difficult to define the expression "promotional freight rates" and various criteria may be adopted in this respect. In the present study, a freight rate that is below the average and is applied to commodities in which there is little traffic compared with the total over a given route, but which apparently have great potentialities, may be considered in principle as a promotional freight rate.

10. "The greater the proportion of a particular commodity in the total tonnage carried over a route, the lower will be the freight rate per ton applied to it".

/The reasoning

The reasoning underlying this hypothesis is based on the possibility open to shipowners of charging higher rates for goods carried in small quantities over a certain route while favouring goods that represents a large proportion of the total cargo carried. The better treatment obtained for trade of the latter kind will not only be due to initiative of a freight conference or an agreement, which take into account the advantages accruing from such basic cargo for their vessels. It may also derive from the increased bargaining power that the owners of the commodities in question would have in negotiating a lower freight rate.

11. "When freight rates are fixed by weight, the rate for a particular commodity will rise in proportion to its stowage factor".

12. "Over routes on which commodities with a relatively high volume/weight ratio account for the bulk of the traffic, the importance of the stowage factor in the structure of freight rates will be greater than in the opposite case".

Commodities that weigh a great deal but occupy relatively little space and vice versa are a constant problem for transport services, and for shipping in particular. This question was raised in chapter III and also referred to at the beginning of this chapter. It was pointed out that shipping companies try to make maximum use of their vessels' carrying capacity in both volume and weight. This might be expected to change the weighting of the stowage factors on the different routes, in accordance with the nature of the cargo carried. For instance, if commodities with a high volume/weight ratio predominate on a certain route, it is to be expected that the freight rate per ton would be higher for those occupying a great deal of space and lower for the heavier goods, in order to attract more heavy cargo and make the best possible use of the freight-earning capacity.

It appears from the foregoing that freight rates are expressed in terms of both weight and measurement and that shipping companies in certain cases can choose which of the two systems they want to apply.

/However, the

However, the fact that a freight rate is fixed by weight does not mean that volume has not been taken implicitly into account.3/

The question is covered by hypotheses 11 and 12, which are really stating that, although freight rates may be fixed in accordance with one type of unit, the other type is implicit in each case. The mutual influence of the two kinds of unit is clearly defined in hypothesis 11, which assumes that the factor of measurement is implicit in freight rates established by weight, so that the rate is higher for commodities which are physically more voluminous.

The second hypothesis refers to another facet of the same question, in indicating that stowage factors are more important on routes on which the bulk of the cargo consists of commodities with a high volume/weight ratio. Stowage factor signifies the space occupied by a ton of merchandise in the hold of a ship. It has been defined in this study more specifically as the number of cubic feet occupied by 1,000 kilogrammes of each commodity considered. This is a purely technical ratio which, to the extent that a commodity is homogenous, should be the same over every route.4/ The hypothesis is concerned with the importance of the stowage factors.

An initial inspection of the working hypotheses indicate that many of them refer to relationship between freight rates per ton and some factor which is assumed to explain, up to a point, the differences in the rate per ton for the various commodities. These hypotheses are number 2, which relates the structure of freight rates to the value per ton of the cargo carried, number 5, which is concerned with handling costs, number 7,

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3/ It is theoretically possible for the opposite type of situation to occur, in which the factor of weight is taken implicitly into account in establishing freight rates by measurement, but a detailed analysis of the freight tariffs shows that it is not actually contemplated. It would be interesting to find out why shipowners have taken up this apparently irrational attitude.

4/ The manuals on stowage factors give the number of cubic feet per long, short or metric ton. In order to simplify this study and the comparisons with other publications on the subject, it was decided to use cubic feet per metric ton.

/on the

on the possibility of damage or pilferage, number 10, on the importance attaching to the quantity of a commodity that is transported, and number 11 and 12, which deal with the nature of the goods carried, as reflected in their respective stowage factors. Hypothesis number 1, which refers to the average rate level to be expected on a route, should also be added to the group.

In view of this, it seems feasible to make a simultaneous analysis of the role played by the above factors, instead of assessing each one on a piecemeal basis - a very cumbersome process and results are difficult to interpret. From the statistical-econometric standpoint, this would entail the construction of a multiple regression model in which the dependent variable (to be explained) would be the freight rate per ton for the different commodities over each of the routes involved, and the explanatory or independent variables would be related to each of the hypotheses set out.[5/] Hypothesis number 1, which refers to the over-all level of freight rates on a certain route, can be analysed by means of the same kind of model through the inclusion and analysis of a constant in the regression equation.

Another three hypotheses - number 4, on commodities that may be carried in tramps, number 8, on commodities requiring special installations for carriage, and number 9, on promotional freight rates - relate to special freight rates for certain commodities and should be analysed separately on the basis of the data available. Part of this analysis was implicitly undertaken when the regression model was built since, if the conclusions to be drawn from the model are to be generally valid, only commodities carried under normal conditions should be included. This means, for instance, that freight rates for refrigerated cargo and for commodities which may be transported as full cargoes by tramps must be excluded. Results would be skewed if variables were to be put in, which are not considered in the model and refer to these commodities alone.

5/ A general explanation of the technical bases and of the statistical terms used in this study is given in annex 12.

/Lastly, hypotheses

Lastly, hypotheses 3 and 5 will not be dealt with in detail, for want of the necessary information, but they will be discussed indirectly when considering those aspects of the tariff structure that cannot be explained by the regression model.

The study of the rate structure will thus be based on a multiple regression model which will make it possible to ascertain simultaneously the influence of a number of factors on that structure.

The form of the multiple regression model proposed for the first stage is as follows:

$$X_1 = b_1X_2 + b_2X_3 + b_3X_4 + b_4X_5 + b_5X_6 + b_6X_7$$

in which X_1 is the freight rate per ton of each commodity on a route, in dollars

X_2 is the value per ton of each commodity on a route, in dollars

X_3 is the handling cost per ton of each commodity on a route, in dollars

X_4 is the insurance premium for each commodity on a route, in percentages (see page 91)

X_5 is the proportion of the total cargo carried over a route represented by each commodity, in percentages

X_6 is the stowage factor for each commodity, expressed as cubic feet per 1,000 kilogrammes

X_7 reflects the constant in the equation, so that $X_7 = 1$

The information required to apply a multiple regression model of this kind must have certain characteristics and meet certain conditions. For instance, a minimum number of observations must be included to make each regression statistically significant. The basis of the study is, as indicated in previous chapters, the export trade of ten Latin American countries, namely, Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Mexico, Peru, Uruguay and Venezuela, with the other Latin American countries (including those already named), the United States and Canada, Europe, and Japan as destination. The basis thus consists of 193 combinations of countries or "routes" as they have been called, which constitute the field of study to which the model will be applied. However, on some routes, the

/minimum of

minimum of twelve commodities acceptable for the purposes of this study, was not carried in 1965, so the model cannot be applied to all of them. The statistical data in annex 1, the basis of this study, indicate that the number of commodities transported was more than twelve in only fifty-nine of the 193 cases. After this first selection, two further steps had to be taken before the final choice could be made. The first step was to eliminate from the fifty-nine examples all the commodities not normal for regular shipping services. These are basically goods which may be carried as a full cargo in tramps and to which specially agreed freight rates are usually applied when carried in liners, and those requiring special conditions of carriage, such as refrigerated cargo.[6/] The second step was to simplify the study by eliminating routes which had similar characteristics to other routes that had already been included and would therefore add little to the conclusions. The intention, in any case, was to bring together a set of routes that would cover the bulk of the traffic and of the geographical areas through which Latin American export trade was carried.

The result was the following list of thirty-three routes, which fulfill the conditions laid down above.

Route number	Countries linked up	Number of commodities considered
1	Argentina - Brazil	26
2	Argentina - Colombia (Pacific)	11
3	Argentina - Chile	27
8	Argentina - Venezuela	16
18	Argentina - United Kingdom and northern Europe	35
19	Argentina - Mediterranean	24
21	Argentina - United States (Atlantic)	24
22	Brazil - Argentina	44
24	Brazil - Chile	22

6/ For instance, live cattle, grains, fresh or refrigerated fruit, chilled or frozen fish, beef, fruit juices and passenger cars.

/Route number

Route number	Countries linked up	Number of commodities considered
26	Brazil - Mexico (Atlantic)	13
40	Brazil - Mediterranean	30
41	Brazil - Japan	17
42	Brazil - United States (Atlantic)	39
46	Colombia (Pacific) - Ecuador	15
64	Chile - Argentina	23
65	Chile - Brazil	15
66	Chile - Colombia (Pacific)	10
69	Chile - Peru	22
84	Chile - United States (Atlantic)	19
106	Mexico (Atlantic) - Argentina	12
107	Mexico (Atlantic) - Brazil	12
108	Mexico (Pacific) - Colombia (Pacific)	17
111	Mexico (Pacific) - Peru	13
113	Mexico (Pacific) - Venezuela	19
114	Mexico (Pacific) - Costa Rica (Pacific)	20
119	Mexico (Pacific) - Nicaragua (Pacific)	16
123	Mexico (Pacific) - United Kingdom and northern Europe	28
124	Mexico (Pacific) - Mediterranean	12
130	Peru - Chile	11
131	Peru - Ecuador	13
147	Peru - United States (Atlantic)	19
165	Uruguay - United Kingdom and northern Europe	15
189	Venezuela - United States (Atlantic)	10

Some routes with less than twelve commodities were finally placed on the list (Argentina - Colombia, Chile - Colombia, Peru - Chile and Venezuela - United States) because they were representative of conditions of carriage that were not sufficiently reflected on the other routes. Even so, the list does not give complete coverage to other important traffic. For instance, the routes between the Pacific coast of South America and northern Europe had to be excluded owing to statistical difficulties with the data.

/The most

The most complex step in the construction of the model was the collection of the information on each variable, since it entailed the preparation of various studies, some of fairly wide scope, as a corollary to the study of freight rates itself. Detailed annexes have been prepared on the subject, so that only a brief account of the work is presented here.

It has already been explained in chapter I, in regard to freight rates per ton, that after protracted dealings with the freight conferences, shipping companies and other institutions connected with shipping, most of the freight rates which are significant for the traffic over the routes in question were ascertained. The rates expressed in terms of weight/measurement (W/M) were converted according to the corresponding stowage factors so as to give a rate per ton. Detailed data on all the trade covered in the study are given in annex 1.

The data on the value per ton of each commodity and the proportion each one represents of the total tonnage carried over each route, were obtained from the foreign trade yearbooks of the countries concerned. As many of these yearbooks are published with considerable delay, homogeneous and complete data were obtainable for 1965 only, and even then it was necessary to refer to the 1964 yearbooks for Colombia and Ecuador. These data are also given in annex 1.

It was more difficult to obtain data that would give a clear picture of the other variables. In the case of handling costs, the commodities included in the sample were classified beforehand according to form of packing, and a certain cost was then assigned to each one, fundamentally on the basis of Brazil's experience, but with due regard for applicability to other countries. The figures are not as precise as they should be, since they do not reflect country differences and can only be considered as a ranking. However, in the sense that the relative difficulties of handling the different kinds of merchandise are similar in other countries - the loading or discharging of machinery which is

/more difficult

more difficult than that of bags - the ranking adopted here is an adequate reflection of this variable.7/ The figures used are to be found in annex 6.

The inclusion of the variable relating to the possibilities of pilferage and damage to goods, necessary for testing hypothesis 7, posed the greatest difficulties. Ideally, this variable should be represented by a series of data on the damage and losses suffered in past years by all the commodities comprised in the sample in the different regions. These data exist in the corresponding insurance adjustments, but are obviously difficult to obtain. In default of them, it was assumed that the insurance premiums for different commodities would be a good indicator. The information was obtained from the countries concerned, as conditions might vary considerably from one to another. Payment of such insurance is not, of course, the responsibility of the shipping companies. It represents the risk they do incur in acting as carriers since, under certain circumstances, the shipowner is held responsible for theft or damage and must compensate the insurance companies for the losses incurred. Annex 10 contains part of the material used in this connexion.

The information needed to include the variable representing the stowage factors proved less difficult to obtain since it was readily available in publications on the subject or from the shipping companies themselves. What was required in this case was a purely technical and general ratio between the weight and measurement of the different commodities, and not the emphasis which might be given to weight or measurement over a particular route in accordance with the special conditions prevailing. Thus the stowage factors adopted were the same in virtually every case.

The application of the multiple regression model as described in the previous section presents some statistical difficulties. These may be important and must be clarified if the results are to be properly interpreted.

7/ It must be remembered that, statistically, the use of a variable represented by a rank correlation will not lead to significant errors if the number of observations is more than twelve in a simple correlation and still more in a multiple correlation. The information used to represent this variable is even better than a simple ranking, where the intervals between the observations are constant.

/Four of

Four of them are particularly troublesome and are analysed in this section. The first derives from the inclusion of stowage factors as an explanatory variable of the structure of freight rates. The second originates in the fact that some of the explanatory variables may be inter-related so that the inclusion of a few of them is sufficient to explain the rate structure. The inclusion of inter-related variables reduces the quality of the model from a statistical standpoint (problems of multicollinearity). The third difficulty is related to the form of the model, that is, the form in which the variables are thought to be related. The model may be linear or more complex in form. Lastly, the quality of the model itself will depend essentially on the way in which the different variables are represented in it. This poses problems of measurement. If a variable is poorly represented, its true importance as an explanatory variable will not be brought out.

(a) The first of these difficulties is the inclusion of stowage factors as an independent variable.

As already pointed out, the existence of commodities with different relationships of weight and volume has led the shipping companies to establish freight rates by weight in some cases and by measurement in others. In yet other cases the companies may choose whichever of the two rate bases would bring the most revenue. Some method of standardising the observations available on freight rates had to be devised for this study, so that they would all be expressed in terms of either weight or volume. It would have been statistically impossible to construct a multiple regression model in which the different observations were expressed in heterogeneous units, since its interpretation would have had no logical meaning.

It was decided to convert all freight rates to dollars per ton of 1,000 kilogrammes, and to use the corresponding stowage factors as a basis of conversion for rates fixed in terms of volume.

This signifies that, in the case of certain observations, the stowage factor will be on both sides of the regression equation. This would normally tend to increase the correlation coefficient, that is, the index of the fitness of the model used and would produce a false

/correlation. Any

correlation. Any systematic study of maritime freight rates will encounter this problem, which is a general one and undoubtedly the main difficulty of a statistical-econometric kind. Moreover, owing to the lack of earlier studies on the subject, there is no ready-made solution to it.

It is, of course, imperative to have a standardised unit for expressing the different observations, if quantitative studies are to be made on the structure of freight rates. The solution adopted here seems to be the soundest and the least open to error. There are other possibilities, but all of them create even greater problems. One such method is to express all freight rates by measurement instead of by weight. This simply tends to aggravate the problem, however, since most freight rates are based on weight, and the false correlation would thus be even more pronounced while the stowage factor would in any case remain on both sides of the equation.

Another method would be to make separate studies of rates by weight and by measurement, thereby eliminating the problem altogether. The drawback to this method is that it would reduce the number of observations that could be used for the few routes on which they are sufficient for a quantitative analysis, because of the small number of commodities transported in significant quantities. The possibilities of the study would be appreciably reduced as well and only a very small number of conclusions could be drawn. Consequently, it would not be possible to apply the model to the freight rates expressed in terms of measurement for any of the routes used for Latin American foreign trade, since the number of rates would be insufficient in each case for the regression model to be statistically significant. As will be seen later, it was decided to eliminate all the observations with measurement rates from every route where it was possible, and the model was applied to the remainder so as to compare the results. In studies of freight rates in other regions or on routes over which the number of goods carried with rates expressed in both units is large enough, this is one of the most logical methods which can be used.

/A further

A further solution would be to exclude stowage factors as an explanatory variable for the structure of freight rates. This has the serious disadvantage of discounting one of the factors representing the cost of transport, which is assumed to be highly important in determining the rate structure. The results of the study show that these misgivings were justified, since stowage factors as a variable representative of costs is one of the most important for explaining the structure of freight rates.

Thus the only course left open was to devise some tests that would be applicable to the solution adopted in the study, namely, the standardisation of freight rates by weight, with stowage factors as the basis for conversion.

The first test was to calculate the percentage of rates by measurement or by weight/measurement in ship's option on the routes to which the regression model was applied, and to compare these percentages with the multiple correlation coefficients obtained on those routes for the complete model represented by equation 1 (see table 21). It might be assumed a priori, in view of the problem under consideration, that the greater the proportion of rates on a route that were based on measurement, the higher would be the correlation coefficient, since the inclusion of the stowage factor on both sides of the equation would tend to raise that coefficient. A glance at the corresponding columns in table 21, however, will show that this correlation is not clearly demonstrated. There are, of course, cases with both a high coefficient and a large proportion of measurement rates, but in several the latter is very small while the former is fairly high. In other cases again, such as routes 22, 40 and 42, there are inverse correlations, that is, a heavy proportion of freight rates based on measurement and a correlation coefficient on the low side. Hence, the problem cannot be highly significant.

A second test is to compare the correlation coefficients in equations 9, 10 and 11, as indicated in table 21.

/Table 21

Table 21

GENERAL RESULTS OF THE PRINCIPAL REGRESSION MODELS USED IN THE STUDY OF THE STRUCTURE OF MARITIME FREIGHT RATES IN FOREIGN TRADE, 1966

Route number	Countries linked up	Number of observations	Freight rates based on measurement in proportion to total observations	Multiple correlation coefficients			
				Equation 1 (1)	Equation 9 (2)	Equation 10 (3)	Equation 11 (4)
1	Argentina-Brazil	26	30.8	0.828	0.819	0.809	0.800
2	Argentina-Colombia	11	9.1	0.957	0.931	0.937	0.928
3	Argentina-Chile	27	25.9	0.933	0.755	0.926	0.745
8	Argentina-Venezuela	16	25.0	0.969	0.846	0.967	0.842
18	Argentina-United Kingdom/Continent	35	25.7	0.706	0.594	0.692	0.575
19	Argentina-Mediterranean	24	12.5	0.626a/	0.506a/	0.622	0.488
21	Argentina-United States and Canada	24	20.8	0.700	0.642	0.638	0.568
22	Brazil-Argentina	44	34.1	0.777	0.632	0.752	0.623
24	Brazil-Chile	22	31.8	0.856	0.816	0.748	0.728
26	Brazil-Mexico	13	69.2	0.918	0.913	0.909	0.908
40	Brazil-Mediterranean	30	40.0	0.712	0.359a/	0.693	0.229a/
41	Brazil-Japan	17	5.9	0.606a/	0.552a/	0.447a/	0.416a/
42	Brazil-United States and Canada	39	56.4	0.697	0.393a/	0.672	0.321
46	Colombia-Ecuador	15	53.3	0.947	0.198a/	0.926	0.024a/
64	Chile-Argentina	23	17.4	0.889	0.718	0.821	0.619
65	Chile-Brazil	15	-	0.797a/	0.670a/	0.385a/	0.265a/
66	Chile-Colombia	10	10.0	0.817a/	0.586a/	0.539a/	0.407a/
69	Chile-Peru	22	22.7	0.943	0.873	0.920	0.805
84	Chile-United States and Canada	19	21.0	0.963	0.961	0.955	0.954
106	Mexico-Argentina	12	33.3	0.937	0.629a/	0.838	0.468a/
107	Mexico-Brazil	12	25.0	0.856a/	0.703a/	0.773	0.463a/
108	Mexico-Colombia	17	52.9	0.949	0.900	0.934	0.887
111	Mexico-Peru	13	46.1	0.930	0.750	0.920	0.682
113	Mexico-Venezuela	19	63.1	0.990	0.903	0.986	0.896
114	Mexico-Costa Rica	20	60.0	0.925	0.671	0.922	0.585
119	Mexico-Nicaragua	16	75.0	0.897	0.378a/	0.881	0.116a/
123	Mexico-United Kingdom/Continent	28	67.9	0.893	0.722	0.880	0.701
124	Mexico-Mediterranean	12	50.0	0.867a/	0.653a/	0.847	0.489a/
130	Peru-Chile	11	9.1	0.815a/	0.405a/	0.744	0.200a/
131	Peru-Ecuador	13	76.9	0.930	0.522a/	0.854	0.126a/
147	Peru-United States and Canada	19	31.6	0.903	0.828	0.900	0.785
165	Uruguay-United Kingdom/Continent	15	20.0	0.569a/	0.491a/	0.530a/	0.464a/
189	Venezuela-United States and Canada	10	40.0	0.925a/	0.567a/	0.650a/	0.029a/

Source: Annex 12.

a/ Non-significant correlation coefficients.

(1) $X_1 = b_1X_7 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6$

(2) $X_1 = b_1X_7 + b_2X_2 + b_3X_4 + b_4X_5$

(3) $X_1 = b_1X_7 + b_2X_2 + b_3X_6$

(4) $X_1 = b_1X_7 + b_2X_2$

X_1 – Freight rate per ton of each commodity on a route, in dollars.

X_2 – Value per ton of each commodity on a route, in dollars.

X_3 – Handling cost per ton of each commodity on a route, in dollars.

X_4 – Insurance premium for each commodity on a route (per cent).

X_5 – Proportion of total cargo carried over a route represented by each commodity (per cent).

X_6 – Stowage factor in cubic feet.

X_7 – Reflects the constant in the equation, so that $X_7 = 1$.

/These regression

These regression equations are alternatives to the general model set out in equation 1, and each one contains some of the explanatory variables included in that model. Nearly all the variables are to be found in equation 9, except the stowage factors, while equation 10 simply includes the value of the goods and the stowage factors. Finally, the only independent variable in equation 11 is the value of the cargo. Consequently, if equations 9 and 11 are compared with 10, the importance of the stowage factors on the structure of freight rates will be noted. A considerable difference between the correlation coefficients in equations 9 and 10, with the first as the lower of the two, would mean that its influence is very important.

An analysis of the figures in table 21 will show that in most cases there is little difference between the coefficients in the two equations. The value of the coefficient in equation 9 is nearly always lower than that in equation 10, which suggests that stowage factors do have an influence on the structure of freight rates, but do not distort the results to any significant extent. The comparison between equations 10 and 11 is even more significant in this respect and a similar conclusion can be drawn from it.

A comparison of the correlation coefficients in equations 9 and 10 shows that they differred appreciably (with the coefficient in equation 9 as the lower of the two), on only eleven of the thirty-three routes to which the model was applied, namely routes 3, 40, 42, 46, 106, 111, 114, 119, 124, 130 and 131 (table 21 indicates the countries linked up by these routes). No common factor could be found, either for the countries, or for the proportion of rates expressed in terms of measurement in the total number of observations for each route. The only outstanding point is the larger number of routes that begin in Mexico, on which the proportion of rates based on measurement is substantial.[8/]

8/ One of the reasons for the large number of freight rates based on measurement on certain routes is the proportion of the rates for cargo not otherwise specified that had to be applied, which are based on weight or measurement. This is especially common on some routes that begin in Mexico.

/In short,

In short, this second indicator shows that, with certain exceptions which add up to a third of the total routes considered, the inclusion of the stowage factors as an explanatory variable for the structure of freight rates cannot be regarded as having raised the correlation coefficient to such an extraordinary extent as to distort the results. Even when the comparison between the coefficients of the two equations indicates that stowage factors exercised a marked influence, it cannot be immediately concluded that this is due to a false correlation, which is the point at issue. On the contrary, it may be due precisely to the fact that stowage factors which reflect the costs of the shipping services, are particularly significant.

Lastly, a third test was used to determine how important it really is to use stowage factors as an explanatory factor. It consisted in eliminating the measurement freight rates on any route on which the number of observations made it possible to do so, and to apply the model to the rest of the observations so as to compare the results with those obtained when all rates were taken into account. The respective calculations were made for six of the routes to which the model was applied, that is, routes 1, 3, 18, 22, 64 and 84.

On these routes, there were a large number of observations and a small number of rates based on measurement. Consequently, even with the latter eliminated, a sufficient number of observations were left to ensure that the conclusions would be statistically significant.

The results of these calculations are given in table 22, which bears out the conclusions arrived at in the other two tests. On two of the six routes, the correlation coefficient was higher when freight rates based on measurement were excluded, which indicates that the use of stowage factors as a variable militates against the explanatory quality of the model. On two other routes, the coefficients declined but without affecting the conclusions. It was only in two cases, that of route 1 between Argentina and Brazil, and of route 84, between Chile and the United States and Canada, that the coefficient dropped so much that the model no longer gave a true picture of the situation.

/Table 22

Table 22

EFFECTS ON THE RESULTS OF THE REGRESSION MODELS USED FOR THE STUDY OF THE STRUCTURE OF MARITIME FREIGHT RATES OF NOT INCLUDING RATES BASED ON MEASUREMENT

Route number	Countries linked up	Number of observations including measurement rates	Number of observations excluding measurement rates	Multiple correlation coefficients					
				Equation 1 (1)		Equation 9 (2)		Equation 10 (3)	
				Including measurement rates	Excluding measurement rates	Including measurement rates	Excluding measurement rates	Including measurement rates	Excluding measurement rates
1	Argentina-Brazil	26	18	0.828	0.443a/	0.819	0.293a/	0.809	0.271a/
3	Argentina-Chile	27	20b/	0.933	0.915	0.755	0.733	0.926	0.871
18	Argentina-United Kingdom/ Continent	35	26	0.706	0.747	0.594	0.395a/	0.692	0.643
22	Brazil-Argentina	44	29c/	0.777	0.919	0.632	0.892	0.752	0.908
64	Chile-Argentina	23	19	0.889	0.756	0.718	0.356a/	0.821	0.571
84	Chile-United States and Canada	19	15	0.963	0.632a/	0.961	0.589a/	0.955	0.614a/

a/ Non-significant coefficients.

b/ Only seventeen observations were used to estimate the regression equation.

c/ Only twenty-eight observations were used to estimate the regression equation.

(1) $X_1 = b_1X_7 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6$

(2) $X_1 = b_1X_7 + b_2X_2 + b_3X_4 + b_4X_5$

(3) $X_1 = b_1X_7 + b_2X_2 + b_3X_6$

X_1 – Freight rate per ton of each commodity on a route, in dollars.

X_2 – Value per ton of each commodity on a route, in dollars.

X_3 – Handling cost per ton of each commodity on a route, in dollars.

X_4 – Insurance premium for each commodity on a route (per cent).

X_5 – Proportion of total cargo carried over a route represented by each commodity (per cent).

X_6 – Stowage factor, in cubic feet.

X_7 – Reflects the constant in the equation, so that $X_7 = 1$.

/An explanation

An explanation should probably be looked for in the nature of the commodities carried over those routes, and in their physical characteristics, which are indirectly reflected in the stowage factors. On the Argentina-Brazil trade route, however, the large number of shipping lines that operate between the two countries, and their alleged excess of carrying capacity, may give rise to such heavy competition that the structure of freight rates will vary little from the average.9/ If the value of the standard deviation on this route is compared with that of the deviation on the others, the results will bear out this hypothesis (see annex 12), since in this case its value will be lower than in the majority of cases. In other words, it is cost rather than demand that would seem to be most useful in explaining the structure of freight rates over this route. This question will be discussed later in this chapter.

The third test appears to bear out the expected conclusion that the problem of including stowage factors as a variable and of the need to standardise rates based on measurement and on weight has been settled satisfactorily without producing any appreciable distortions in the results of the model. The results must, of course, be carefully interpreted with this problem constantly in mind.

(b) The second statistical difficulty connected with the model is the possible inter-relationship of the independent variables. If they are inter-related, the inclusion of one or two of them will not provide any additional explanation and will even lower the statistical power of the model. This kind of problem is called one of multicollinearity.

9/ It is often argued, on the contrary, that the existing monopoly situation is the key to the establishment of freight rates on this route.

As these variables can have so many inter-relationships, especially in regressions for which a large number of variables are required, it was impossible to devise a general statistical test to disclose the existence of the problem, and alternative methods had again to be sought. The two most common methods were used in this study. The first consists in calculating the partial correlation coefficients between the independent variables so as to ascertain their degree of relationship. This was done when an a priori assumption of inter-relationship could be made. The results are given in annex 12, and indicate that, with the exception of a few routes, there is no serious problem of multicollinearity in the model adopted. The second method is to test alternative models with different combinations of independent variables, and to compare the results so as to determine the variables that would be significant in all cases.

As will be seen later in this chapter, the models finally adopted are fairly simple, with no more than two independent variables. The problem of multicollinearity can thus be dealt with quite easily.

(c) The third problem of a statistical nature which is a built-in part of the structure of the model itself is how to determine the precise form of the regression equation. The form set out on page 87 assumes a linear relationship between the two variables, which is not necessarily the case.[10/] Two types of models were tried out, one linear and the other logarithmic. The results are found in annex 12. A detailed analysis of the results suggests that the linear model can be used for all the routes. On some of them, of course, the logarithmic form provides a model of greater explanatory power. However, the difference between the multiple correlation coefficients (which is regarded as an indicator of the explanatory power of the model) in the two forms is so small that there is clearly no justification for working with the far more complex

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10/ A linear relationship between two variables signifies the situation in which a certain kind of change in one of them will produce a change of the same kind in the other. This principle can be extended by analogy to a larger number of variables.

logarithmic relations, simply to achieve a marginal improvement in the power of the model. The operating advantages of a linear model more than compensate for the difference.

(d) The last statistical problem is the measurement of the variables. As pointed out at the beginning of this section, the observations forming the basis for the introduction of an explanatory variable in the model must adequately represent the phenomenon in question, if the ensuing relationship is to have any value.

As already explained, difficulties were encountered in two cases in attempting to obtain the necessary information for including the different variables. Happily, the results indicate that the structure of freight rates is largely explained by the variables that were easiest to measure, and any improvement in the quality of the other variables would scarcely change the picture.

Knowing the structure of the model used and the way to cope with its possible statistical shortcomings, an analysis can be made of the results obtained.

First to be established is the fitness of the model to determine the factors underlying the structure of freight rates. The symbol which can be used for this purpose is the correlation coefficient corresponding to each multiple regression and its statistical significance. The results appear in table 21, in the column corresponding to equation 1, representing the complete linear model.

The results indicate that the model gives a fairly accurate picture of the situation. The variables it presents as possible explanations of the structure of freight rates do, in fact, explain it satisfactorily. More precisely, the multiple correlation coefficient was statistically significant for twenty-four of the thirty-three routes considered.[11/] The nine cases in which it was not are mainly the routes on which the number of observations was too low in proportion to the number of variables for adequate results to be obtained.

11/ A statistically significant correlation coefficient between two or more variables in 95 out of every 100 tests (95 per cent reliability) is one whose value is higher than it would be if a random sample of two or more series of values had been used.

The values of the correlation coefficients themselves are very high on some of the routes. On fifteen they are over 0.900, which in most cases means that nearly all the variations in the structure of the freight rates can be traced to the variables in the model. On nine others the range of values lies between 0.800 and 0.900 which depending on the number of observations, is a high correlation.12/

Among the routes for which the model does not yield statistically significant results, the case of route 19, which links Argentina with the Mediterranean countries, is the most interesting. It is one of Latin America's traditional foreign trade routes and there were a considerable number of observations. The composition of the sample used may account for the result obtained.

The confirmation that the model is suitable for analysing the structure of freight rates is vitally important since it bears out the premises expressed in the hypotheses. The fact that the variables included explain virtually all the variations in the freight rates per ton for the different commodities also implies that any explanatory variables not in the model would have little significance. In view of the importance of these conclusions they must also be evaluated in the light of the possible statistical difficulties envisaged in the previous section. The inclusion of the stowage factors as an independent variable may have brought about a spurious improvement in the degree of correlation found in the model. As far as could be seen, this was actually the case although, given the high coefficients obtained over most of the routes and the results of the tests carried out, it seems unlikely that it will radically change the conclusions arrived at for many of the routes. The basic conclusion as to the general validity of the model will apparently be unaffected.

Although the multiple regression model adopted provides a satisfactory explanation for the structure of freight rates, its internal nature as a theoretical schema for predicting specific freight rates is less satisfactory. The results of the regression equations in annex 12 show that in the majority of cases, whether the model is linear or logarithmic, the regression

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12/ The value of the correlation coefficients fluctuates between 0 and 1.

/coefficients (which

coefficients (which accompany each variable) are seldom statistically significant. In the case of some variables, such as handling costs and tonnage carried, the coefficients are insignificant on nearly all the routes. Moreover, not even the constant in the equation is statistically significant on some of the routes.

More often than not, this means that the variables with insignificant regression coefficients are not an important explanatory element in the freight rate structure. Another possibility is the existence of a problem of multicollinearity; in other words, a high correlation between two of the independent variables. This possibility calls for a more complex solution, since it is impossible to know offhand exactly which variable should be removed from the model.

Only the regression coefficients of the variables related to the value of the cargo and the stowage factors are statistically significant in the general model. This suggests that a model consisting of only these two explanatory variables would suffice to explain the structure of freight rates. However, the problem of multicollinearity may be such that some of the other variables may also be important as an additional explanatory element.

To obviate this problem, three alternatives to the general model were tested, which may be termed "reduced models". They are as follows:

$$X_1 = b_1X_2 + b_2X_4 + b_3X_5 + b_4X_7 \qquad \text{equation 9}$$

$$X_1 = b_1X_2 + b_2X_6 + b_3X_7 \qquad \text{equation 10}$$

$$X_1 = b_1X_2 + b_2X_7 \qquad \text{equation 11}$$

X_1 corresponds to the freight rate per ton, X_2 to the value of the commodity, X_4 to the insurance premium, X_5 to the proportion of the total trade on a route represented by the tonnage of each commodity carried, X_6 to the stowage factors and X_7 reflects the constant in the respective equations.

Apart from these models, all the simple correlations between each of the independent and the dependent variables and between some of the independent variables were calculated in order to determine if there were any problems of multicollinearity. Some of the results are in annex 12.

/As regards

As regards the kind of model set out above, it was hoped to have others that would show the influence of the key variables - the value of the commodity and the stowage factors - and also of the variables that were insignificant in the general model. The explanatory power of these other models measured by the respective multiple regression coefficients is given in table 21. It must be stressed that the use of reduced models implies an estimate of the possible influence of the unincluded variables, since an unknown reduction is accepted in the correlation coefficient.

The analysis of these results leads to what is undoubtedly one of the most interesting conclusions of the whole study. In the first place, the reduction in the value of the correlation coefficient is usually very slight in relation to the general model, especially to equations 10 and 11. This means that the principal explanatory variables of the structure of freight rates are actually the value of the commodity and the stowage factors. This result is astonishingly uniform for the routes to which these models were applied. These routes represent a great variety of transport conditions. It was found that the reduced form of the general model, with the value of the commodity and the stowage factors as the only independent variables, gives the best explanation of the structure of freight rates on twenty-three of the thirty-three routes, and also, being a simpler type of model, yields results that have better properties in terms of statistical significance and are more operational.

On six other routes, an even simpler model can be applied, since the value of the commodity will suffice as an explanatory variable, in conjunction with a constant.

Four routes will then remain to which a simplified model cannot be applied. They represent the traffic between Brazil-Japan, Chile-Brazil, Chile-Colombia (Pacific coast) and Venezuela-United States (Atlantic coast). The results for these routes were so inconclusive that not even the general model was statistically significant.

The regression equations for the twenty-nine routes which make up the most satisfactory model for explaining the structure of freight rates are presented in tables 23 and 24. The statistical significance of the respective coefficients is also indicated there.

/Table 23

Table 23

ROUTES FOR WHICH THE MODEL REPRESENTED BY EQUATION 10 IS THE MOST APPROPRIATE ($X_1 = b_1X_7 + b_2X_2 + b_3X_6$)

Corresponding regression equations

Route number	Countries linked up	Number of observations	Multiple correlation coefficient	Regression coefficients			Simple correlation coefficient between variables X_2 and X_6
				X_2	X_6	X_7	
3	Argentina-Chile	27	0.926	0.00524	39.35	-1.12a/	0.355a/
8	Argentina-Venezuela	16	0.967	0.0175	86.67	-22.14a/	0.444a/
18	Argentina-United Kingdom/ Continent	35	0.692	0.0103	84.73	-18.31a/	0.192a/
19	Argentina-Mediterranean	24	0.622	0.00513	35.38	13.10a/	0.147a/
21	Argentina-United States and Canada	24	0.638	0.00881	59.29a/	15.91a/	0.302a/
22	Brazil-Argentina	44	0.752	0.00343	34.25	6.75a/	0.427
40	Brazil-Mediterranean	30	0.693	0.00356a/	135.18	-28.74a/	0.066a/
42	Brazil-United States and Canada	39	0.672	0.00734a/	110.10	-10.71a/	0.057a/
46	Colombia-Ecuador	15	0.926	-0.00148a/	56.18	-0.478a/	0.307a/
64	Chile-Argentina	23	0.821	0.0121	28.96	5.45a/	0.219a/
69	Chile-Peru	22	0.920	0.00355	40.44	-3.15a/	0.559
106	Mexico-Argentina	12	0.838	0.00982a/	150.19	-31.64a/	0.130a/
107	Mexico-Brazil	12	0.773	0.00949a/	150.64	-22.75a/	0.465a/
111	Mexico-Peru	13	0.920	0.0272	55.98	3.12a/	0.409a/
113	Mexico-Venezuela	19	0.986	0.0218	96.95	-17.45a/	0.405a/
114	Mexico-Costa Rica	20	0.922	0.00729	136.85	-41.32	0.396a/
119	Mexico-Nicaragua	16	0.881	-0.00112a/	129.52	-6.03a/	0.458a/
123	Mexico-United Kingdom/ Continent	28	0.880	0.0428	202.76	-43.74a/	0.541a/
124	Mexico-Mediterranean	12	0.847	0.0593	244.39	-102.27a/	0.402a/
130	Peru-Chile	11	0.744	-0.00304a/	32.13	5.85a/	0.264a/
131	Peru-Ecuador	13	0.854	-0.0152a/	32.82	12.64	0.077a/
147	Peru-United States and Canada	19	0.900	0.0246	107.89	-22.31a/	
165	Uruguay-United Kingdom/ Continent	15	0.530a/	0.0116a/	74.29a/	2.84a/	0.239a/

a/ Non-significant coefficients.

X_1 - Freight rate per ton of each commodity on a route, in dollars.

X_2 - Value per ton of each commodity on a route, in dollars.

X_6 - Stowage factor in cubic feet.

X_7 - Reflects the constant in the equation, so that $X_7 = 1$.

/Table 24

Table 24

ROUTES FOR WHICH THE MODEL REPRESENTED BY EQUATION 11 IS THE MOST APPROPRIATE ($X_1 = b_1 X_7 + b_2 X_2$)

Corresponding regression equations

Route number	Countries linked up	Number of observations	Multiple correlation coefficient	Regression coefficients	
				X_2	X_7
1	Argentina-Brazil	26	0.800	0.00509	22.11
2	Argentina-Colombia	11	0.928	0.00927	42.65
24	Brazil-Chile	22	0.728	0.0105	39.64
26	Brazil-Mexico	13	0.908	0.0217	38.77
84	Chile-United States and Canada	19	0.954	0.0189	27.38
108	Mexico-Colombia	17	0.887	0.0685	26.54

X_1 - Freight rate per ton of each commodity on a route, in dollars.

X_2 - Value per ton of each commodity on a route, in dollars.

X_7 - Reflects the constant in the equation, so that $X_7 = 1$.

/The interpretation

The interpretation of the foregoing result makes it possible to analyse in detail some points of interest with respect to the general approach on working hypotheses referred to at the beginning of this chapter. First of all it was confirmed that the existing opinions, that the explanation of the structure of maritime freight rates was highly complex because of the numerous factors that could affect the various cases, were unrealistic since many of those factors considered independently were merely manifestations of one and the same situation. Thus it would suffice to consider one of them in order to include that situation as a possible explanation of the freight rate structure. This reasoning at the stage of formulating the model made it possible to simplify it enormously from the outset, by including as explanatory factors only those variables which represented phenomena that were apparently independent of one another. The conclusion finally reached and applicable to practically all routes, is that only two factors - the value of the commodity carried and the stowage factors - account almost entirely for the differences between the freight rates per ton for the various commodities, thus enabling the systems existing hitherto to be further simplified.

Every effort should be made to stress the importance of this simplification. The excessively complex models which take into account an infinite number of factors which "might" in some cases affect a certain situation are not usually applicable in practice, owing to their very complexity. If a model is to be applicable, one of the most important requirements is that it can be used as a basis for the formulation of policies. It is quite clear that policies which attempt simultaneously to consider a wide range of factors, some of which may be unimportant, are not very useful. The explanations given thus far regarding the factors that may have some influence in determining the freight rate structure may undoubtedly be correct. They are, however, not applicable in practice because they fail to provide a proper evaluation of the relative importance of each factor and are too complex.

The nature of the two most important explanatory factors leads to consideration of other points of interest as well. The first factor - the value of the commodity carried - may be regarded as reflecting the conditions

of demand for shipping services, while the stowage factors reflect the conditions governing the cost of transport. The results obtained might have been expected, since the factors that are normally mentioned may be classified in those two groups. As soon as one of them was found to be representative of each group, the rest would diminish in importance or would be implicit in those finally included in the model.

The quality of the two factors established in the model as being representative of these two groups seems to be adequate. The demand for transport services is normally considered as "derived demand", particularly in the transport of cargo. Thus it depends ultimately on the demand for the commodities transported. The value of the commodity, as an indication of the possibilities of establishing certain freight rates without substantially modifying the demand for the commodities themselves, seems to be adequate, and other similar factors would appear to add nothing to the explanation of the freight rate structure. In any case, it cannot be said that other demand factors are implicit in the value of the commodity, especially that relating to competition from different sources in supplying a country or region with a specific commodity. Presumably, such factors would account for some of the differences in the freight rates which was not clarified by the model used.

The stowage factor as a representative element of a large proportion of the costs is also adequate. Inasmuch as uniform stowage factors are used on the different routes, assuming that the commodities carried are sufficiently similar, they implicitly take into account the differences in the difficulties and costs involved in transporting each commodity. An additional hypothesis deriving from the foregoing conclusions would be, for example, that, if the system of remuneration of port labour were established according to the actual operational difficulties, the inclusion of handling costs as an explanatory variable would add nothing of importance over and above the inclusion of the stowage factors.

It should be noted, however, that the inclusion of this cost variable with technical stowage factors (the same for all routes) leaves out the issue mentioned above, which is the relative importance that may be given to the weight/measurement factor on the different routes. The inclusion of

/different stowage

different stowage factors on the various routes would adequately represent the cost conditions. It would also consider this new issue which would convert cost conditions into something in the nature of "opportunity costs" that would more clearly reflect the conditions prevailing on each route. In practice, the fact that this variable has afforded a satisfactory explanation in most cases, when technical stowage factors were used as a basis for introducing them in the model, may mean that the "opportunity costs" on the different routes do not vary enough to modify the results obtained.

As indicated above, one explanation for those cases in which the model proved unsatisfactory may be found in the nature of the commodities that were included in the sample and were carried on those routes. It may sometimes happen that they are so different from those transported on other routes that the use of the same stowage factors for all routes does not provide a proper explanation of the structure of the freight rates in these special cases.

Nevertheless, some elements of cost are probably not duly reflected in the stowage factors, particularly all those related to port costs. These are of no great importance in analysing the structure of freight rates on one route, since presumably the port conditions are the same for all commodities. Another cost factor which was not taken into account relates to the possibility of pilferage or damage to the goods, in so far as the shipping companies' responsibility is concerned. This was included in the model by means of insurance premiums for the merchandise concerned. Apparently, this factor has a minimal effect and is important on only 3 of the routes.

Once it is determined what model provides the best explanation of the difference in freight rate per ton on the routes considered in this study, an attempt should be made to explain why the models offering the best explanations differ from one route to another. In the case under study, the question may be couched in more specific terms. Particularly why on 10 of the routes, the model accepted for most of the sample (the value of the commodities and the stowage factors as independent variables) should not be adequate. The discussion may be divided into two parts, the first relating to the 6 routes on which only the value of the commodities is considered as an explanatory variable in the equation, and the second relating to those cases in which no reduced model is satisfactory.

/In neither

In neither case are there definite explanations, and the following comments deal with the type of conclusions deriving from this study, i.e., the formulation of new hypotheses. The reason is that to find explanations for these differences would entail lengthy research that in some degree is outside the scope of this study, in which only general conclusions are sought.

As shown in table 23, the routes for which the best explanatory model includes only the value of the commodities as an independent variable are route 1 between Argentina and Brazil, route 2 between Argentina and Colombia, route 24 between Brazil and Chile, route 26 between Brazil and Mexico, route 84 between Chile and the United States and Canada, and route 108 between Mexico and Colombia. A possible reason for the different results on these routes is that they form part of a "major route", so defined because it connects extensive regions that include several countries; for example, that between the Atlantic coast of South America and northern Europe. However, a superficial analysis of all the routes considered suffices to show that this cannot be a satisfactory explanation. The six cases are spread over practically all the major routes. If the situation in a specific geographical region were different from the general situation, it might be assumed that similar results would be found in all the traffic on that major route, which is not the case.

Another possible explanation is that, for some as yet undefined reason, these routes in fact offer better possibilities of charging freight rates according to the value of the commodity. Or, to charge "what the traffic will bear" is a more realistic possibility. These six routes are used by only a few countries of the region: Argentina, Brazil, Colombia and Mexico. It appears that some special conditions may occur in their trade, which probably has something to do with the greater possibility of charging what the traffic will bear. It is interesting to note, too, that this situation does not arise in the trade between the Latin American countries and Europe. This could mean that the cost factors are more important on these routes than on the rest of those discussed in this section. Conversely, in view of the lesser competition in intra-regional traffic, the cost factors would carry less weight on these routes.

/Another explanation

Another explanation may lie in the actual composition of the sample of commodities on the six routes analysed. One or two commodities may well represent the major part of the movement of general cargo on these routes, and, therefore, the conditions of transportation may be specially important. However, no conclusions in this respect can be drawn from the analysis. Indeed, in some cases no more than three commodities make up nearly the whole tonnage shipped: the traffic between Argentina and Colombia, in which beef fat and tallow represent two-thirds of the total movement of general cargo; the trade flow between Brazil and Chile, which consists almost entirely of coffee and maté; and that between Brazil and Mexico, comprising rubber. On the other routes, there is no marked preponderance of any small group of commodities. It cannot be said that there is any definite uniformity in this respect. That is not the problem, but rather that this same situation is found on practically all the other routes for which the most satisfactory model is different. This was only to be expected, since, as exports from the various Latin American countries are fairly similar in structure, it may be assumed that the composition of their export trade to different destinations is also very much alike. Brazil's major exports to Chile are, in general, the same as its most important exports to virtually all the other countries. Accordingly, a similar analysis of the twenty-three routes for which the model with two independent variables was adequate led to much the same results as that obtained for these 6 routes.

Lastly, an explanation may lie in finding a more general difference in the trade on those routes, considering the traffic in both directions and studying in detail the structure of the trade between the countries concerned. This would require a detailed study of the structure of Latin American imports, a subject which was not included in this investigation.

The difficulty of explaining the fact that the models applicable to some routes are different from those applicable to others is even greater if an attempt is made to explain those cases where no reduced model had any statistical significance. As indicated above, in these specific cases other variables besides those included in the general model may be important, or measurement problems may be more significant.

/The problem

The problem is to determine why such circumstances arise precisely on these routes. From the analysis it seems that the most reasonable explanations, which should be studied in detail, relate to the characteristics of the commodities included in the sample and to the very nature of the trade in both imports and exports. In some cases, such as the route between Chile and Colombia, the number of observations are so few that it is scarcely possible to obtain conclusions of any statistical significance. On the other hand, it is clear that the characteristics of the trade conducted between Venezuela and the United States differ substantially from the general features of Latin American foreign trade, including the movements of general cargo, so that special results were to be expected on that route. Trade between Brazil and Chile also seems to have some characteristic features, for reasons which have not been definitely established, since in both directions the results are different from those for the majority of the routes: on the route from Chile to Brazil the reduced models tried out are not applicable, and in the opposite direction the cost factors do not seem to weigh very heavily. Strange to relate, however, on the remaining routes between the Atlantic and Pacific coasts of South America the results were "normal", in the sense that they did not differ greatly from those found on the rest of the routes analysed.

An explanation for these two types of special cases may lie in the fact that it was necessary to apply the freight rate for cargo n.o.s. to an extraordinary number of commodities not explicitly mentioned in the tariff. Obviously, the n.o.s. is a general freight rate and bears no relation to the commodity to which it may be applied. Thus the model may attempt to find a rational procedure where, in fact, there can be none.

Table 25 was prepared with the purpose of quantifying the importance of this factor on the routes analysed. One of the columns indicates the proportion of the commodities on each route to which the freight rate for cargo n.o.s. was applied. It will be noted that on many routes this was not applied, and that on an average it represented a proportion of only 14.3 per cent. There are, however, some extreme cases in which

/this proportion

this proportion was as high as 57.1 per cent. If a study is made of the two groups of routes for which the reduced model, applied to the majority of them, was inadequate, it will be noted that the proportion of freight rates for cargo n.o.s. was lower than the average. The peak was 15.8 per cent. On 3 of the four routes for which no model was adequate, there was no commodity to which the n.o.s. rate had to be applied.

This may mean that the higher the proportion of freight rates for cargo n.o.s., the more chance there will be that the reduced model with two independent variables is the most suitable. The conclusion is quite wrong, however, since on the twenty-three routes to which the reduced model was applied the proportion of freight rates for cargo n.o.s. varied widely. It was very low in some cases, and it is impossible to determine a logical causal relationship between the two conclusions.

The effect of these freight rates for cargo n.o.s. on the results obtained depends largely on their nature. These rates are said to be established in accordance with two criteria. First, that they should represent the average freight rate that a conference or agreement may set for a particular route, taking care not to discourage the shipment of new commodities and, as far as possible, with a view to simplifying the tariff structure. Secondly, they may be established at a very high level, by way of indicating that they are applicable only to sporadic traffic. Freight rates for cargo n.o.s. are expressed in terms of weight or measurement, the shipping company being entitled to use whichever suits it best. It has always been argued that it is impossible to compare the level of these freight rates with an average rate per ton, since it is not known to which commodity the freight rate for cargo n.o.s. is being applied. In order to make this comparison, the simple average freight rate per ton was estimated for each route, and to obtain the freight rate per ton for this n.o.s. cargo, the stowage factor used was the average stowage factor for all the commodities carried on the route, which is equal to that implicit in the simple average freight rate.

/This calculation,

This calculation, which is also shown in table 25, reveals some interesting results. On none of the routes is the freight rate for n.o.s. cargo lower than the simple average freight rate for the route. On only two of the thirty-three routes the two values were approximately the same. The freight rate for n.o.s. cargo was as much as 130 per cent of the simple average freight rate on four routes, it was 131 to 150 per cent on three routes, 151 to 175 per cent on fourteen routes, 176 to 200 per cent on four routes, and over 200 per cent on six routes. These are even minimum proportions, since the rates for n.o.s. cargo that had to be applied were already considered in estimating the simple average freight rate. It is therefore logical to expect that inasmuch as their share of the total is greater, the difference between the values studied will be smaller, as happens for example on route 113.

The conclusion reached is that in most cases the freight rate for n.o.s. cargo was not established with a view to representing the average freight rate for a route. It is really one of the highest freight rates in the tariffs. Therefore, this conclusion must be taken expressly into account in evaluating possible distortions in the results of the model deriving from the use of these freight rates.

In this whole search for explanations, the distortions that may arise in certain circumstances, owing to the stowage factors, must always be kept in mind. A study of table 21 shows that the stowage factor does not seem to be important in seeking an explanation of the fact that both of the reduced models (equations 10 and 11) are appropriate on different routes. Of the six routes for which equation 11 appears adequate, the proportion of freight rates based on measurement varies too widely to give any conclusion in this respect. The situation is different on the 4 routes for which no reduced model is adequate, since on 3 of them - the exception being that from Venezuela to the United States - the proportion of freight rates based on measurement is very low. In one case there are no freight rates of this type, and in the other two the proportions are 5.9 and 10 per cent, respectively. It may well be, therefore, that these are cases in which due weight has not been given to the stowage factors, and that not many freight rates based on measurement were even established.

/Table 25

Table 25

COMPARISON BETWEEN THE LEVEL OF FREIGHT RATES FOR CARGO N.O.S. AND THE SIMPLE AVERAGE FREIGHT RATE FOR THE VARIOUS ROUTES, 1966

Route number	Countries linked up	Number of observations	Number of freight rates for cargo n.o.s.	Freight rates for cargo n.o.s. as a percentage of total	Simple average freight rate on route (dollars per 1,000 kg)	Average stowage factor (cu.ft. per 1,000 kg)	Freight rate for cargo n.o.s. W/M	Freight rate for cargo n.o.s. W	Freight rate for cargo n.o.s. as percentage of average freight rate
1	Argentina - Brazil	26	3	11.5	28.77	70.50	25.00	50.00	173.8
2	- Colombia (Pacific)	11	0	-	52.36	70.91	67.00	134.53	256.9
3	- Chile	27	2	7.4	37.26	77.93	27.50	60.68	162.9
8	- Venezuela	16	2	12.5	67.44	80.62	59.50	135.83	201.4
18	- United Kingdom/ Continent	35	6	17.1	57.09	73.97	41.50	86.93	152.3
19	- Mediterranean	24	3	12.5	46.22	74.75	36.00	76.20	164.9
21	- United States (Atlantic)	24	1	4.2	89.28	85.75	80.00	171.50	192.1
22	Brazil - Argentina	44	3	6.8	38.23	74.57	25.30	53.42	139.7
24	- Chile	22	1	4.5	60.22	75.68	35.20	75.43	125.3
26	- Mexico (Atlantic)	13	1	7.7	85.61	65.77	66.00	122.92	143.6
40	- Mediterranean	30	3	10.0	62.78	64.80	M 60.50	111.01	176.8
41	- Japan	17	0	-	48.19	56.47	77.00	108.70	225.6
42	- United States (Atlantic)	39	4	9.7	89.33	81.31	68.50	157.71	176.5
46	Colombia - Ecuador	15	6	40.0	39.25	76.87	23.00	44.20	126.1
64	Chile - Argentina	23	1	4.3	33.71	68.65	27.50	53.46	158.6
65	- Brazil	15	0	-	33.03	69.33	35.20	63.12	191.1
66	- Colombia (Pacific)	10	0	-	27.45	61.50	30.00	46.12	168.0
69	- Peru	22	1	4.5	30.22	72.04	23.00	46.92	155.3
84	- United States (Atlantic)	19	1	5.3	68.16	71.32	80.00	142.64	209.3
106	Mexico - Argentina	12	3	25.0	69.67	58.17	66.00	108.72	156.0
107	- Brazil	12	2	16.7	62.48	56.42	68.00	108.64	173.9
108	- Colombia (Pacific)	17	0	-	84.00	72.65	64.50	132.69	158.0
111	- Peru	13	0	-	64.96	74.61	64.50	136.27	209.8
113	- Venezuela	19	9	47.4	87.00	86.58	M 36.00	88.26	101.4
114	- Costa Rica (Pacific)	20	3	15.0	78.20	82.40	56.50	131.83	168.6
119	- Nicaragua (Pacific)	16	2	12.5	90.72	95.50	56.50	152.79	168.4
123	- United Kingdom/ Continent	28	16	57.1	194.87	85.89	111.30	238.98	122.6
124	- Mediterranean	12	6	50.0	177.44	83.75	111.30	233.03	131.3
130	Peru - Chile	11	0	-	26.04	66.36	23.00	43.22	166.0
131	- Ecuador	13	10	7.7	28.42	58.23	20.00	29.11	102.4
147	- United States (Atlantic)	19	3	15.8	79.85	65.26	80.00	130.52	163.5
165	Uruguay - United Kingdom/ Continent	15	0	-	89.13	80.00	50.50 a/	114.40	128.4
189	Venezuela - United States (Atlantic)	10	1	10.0	60.55	76.50	75.00	143.44	236.9
	Total	649	93	14.3					

Source: Annexes 1 and 12.

a/ Plus 1.5 per cent ad valorem if the value is over 1,400 dollars per 1,000 kg.

/The interpretation

The interpretation of the results obtained from the multiple regression models cannot be considered complete without an analysis of the actual equations and of the relative importance of each of the variables in explaining the freight rate structure. The basis for this analysis is the data contained in tables 23 and 24. The first step is to analyse the results for the 23 routes on which the best model is that represented by equation 10. It is immediately obvious that, even in this simplified model, some correlation and regression coefficients are not statistically significant. Of the correlation coefficients, this occurs on only 1 of the 23 routes, which indicates that, although the model represented by this regression equation yields better results than any of the other models tested, it has only relative validity as an explanation of the differences in freight rates per ton on that route.

The lack of statistical significance of the regression coefficients is also of general importance with respect to the subject under study. It should be taken to mean that, although the model, as such, is adequate as an explanation of the real situation, its internal structure is not sufficiently precise conceptually to evaluate the relative importance of the various factors. The problem is not very serious, since in most cases the regression coefficients of the two variables are significant and only the constant is not. This may mean that the form of the equation is neither linear nor logarithmic, but of another more complex type, or that the number of observations used on the majority of the routes was insufficient to enable the significance of this constant to be clearly specified.

With respect to the structure of the equations themselves, the conclusion is that in every case the differences between the freight rates per ton for different commodities are explained by the effect of the two independent variables, not by the value of the constant in the equation. This conclusion is important, since it might be thought that these differences are very small or non-existent. In that case the average of the freight rates concerned would be the best "model" to represent the structure on a route.

/It is

It is difficult, on the whole, to determine the relative importance of the value of the commodity and the stowage factor in explaining those differences. This depends, for each route, on the values of the respective coefficients and of the variables themselves. The values of the coefficients vary considerably from one route to another. The coefficients for the value of the commodity cover a wider range, from 0.00148 to 0.0393 (this variable is expressed in dollars), while the stowage factor coefficients range from 29 to 244 (this variable is expressed in hundreds of cubic feet). Therefore, these differences give rise to different situations on each route.

As regards the value of the variables themselves, there are also greater variations in the value of the commodities than in the stowage factors. The stowage factors are nearly always between 60 and 120 (cubic feet per ton), but the value of the commodities fluctuates much more widely, generally between 100 and 2,000 dollars per ton, and in some extreme cases it reaches much higher values.

The combination of these factors will explain in each case the differences between the freight rates for the commodities on each route and will determine the relative importance of each explanatory variable. In any case, a detailed analysis of the available data and of the equations for each model leads to the conclusion that in the majority of cases the stowage factor accounts for most of those differences, although often the value of the commodity is the most important factor. See detail in annexes 1, 9 and 12.

Attention must be drawn once again to the importance of this conclusion, which complements that set forth above regarding the importance of a demand factor (the value of the commodity) and a cost factor (the stowage factor) as explanations of the freight rate structure. The general conclusion is that the relative importance of each of these two variables on a route will depend on the nature of the commodities concerned. For some of them, the shipping companies seem to be in a position to charge "what the traffic will bear". In most cases, however, the cost factor appears to be decisive. These comments relate to the sample of commodities used, which means that it is applicable to the region's major present and potential exports.

/The second

The second conclusion drawn from those results relates to the method which the companies seem to use in assigning common costs. One hypothesis deriving from these conclusions, which needs to be tested, is that the shipping companies assign the common costs for a voyage according to the physical characteristics of the various commodities, as reflected by the stowage factors.

Another aspect of the structure of the equations is the behaviour of the constant, which varies widely between one route and another, and in several cases is negative. This is an unusual result, especially when the constant is negative. However, the much discussed question of freight rates based on measurement seems to provide a clear explanation of this situation. Table 26 shows the values of the regression coefficients for the models represented by equations 9 and 10 for the six routes for which these models were considered, first including the observations in terms of freight rates based on measurement, and then without them. The result clearly indicates that the most striking effect of the inclusion of these freight rates based on measurement on the actual form of the equations is to accentuate, in greater or lesser degree, the importance of the regression coefficient for the stowage factors, and proportionally to reduce the value of the constant, in some cases making it negative. There are also routes on which a high proportion of the freight rates are based on measurement, yet the constant is positive, but in practically all of them the value of this term is low. Some of these variations may be ascribed to the relative importance of the stowage factors as explanatory elements on the different routes.

These general conclusions are confirmed by analysing the structure of the equations for the six routes on which the model had only one independent variable - the value of the commodity - and one constant. In this case, the constant is obviously higher, since there are more variables implicit in it, and the importance of the only explanatory variable changes a great deal between the different routes. Furthermore, the results of this equation confirm those obtained from the equation applied to the twenty-three routes, since the new constant reflects the effects of the constant of the participation or influence of the stowage factor variable of the former equation (see annex 12).

/Table 26

Table 26

MODELS OF THE STRUCTURE OF MARITIME FREIGHT RATES
ANALYSIS OF THE EFFECTS ON THE REGRESSION EQUATIONS FOR SIX ROUTES OF NOT INCLUDING FREIGHT RATES BASED ON MEASUREMENT

Route number	Countries linked up	Number of observations	Multiple correlation coefficients	Regression coefficients				
				X_2	X_4	X_5	X_6	X_7
A. Results of equation 9, if the rates based on measurement are included ($x_1 = b_1x_2 + b_2x_4 + b_3x_5 + b_4x_7$)								
1	Argentina-Brazil	26	0.819	0.00499	0.547a/	-0.551a/		16.91
3	Argentina-Chile	27	0.755	0.00753	0.409a/	0.672a/		19.37
18	Argentina-United Kingdom/ Continent	35	0.594	0.0114	0.260a/	-8.118a/		43.50a/
22	Brazil-Argentina	44	0.632	0.00512	0.0223a/	-0.457a/		30.05
64	Chile-Argentina	23	0.718	0.0126	0.736	0.0308a/		10.92a/
84	Chile-United States and Canada	19	0.961	0.0183	0.704a/	-0.480a/		14.23a/
B. Results of equation 9, if the rates based on measurement are excluded								
1	Argentina-Brazil	18	0.293a/	0.00146a/	0.100a/	-0.0135a/		18.68
3	Argentina-Chile	20b/	0.733	0.0166	-0.234a/	1.071a/		23.13
18	Argentina-United Kingdom/ Continent	26	0.395a/	0.00166a/	-0.280a/	-3.233a/		41.61
22	Brazil-Argentina	28	0.892	0.00746	0.387a/	-0.126a/		18.56
64	Chile-Argentina	19	0.356a/	-0.00206a/	0.0718a/	-0.582a/		32.51
84	Chile-United States and Canada	15	0.589a/	0.00856a/	-0.154a/	-3.398a/		38.43
C. Results of equation 10, if the rates based on measurement are included ($x_1 = b_1x_2 + b_2x_6 + b_3x_7$)								
1	Argentina-Brazil	26	0.809	0.00427			15.63a/	12.16a/
3	Argentina-Chile	27	0.926	0.00524			39.35	-1.12a/
18	Argentina-United Kingdom/ Continent	35	0.692	0.0103			84.73	-18.31a/
22	Brazil-Argentina	44	0.752	0.00343			34.25	6.75a/
64	Chile-Argentina	23	0.821	0.0121			28.96	5.45a/
84	Chile-United States and Canada	19	0.955	0.0181			11.09a/	21.23a/
D. Results of equation 10, if the rates based on measurement are excluded								
1	Argentina-Brazil	18	0.271a/	0.00111a/			2.29a/	18.45
3	Argentina-Chile	20b/	0.871	0.0109			28.81	3.44a/
18	Argentina-United Kingdom/ Continent	26	0.643	0.00209			36.19	8.88a/
22	Brazil-Argentina	28	0.908	0.00681			10.14	14.97
64	Chile-Argentina	19	0.571	0.00229a/			21.48	15.97
84	Chile-United States and Canada	15	0.614a/	0.00855a/			17.24a/	23.19

a/ Non-significant coefficients.

b/ Only 17 observations were used in adjusting the regression equation.

x_1 – Freight rate per ton of each commodity on a route, in dollars.

x_2 – Value per ton of each commodity on a route, in dollars.

x_4 – Insurance premium for each commodity on a route (per cent).

x_5 – Proportion of total cargo carried over a route represented by each commodity (per cent).

x_6 – Stowage factor, in cubic feet.

x_7 – Reflects the constant in the equation, so that $x_7 = 1$.

/The six

The six routes for which this model, with only one independent variable, is the best are characterized by the greater relative importance of the value of the commodity as an explanatory element of the freight structure. To illustrate this, a case corresponding to this model may be compared with another in which the model with two independent variables was applied to twenty-three routes. On route 3, which covers trade between Argentina and Chile, the use of the model with two independent variables would indicate, in the case of a commodity with a stowage factor of 100 (cubic feet per 1,000 kg) and a f.o.b. value of 1,000 dollares per ton, that the freight rate would be determined by 39.35 dollars derived from the stowage factors, plus 5.24 dollars derived from the value of the commodity, to which would be added the constant, which in that equation is negative and equal to 1.12 dollars. The freight rate for a commodity under those conditions would be expected to be 43.47 dollars per ton, or 15.36 dollars per cubic metre. As may be observed, the effect of the value of the commodity is not important, the stowage factor being the key element. Conversely, in the case of route 24, which links Brazil and Chile and corresponds to the model analysed, the freight rate for a commodity with a f.o.b. value of 1,000 dollars per ton would be 50.14 dollars, determined by the constant - in this case, 39.64 dollars - plus the incidence of the value of the commodity - 10.50 dollars - which represents a substantially higher proportion than in the previous example. As regards the four routes to which it was not possible to apply a reduced model, the analysis of the regression coefficients and their statistical significance is not too important, since these are cases in which the general model used was evidently not very successful. The freight rate structure depended on factors that were not considered in the approach to this study.

A point of additional interest with respect to all the results described thus far is to find some special difference between the intra-regional and extra-regional routes. If the results shown in tables 21, 23 and 24 are analysed, it may be inferred that it is impossible to arrive at any important conclusion in this respect. There are twelve extra-regional routes out of the thirty-three selected as a basis for this analysis, and they are distributed in the same proportion as the intra-regional routes among the three types of models which were ultimately applicable to all of them.

/Once the

Once the general results of these models relating to the structure of freight rates are known, each of the working hypotheses can be considered again, with a view to analysing the pertinent conclusions. These are as follows:

(a) Hypothesis 1 sustains that the freight rates per ton are equal to the average cost of transport. In this respect, the results indicate that on most of the routes the freight rate per ton for each commodity bears no relation to an average freight rate as such, but is basically related to the stowage factor, which means giving particular consideration to individual costs. This is concluded from the fact that the constant is not significant.

(b) Hypothesis 2 postulates that on a specific route the freight rates for commodities of more intrinsic value will be higher than those for less valuable commodities.

This hypothesis may be said to have been proved through the application of the model. In fact there is a positive relationship between the value per ton of a commodity and the freight rate involved. This relationship appeared as significant in all the models tested, both general and reduced. The relationship between the two variables is positive on all routes where use was made of the model in which the value is the only independent variable. In the reduced model, where the stowage factors also appear as a variable, the regression coefficient for the value is negative on four routes (46, 119, 130 and 131), which means that in those cases the freight rates are lower for the more valuable commodities. In the general model, this situation occurs on routes 107, 119, 130 and 131 (see annex 12).

The cause must be sought basically in the composition of the sample used, and also in the number of observations, since these are the routes for which the fewest observations are recorded. Nor are the regression coefficients statistically significant, so these cases cannot be seriously considered as exceptions to the general conclusion.

The outstanding feature of the value of the commodity is, as mentioned above, its varying effect on the freight rate structure.

(c) Hypothesis 5 sustains that the higher the handling costs on a given route that are directly attributable to each commodity, the higher will be the freight rates for the commodities in question.

/The results

The results of the models used appear to disprove this hypothesis in the form in which it was set forth. The general model indicates that the regression coefficient for this variable was not significant on any of the routes; moreover, these coefficients were completely heterogeneous, many of them being negative. This would indicate that the freight rates per ton are lower if handling costs are high.

A possible explanation may lie in measurement problems; thus, the handling costs included in the model may not represent the true situation. This does not seem to be the case, however, since a very broad index was used for the purpose, as detailed in annex 6. Another possibility is that this variable is directly related to the stowage factors, which have been used to represent the transport costs of specific types of commodities. In this case their inclusion as an independent variable adds nothing to the model, which would account for the results obtained.

Moreover, the results of the reduced model which includes the value and stowage factors are so satisfactory on most routes that the possible importance of other variables in explaining the freight rate structure is negligible.

(d) Hypothesis 7 maintains that the freight rate for a commodity will be higher if there are special risks of theft or damage which also affect some of the other cargo.

The results of the study seem to disprove this hypothesis for the majority of cases. It will be recalled that this element was introduced in the model through the use of insurance premiums on the merchandise. The corresponding regression coefficient in the general model was significant only for routes 24, 64 and 65 (see annex 12). These incidentally are some of the few routes to which the reduced model with two independent variables could not be applied, thus showing that they are special cases in which this factor may, in fact, have some influence.

Measurement problems may also have arisen here, since it is possible that the insurance premiums on merchandise do not properly reflect the difficulties and risks it is wished to measure, or that other factors are also taken into account in determining them. The analyses indicate, however, that such insurance premiums were established on purely technical bases and therefore, they should accurately represent the possibilities of risk and theft in respect to the merchandise. Distortions may also occur in the case of new commodities which are beginning to move on some routes, where no experience has

been accumulated for establishing the optimum premium. In any case, the shipping companies do not seem to attach much importance to this factor and, except in extreme cases, it does not affect the establishment of freight rates.

A last possible explanation may relate to the problems of multicollinearity, but it may be inferred from the outset that this variable will not be related to any other one in the general model; definitely not with the stowage factors, the only possibility being that it may be related to the value of the commodity. This possibility was analysed, however, and no statistically significant relationship was found.

(e) Hypothesis 10 postulates that the bigger the share of a commodity in the total quantity moving on a route, the lower will be the freight rate per ton of that commodity.

This hypothesis is also disproved by the results of the model, which indicate that the quantity of the commodity transported is unimportant as an explanatory variable. The corresponding regression coefficients in the general model were not significant in all but one case, which means that the variable is of no great importance. As in the case of the variables discussed above, these results were corroborated by simple regressions in which the only independent variable was the one it was wished to analyse.

Nor can there be important measurement problems in relation to this variable, since the data were taken from the foreign trade yearbooks of the respective countries which are presumably accurate, nor multicollinearity problems, since there is no clear relationship between this variable and any other. Therefore, the conclusion seems to be well founded that the quantity transported is of little significance in accounting for the differences in freight rates per ton.[13/]

13/ Several tariffs provide for reductions in freight rates if a minimum quantity, generally a few hundred tons, of a specific commodity is loaded by one shipper for a single consignee. Such reductions were not taken into account in this study. It is only logical, however, that if complete shifts can be worked in loading and discharging one commodity, whether in bags, bales, boxes or barrels of the same size, the operations will be performed much more rapidly, with the resulting saving in costs. This can serve as a basis for formulating a new hypothesis which may help to explain the structure of freight rates in some cases, and which would relate the size of the individual consignments with the freight rates charged per ton.

/Nevertheless, it

Nevertheless, it is interesting to note that the general model showed that in most cases the freight rate increases in indirect proportion to the quantity, that is, the freight rate will be lower if a larger quantity is shipped, which is in any case a logical result. In annex 12 it will be noted that most of the regression coefficients for this variable are negative.

(f) The last hypotheses that were tested directly with the model related to the stowage factors.

These hypotheses were definitely confirmed. The conclusions indicate that the stowage factors, as representative elements of the operational costs of a vessel and of a certain system of distribution among the various commodities, as adopted by the shipping companies, provide one of the best explanations for the structure of freight rates, together with the value of the commodities.

The stowage factors are highly significant in absolute terms, since, as shown in previous sections, they play an important part in determining the freight rates.

The relationship between the freight rate and the stowage factor is generally positive, except on route 41 in the general model. This case does not affect the general conclusions, however, since none of the models applied to route 41, covering trade from Brazil to Japan, gave satisfactory results.

The consequences of this result have already been analysed in the earlier sections.

The foregoing results related to the confirmation or rejection of the hypotheses by means of the general multiple regression model. Some hypotheses cannot be analysed on the basis of this model and require separate treatment. These hypotheses are discussed below.

(a) Hypothesis 4 sustains that the freight rate for a specific commodity will be lower if its quantity and nature are such that it may be carried as a full cargo by tramp.

This hypothesis was formulated in general terms and it must be properly defined in order to prove or disprove it. One possibility would be to compare the freight rates for commodities in that situation with the average rate for all commodities transported on a given route, the expected result being that

/they would

they would be lower than the average. Since this average is not weighted by any factor that might reflect the relative importance of the different commodities, it would be greatly influenced by the composition of the sample used in each case. The importance of valuable manufactures moving on a small scale means that in most cases the simple average freight rate must have an upward bias or margin of error. In other words, it is higher than the average that would be obtained if the freight rates were weighted, for example, by the tonnage of each commodity.

If the direction of the bias is known, this hypothesis can be confirmed or rejected. Table 27 includes the commodities that may go by tramp on the 33 routes that were analysed in detail in the general model, and indicates their freight rate per ton as compared with the average for the route.

The table confirms this hypothesis, since the freight rates for the commodities listed therein are all lower than the average for the route. It is also particularly significant, owing to the bias of this average, that in every case the rate for the commodity concerned is far below the average; thus any change in the method of defining the average would not alter this conclusion.[14/]

In many other cases in which tramps offer keen competition, the conferences leave the freight rate open, so that in each case it can be established by agreement between the interested parties or in consultation with the conference authorities. In any case, it may be assumed that the freight rates thus agreed upon will be lower than the average on the route, as otherwise the "open rate" would make no sense.

(b) Hypothesis 8 sustains that the freight rates will be higher for those commodities which require special transportation facilities. The argument is that such facilities entail higher costs, which the freight rate must cover.

14/ Strictly speaking, the relationship found between the value of the commodity and the possibility of shipping it by tramp is not a legitimate basis for confirming or rejecting this hypothesis, since it is equivalent to hypothesis 2, which relates the freight rate to the value of the commodity.

/Table 27

Table 27

COMPARISON BETWEEN FREIGHT RATES FOR COMMODITIES THAT MAY BE TRANSPORTED AS COMPLETE CARGOES AND THE SIMPLE AVERAGE FREIGHT RATE FOR VARIOUS ROUTES, 1966

Commodity	Route number to which the observation is applicable	Countries linked up	Freight rate per ton	Simple average freight rate for the route
			(dollars)	
Paddy rice	165	Uruguay-United Kingdom/Continent	20.00	89.13
Semi-refined sugar	123	Mexico-United Kingdom/Continent	Open	187.52
Barite (natural barium sulphate)	42	Brazil-United States and Canada	32.50	89.33
	130	Peru-Chile	16.40	26.04
	131	Peru-Ecuador	14.84	28.42
	147	Peru-United States and Canada	Open	81.12
Forage barley	1	Argentina-Brazil	16.00	28.77
	19	Argentina-Mediterranean	Open	46.22
	165	Uruguay-United Kingdom/Continent	15.00	89.13
Fertilizers/urea	106	Mexico-Argentina	29.50	69.67
Fish meal	147	Peru-United States and Canada	29.00	81.12
Maize	40	Brazil-Mediterranean	29.00	62.78
	41	Brazil-Japan	22.64	51.09
	114	Mexico-Costa Rica	22.00	86.60
	119	Mexico-Nicaragua	22.50	105.31
Manganese ore	84	Chile-United States and Canada	14.27	67.64
Common salt	65	Chile-Brazil	19.80	33.03
	108	Mexico-Colombia	Open	91.29
Wheat	2	Argentina-Colombia	28.50	52.36
	3	Argentina-Chile	Open	37.26
	165	Uruguay-United Kingdom/Continent	8.40	89.13

Source: Annex 1.

/In order

In order to test this hypothesis, some commodities which require refrigerated transportation (pineapples, bananas, citrus fruits, apples, fish and beef) have been included in table 28, together with their respective freight rates per ton and the average rate on the respective route.

The results show that, broadly speaking, this hypothesis is also proved, since in most cases the freight rate is actually higher than the average. The results are not so conclusive as in hypothesis 4, however, since the differences between the freight rate and the average are not so marked. Therefore, even taking into account that the average rate may be over-estimated, the actual nature of the sample used to calculate this average may cause these conclusions to alter in those cases where the difference between the freight rate and the average is small. This happens in the transport of pineapples on route 22, bananas on route 40, citrus fruits on route 18, apples on route 21, fish on route 42, and beef on route 165.

2. The level of freight rates

The study of the level of maritime freight rates consisted in an analysis of the variations in the rate per ton for the same commodity over different routes. Its purpose was to determine the factors that underlie these variations and the relative importance of each one. The method of analysis adopted was the same as for the structure of freight rates, namely the testing of a set of hypotheses:[15/]

4. "The freight rate for a specific commodity will be lower if its quantity and nature are such that it may be carried as a full cargo by tramps."

15/ The numeration used here will be the same as in the previous section to avoid confusion.

Table 28

COMPARISON BETWEEN FREIGHT RATES FOR COMMODITIES TRANSPORTED IN REFRIGERATED HOLDS AND THE SIMPLE AVERAGE FREIGHT RATE FOR VARIOUS ROUTES, 1966

Commodity	Route number to which the observation is applicable	Countries linked up	Freight rate per ton	Simple average freight rate for the route
			(dollars)	
Pineapples	22	Brazil-Argentina	35.00	38.23
	123	Mexico-United Kingdom/Continent	110.00	187.52
	130	Peru-Chile	25.00	26.04
Bananas	40	Brazil-Mediterranean	84.00	62.78
	189	Venezuela-United States and Canada	Open	60.55
Citrus fruits	18	Argentina-United Kingdom/Continent	60.80	57.09
Apples	1	Argentina-Brazil	47.00	28.77
	8	Argentina-Venezuela	95.00	67.43
	18	Argentina-United Kingdom/Continent	79.55	57.09
	21	Argentina-United States and Canada	108.35	89.28
	69	Chile-Peru	60.00	30.22
Fish	19	Argentina-Mediterranean	60.00	46.22
	22	Brazil-Argentina	90.00	38.23
	42	Brazil-United States and Canada	101.62	89.33
	64	Chile-Argentina	66.00	33.71
	84	Chile-United States and Canada	95.00	67.64
Beef	3	Argentina-Chile	66.00	37.26
	18	Argentina-United Kingdom/Continent	90.00	57.09
	42	Brazil-United States and Canada	134.84	89.33
	124	Mexico-Mediterranean	128.50	167.40
	165	Uruguay-United Kingdom/Continent	95.00	89.13

Source: Annex 1.

/This hypothesis

This hypothesis has already been put forward with respect to the rate structure. However, if the level of freight rates is to be analysed as indicated above, the hypothesis should be considered, as a commodity's possibilities of being carried by tramp on all routes are apt to vary a great deal, and this may explain the differences in the rate charged per ton. For instance, wheat and other grains can undoubtedly be carried from Argentina to Europe by tramp; indeed the bulk of them is shipped in this way, and conference freight tariffs give wheat an open rate.[16/] It may be inconvenient to ship it by tramp from Argentina on some of the other routes where small quantities are generally involved, and the freight conferences or agreements covering such routes are not seriously perturbed by the possibility of competition.

13. "The greater the number of lines that serve a specific route, the lower will be the general level of freight rates on it."

This presupposes that, in competitive conditions, the general level of freight rates will tend to be lower than when there is a monopoly situation.

It is presumed that the competitive conditions on the different routes are reflected in the number of lines that serve them. The fewer the lines operating on a route, the greater no doubt will be the possibility of exercising some degree of monopoly by means of a pooling agreement in certain fields of operation.

14. "The greater the proportion of vessels over ten years old operating on a specific route, the higher will the level of freight rates tend to be."

This hypothesis assumes a certain degree of monopoly power, since the increased costs involved in operating a fairly old fleet would be at least partly transferred to the users through a higher level of freight rates. Ten years is regarded as the age after which operating costs can be pressumed to start increasing appreciably.

The conferences will very probably include some members that have a relatively modern fleet and others with old ships. The former will

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16/ The regular liners often carry part cargoes of wheat in bulk, to insure maximum use of their carrying capacity.

press for a reduction in the freight rates in order to increase their share of the trade, and the latter for an increase so as to be able to cover their operating costs. It is assumed in this study that the rates are fixed at a level that reflects the differences in the average age of the ships owned by the various companies.17/

15. "The freight rate for a specific commodity carried between two ports (in one direction) will be higher if this direction coincides with the main over-all flow of trade over the most important section of the route."

The factor considered in this hypothesis is the influence that may be exercised on the level of freight rates by the direction of the over-all flow of trade on a route. The main premise is that, if trade between two ports is unbalanced, the general level of rates will be higher in the direction of the main flow of trade, since this is the factor that determines the total tonnage requirements. It should be lower over the section where traffic is at a minimum, as the marginal cost of transporting more cargo over that section is low.

This line of reasoning must be extended to a complete route including various ports of call, since regular liner services usually operate on such a basis. In this case, various imbalances in the flow of trade may be found in both directions between pairs of ports, so the solution becomes more complicated. The hypothesis put forward assumes that the section on which over-all traffic (measured in ton/miles) is greatest, determines the influence of this factor on the general level of freight rates. It also assumes that the level of rates

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17/ It is often argued that operating costs are similar in both old and new vessels, because the increased maintenance costs on the former are offset by the fact that amortisation need no longer be provided for. This is a moot point, since, in the first place, during the period of amortisation, which is usually fifteen to twenty years, operating costs rise as more repairs have to be undertaken, and this can only be partly compensated for by a system of amortisation on a decreasing scale. Secondly, it is doubtful whether the fact that amortisation ceases after fifteen to twenty years will offset for long the rapid increase in the cost of repairs.

will be higher when the direction of the traffic coincides with that of the main over-all flow of trade over the principal section of the route.

This entails a precise definition of the specific routes on which Latin American foreign trade takes place, so that the traffic between different pairs of ports can be assigned to them.

16. "The greater the distance over which a specific commodity is carried, the higher will be the freight rate."

The postulate in this hypothesis is simple. The operating costs of a vessel will tend to rise in proportion to the length of the voyage, and will be reflected in a higher freight rate.

17. "The freight rate per ton of a specific commodity on different routes will be higher on the routes on which port charges, including time spent by vessel in port, are also higher."

Port dues and charges (expenditure other than the cost of loading and discharging) are one of the components of operating costs. They vary from one port to another, thus determining the general level of costs on the different routes. It is assumed that the cost levels attributable to differences in the levels of port dues and charges will be reflected in the freight rates charged on the different routes.

18. "The freight rate per ton of a commodity will be lower the higher the total tonnage of that commodity carried over a particular route."

It might be expected that when a commodity is carried in large quantities over a certain route, its importance as part of the freight market and the possibilities of bargaining open to shippers might lead to a reduction in the rate that would be unobtainable on other routes on which it was carried only sporadically and in small quantities.

19. "Maritime freight rates between countries that have concluded bilateral agreements are higher than where such agreements do not exist."

This hypothesis presupposes that bilateral agreements which imply a monopoly prevent optimum organisation of shipping services on the routes concerned and protect inefficient carriers. The level of rates on those routes will therefore be higher than it would be without such agreements.

As in the study of the structure of freight rates, an analysis of these hypotheses indicates that they postulate a relationship between freight rates per ton for the same commodity on different routes and a

factor which may explain the differences in them. Hypothesis 13, for instance, assumes that the rates are related to the number of lines on each route; 14 is concerned with the age of the vessels serving those routes; 15 with imbalances in trade flow; 16 with distance; 17 with port charges; and 18 with the quantity of cargo carried. The other two hypotheses refer to more special cases, such as commodities which may be carried in tramps, and routes between countries with bilateral agreements. The first of these two will not be explicitly dealt with in this study.

A multiple regression model was again useful for examining the whole group of hypotheses at the same time.

The model had to be more complex in this case because a larger number of variables were involved. The dependent or explained variable was the freight rate per ton for the same commodity over a series of routes, while the independent or explanatory variables were those put forward in each hypothesis. The linear form of the model is as follows:

$$X_8 = b_1X_2 + b_2X_3 + b_3X_4 + b_4X_5 + b_5X_6 + b_6X_7 + b_7X_9$$

in which

X_2 is the number or regular shipping lines on each route

X_3 is the proportion of vessels over ten years old operating on each route

X_4 is the direction of the greatest volume of traffic on the principal section of the route to which a specific flow of trade between two countries has been assigned (dummy variable)

X_5 is the distance over which the cargo is carried, expressed in nautical miles

X_6 are the port costs on each route (port of loading plus port of discharging), in dollars

X_7 is the quantity of a single commodity carried on a certain route, in tons

X_8 is the freight rate per ton for a commodity on a route, in dollars

X_9 reflects the constant in the equation, so that $X_9 = 1$

The basis for the application of the model consisted of the 133 commodities that made up the sample used in the study, and the 193 routes. As already indicated, the main obstacle to the application of a multiple regression model is the number of observations available

/on each