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INTERNATIONAL TRADE RECONCILIATION STUDY

Report of the Secretary-General

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## INTRODUCTION

1. The production of an up-to-date statistical analysis of world trade with comprehensive details on country and commodity trade flows is one of the most important components of the programme of the United Nations Statistical Office. Member countries regularly report their trade statistics to the Office to assist in this task. However, not all can comply with the same timeliness, nor can all report with the same detail and frequency. Although the data banks of the Statistical Office cover 95 per cent of world trade, data related to the developing countries are often available only after a delay of two years. As a result, the picture of world trade assembled by the Statistical Office is marred by time gaps.
2. The Statistical Office has attempted, through the use of various devices, to fill these gaps in the matrix of world trade. Basically its attempts were confined to the direct replacement of missing data by counterpart statistics. That is, missing exports were replaced by the corresponding imports of the partner country and conversely for missing imports. But in making such imputations, the Statistical Office became increasingly aware of the degree of inconsistency between pairs of counterpart statistics noticeable even at very high levels of aggregation. The desire to improve the range of techniques available to estimate missing data, and the pressing need to do so for many of the developing countries converged with widespread interest in the results of a study carried out jointly by Canada and the United States of America, designed to reconcile their bilateral trade statistics. The appearance of this study 1/ was particularly timely, as it also pointed to practical ways of assessing the reliability of trade statistics. This last aspect bears directly on one of the items of the work programme of the Statistical Office, as formulated by the Statistical Commission at its seventeenth session. 2/
3. In consequence, a paper was presented at the fifth session of the Commission's Working Group on International Statistical Programmes and Co-ordination (ST/STAT/62) reviewing the research in North America and providing some measures of discrepancies between trade reports of a number of countries. The Working Group recommended (E/CN.3/442, para. 62) that a specific and detailed proposal be submitted to the Statistical Commission at its eighteenth session. The present paper contains such a proposal. In order to provide perspective, the paper also contains an analysis of the causes of discrepancies in international trade statistics (largely based on the North American experience), measures of the importance of discrepancies, an outline of methods for multilateral reconciliation studies and a list of some of the benefits which would accrue at national and international levels from such a programme.

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1/ The Reconciliation of U.S.-Canada Trade Statistics, 1970, published jointly by the Bureau of the Census, United States Department of Commerce, and Statistics Canada.

2/ Official Records of the Economic and Social Council, Fifty-fourth Session, Supplement No. 2, para. 193 (g).

4. The proposal and its supporting analysis are described below. The Statistical Office should carry out a comprehensive study using its international trade data files with a view to providing measures of the degree of inconsistency in counterpart statistics. This study would take the form of a variety of tabulations - some of them illustrated in annex II to this paper - displaying the differences between exports and matched imports for given pairs of countries and for different levels of detail in the commodity classification. These tabulations taken together would provide the basis for an attempt at classifying the inconsistencies and profiling countries according to the pattern of these inconsistencies. In addition, it is suggested that an expert group should be convened to study the results of the work undertaken by the Office, with a view to formulating a desirable programme of work. One item which would certainly come up for review would relate to the recommendations of concepts and definitions for the compilation of international trade statistics put forward in International Trade Statistics; Concepts and Definitions 3/ and the extent to which failure to adhere to them may be one of the root causes of the observed statistical inconsistencies. Another item which deserves general discussion is the degree of uniformity in understanding and applying the Standard International Trade Classification (SITC). This would be a suitable complement to the discussions at the Customs Co-operation Council on the consistency of applications of the Brussels Tariff Nomenclature. A fuller description of these proposals is given in annex I.

#### I. ACTION BY THE COMMISSION

5. The Statistical Commission may wish to comment on the proposal and supporting analysis and express its wishes on what further work, if any, should be carried out in this field.

#### II. THE NORTH AMERICAN EXPERIENCE IN RECONCILIATION

6. The following paragraphs briefly trace the background to the North American experience. In listing the scope and benefits of this exercise, an attempt is made to relate them to a more generalized situation as well as to define the role that the Statistical Office might play in future attempts to reconcile trade statistics.

7. The attempt by the United States and Canada to reconcile exhaustively the figures of their bilateral trade gave rise to an expensive research programme late in 1971. Some of the original impetus for the work arose from the obstacles to trade negotiations presented by inconsistent trade statistics. The extent of these inconsistencies is shown in the accompanying figure in terms of the difference between the two countries' reports of their bilateral trade balance in recent years. The inconsistencies in the statistics could not be explained by adjustments to aggregates based on known differences in concepts and definitions.

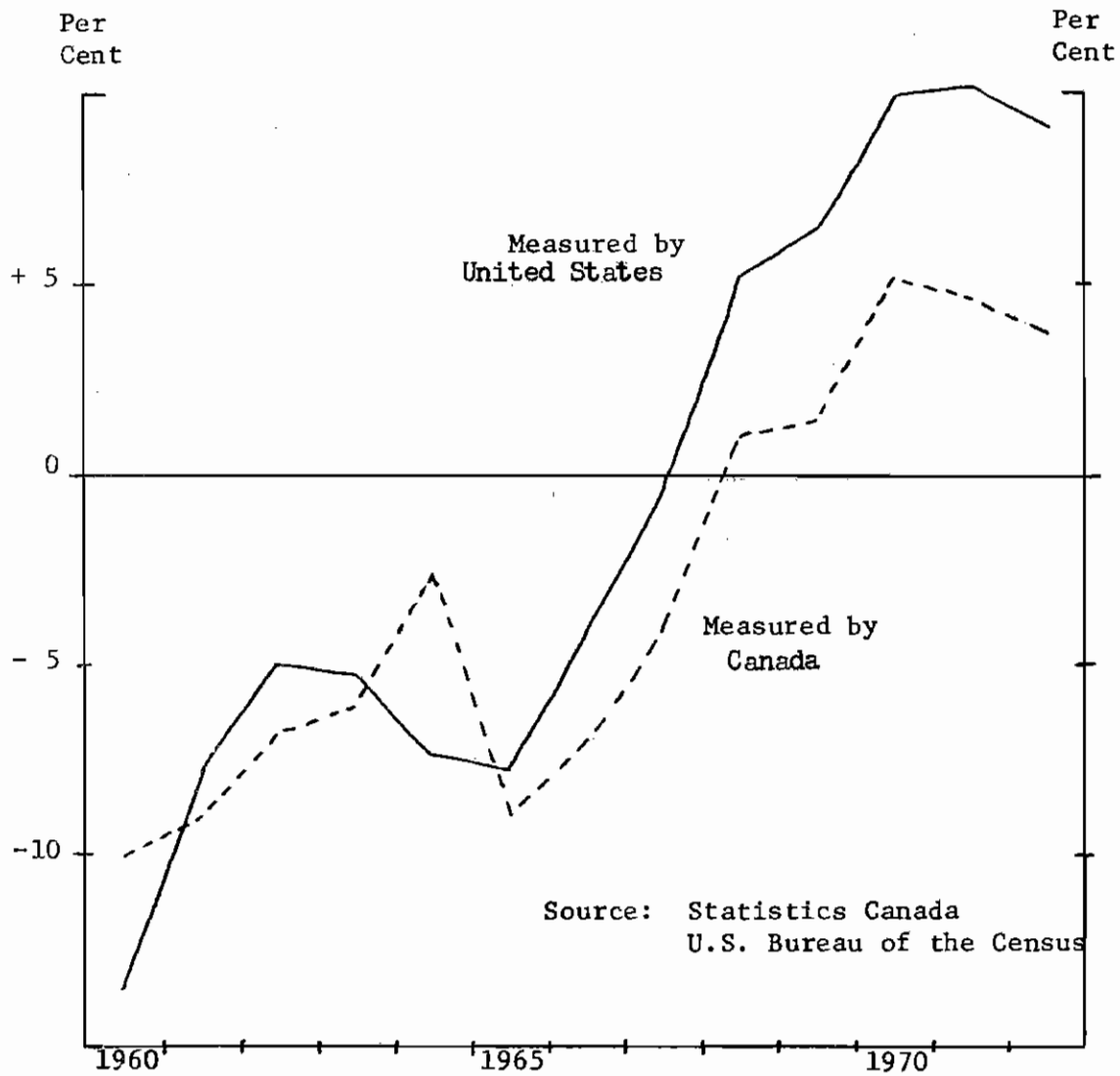
8. As preliminary discussions on the reconciliation programme got under way, it became evident that this programme, aside from facilitating trade policy discussions, was an opportunity to quantify the impact of the choice of definitions of international trade statistics made by each of the two countries, and to detect bias, if any, in the procedures and systems for processing those statistics. It

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3/ United Nations publication, Sales No.: E.70.XVII.16.

Figure

CANADIAN SURPLUS IN TRADE WITH THE UNITED STATES  
AS A PERCENTAGE OF TOTAL TRADE, 1960-1972



was felt that this would be helpful not only in the production of detailed monthly trade figures, but also in the interpretation of the trade aggregates. Indeed, in the case of Canada, trade is sufficiently important as a proportion of GNP to affect the interpretation of changes in over-all economic activity. The magnitude of the discrepancies between the two countries' respective reports of bilateral trade is shown in table 1.

Table 1. Discrepancies between United States and Canadian published measures of their bilateral trade  
 (in \$US millions)

	1970	1971	1972
Canadian exports	10,522	11,913	14,056
U.S. imports	11,092	12,691	14,907
Discrepancy	570	788	851
U.S. exports	9,084	10,365	12,415
Canadian imports	9,486	10,841	13,042
Discrepancy	402	476	627
U.S. deficit	2,008	2,326	2,492
Canadian surplus	1,036	1,072	1,014
Discrepancy	972	1,254	1,478

Source: Bureau of the Census, United States Department of Commerce, and Statistics Canada.

9. Following the successful completion of the first phase of the United States-Canada programme, exploratory talks on trade reconciliation took place between these two countries and Mexico. Officials of the Dirección General de Estadística had been concerned for some time with inconsistencies between their trade figures for Canada and the United States and the two sets of counterpart reports. Table 2 shows the extent to which the figures differ. One well-known problem in this regard has been that substantial exports from Mexico to Canada transit the United States, so that the identification of destination and origin is difficult for all concerned. Accordingly, it was recognized that reconciliation required the participation of the three countries involved in order to resolve trans-shipment problems in addition to other obvious causes of inconsistency such as the valuation of certain exports of primary commodities from Mexico. Studies are now being carried out by Mexican officials to improve the crediting of exports to the two countries and, of course, to resolve discrepancies arising from other causes.

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Table 2. Northbound trade between Mexico-Canada and Mexico-United States: a comparison of published figures  
 (in \$US millions)

<u>Country</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>
Mexico	12	18	20
Canada	47	50	53
Mexico	834	908	1,108
United States	1,219	1,262	1,632
Mexico	846	926	1,127
Canada and United States	1,266	1,312	1,685

Sources: Dirección General de Estadística, Mexico; Statistics Canada; United States Department of Commerce, Bureau of the Census.

### III. SOURCES OF INCONSISTENCIES IN INTERNATIONAL TRADE DATA

10. Some of the discrepancies between counterpart trade statistics arise from obvious inconsistencies between the conceptual frameworks employed by the trading partners. For example, international transportation costs cause import figures valued on a c.i.f. basis to exceed export figures valued on an f.o.b. basis. The effects of conceptual differences on geographical attribution (such as "special" vs. "general" systems of trade or "country of consignment" vs. "country of origin") <sup>4/</sup> cannot be resolved by estimation alone. Thus, for example, the Netherlands' import statistics fall far short of other countries' reports of exports to the Netherlands because the official trade figures published by the Netherlands are compiled on a "special" basis and therefore exclude entrepôt trade.

<sup>4/</sup> International Trade Statistics; Concepts and Definitions, United States <sup>Nations</sup> publication, Sales No.: E.70.XVII.16). General trade is defined as trade where the national boundary is the statistical frontier; it is thus a record of all goods entering or leaving a country. Special trade is defined as trade where the customs boundary is the statistical frontier. Only goods cleared through customs are therefore included in trade. Country of production or origin for imports is, generally speaking, the country where agricultural products were grown, minerals were mined and manufactured goods were manufactured either wholly or partly. Country of consignment, in the case of imports, is the country from which the goods were first shipped to the reporting country without any commercial transaction intervening between that country and the country of import.

Other identifiable conceptual differences in such matters as valuation and coverage are equally difficult to quantify unless several sets of trade figures, based on different concepts, are compiled simultaneously by the same country (an example is the recent decision in the United States to tabulate import figures both f.o.b. and c.i.f.).

11. Other sources of discrepancies arise from the use of customs administrative records in the compilation of trade statistics. Most trade statistics are compiled from complete monthly records of all transactions collected by customs administrations. This means that each separate transaction is measured by both the exporting country and, independently, by the importing country. However, these two measures typically do not receive the same kind of attention. The approach of customs administrations to the recording of export transactions is usually quite different from their approach to the recording of import transactions.

12. In many countries, few taxes or quantitative controls are applied to exports, with the result that the interest of customs authorities in the control and documentation of exports is limited. Such taxes or controls as may be applied do not usually affect more than a few commodities. It may therefore happen more frequently than is normally suspected that a significant number of export transactions are neither documented nor recorded. This has been discovered in recent years by the United States, Canada and the United Kingdom. <sup>5/</sup> Moreover, export documentation may suffer from inadequate commodity descriptions and other tabulated information in so far as it is not subject to thorough checking procedures administered by customs authorities.

13. Imports, on the other hand, are typically subjected to rigorous physical and financial controls because of the revenue-collecting and tariff-protecting responsibilities of customs. To this extent, it can be presumed that the documentation accompanying imported merchandise is generally more detailed and more complete than that prepared for exports and that the incidence of unrecorded transactions is smaller.

14. It should be noted, however, that the absence of any administrative controls on balance may improve the accuracy of reported values and quantities. For instance, countries which apply extensive quantitative controls or foreign exchange regulations to export transactions may be vulnerable to systematic understatement of the value or quantity of their exports. On the import side, the obvious relationship between customs duties paid and the value of transactions may lead to a similar bias. Furthermore, if the statistical values of imported goods are

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<sup>5/</sup> The Reconciliation of U.S.-Canada Trade Statistics, 1970, op. cit., table 1, p. 11: The United States found non-receipt of documents to be 5.6 per cent of its trade with Canada and Canada estimated its under-recording as 1.4 per cent of exports to the United States. Board of Trade Journal, 10 September 1969 and Trade and Industry, 25 November 1970: The United Kingdom found twice in succession a shortfall in export documents approximately equal to 2 per cent of total exports.

based on valuations established by customs officials for duty purposes, discrepancies between counterpart trade statistics will arise wherever the values declared on commercial invoices prove unacceptable to customs. Although intervention by customs officials to change valuation may be confined to certain classes of transactions - those between parent and subsidiary firms, for example, there are indications that the proportion of such transactions in total trade is increasing.

15. Further complications arise from conflicts between the respective administrative requirements of the statistical and customs agencies. For example, if certain customs documents became actually or potentially the object of legal scrutiny, they might be reported too late for inclusion in the statistics for the period to which they refer. Besides, technical difficulties may arise to prevent revising statistics already published. Such conflicts may end up by affecting significantly the statistical coverage or timing of trade transactions.

16. While in principle the sources of discrepancy can be catalogued by national statisticians, they are very difficult to quantify either in relation to trade totals or to commodity-country detail. This is particularly true when they are unintentional in character or result from the statistical processing of documents too numerous to be analysed in detail. It follows that the conceptual adjustments usually applied to the statistics compiled from customs documents to make them consistent with domestic statistics (as when they are incorporated into the system of national accounts) cannot precisely compensate for all the various sources of error. Table 3 gives a breakdown of the adjustments required to reconcile United States export with Canadian import statistics for 1972, in order to illustrate this point.

17. In International Trade Statistics; Concepts and Definitions, 6/ the Statistical Office made explicit recommendations designed, inter alia, to minimize statistical discrepancies. Three of these recommendations may be summarized as follows:

(a) Definition of the statistical territory as the national boundary according to the "general" system of trade rather than as the customs territory as in the "special" trade system (see paragraph 10 above);

(b) Use of transaction values, rather than fiscal or customs values, f.o.b. port of export for exports and c.i.f. port of entry for imports;

(c) Attribution of trade to the "country of consignment" which is, for imports, the first country from which the goods were shipped directly to the importing country and, for exports, the last known destination of the goods.

18. In addition to these three key standards, the Statistical Office also made recommendations on the coverage of transactions, classification of commodities and the measurement of quantity. The headings under which these recommendations fall

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6/ United Nations publication, Sales No. E.70.XVII.16.



Table 3. Reconciliation of published figures on the northbound a/  
 trade between the United States and Canada in 1972  
 (in \$US millions)

<u>As published</u>	<u>Canadian import data</u>	<u>United States export data</u>	<u>Difference</u>
	13,042	12,415	627
Pre-reconciliation adjustments			
(i) Country attribution	+ 76	- 249	
(ii) Transportation charges	- 50	- 143	
(iii) Coverage	- 39		
(iv) Errors	- 47		
Adjusted	12,982	12,023	959
Reconciliation adjustments			
(v) Valuation	- 160		
(vi) Non-receipt of export documents		+ 655	
(vii) Coverage	- 149	- 5	
(viii) Errors	- 36	- 36	
Reconciled	12,637	12,637	0

Source: The Reconciliation of U.S.-Canada Trade Statistics 1971-72, published jointly by the Bureau of the Census, United States Department of Commerce, and Statistics Canada.

a/ United States exports to Canada and Canadian imports from the United States.

are equivalent to a list of the potential sources of inconsistency between systems for compiling trade statistics which, in turn, can lead to discrepancies of a conceptual character. An examination of the systems of trade statistics used by countries reporting to the United Nations, however, reveals that nearly half use the "special" system for both imports and exports. Many attribute imports to country of origin, but some record imports on a f.o.b. basis.

19. Inconsistencies in the conceptual framework used for the compilation of trade statistics such as those described above may create serious obstacles to the analysis of trade flows at the country or at the commodity level. For example, attempts at measuring the export performance of a country hinge on establishing the growth of demand in its foreign markets as well as the change in its share of those markets. But to relate these factors requires a degree of consistency between national export and foreign import data which is hardly achievable at present.

20. The analysis of aggregate trade flows between countries is also complicated by inconsistent procedures for identifying and crediting partner countries. For example, a shipment from country A consigned to country B will appear in A's statistics of exports to B. If the goods exported, rather than entering B for consumption, are re-exported to country C, a number of possibilities arise. If each country's system of trade is "general" and each attributes imports to the country of consignment, no discrepancy will arise; the transaction will be recorded as an import by B from A, an export by B to C and an import by C from B. However, if B's system of trade is "special", the shipment will not appear in its statistics. On the other hand, C's trade will reflect an import either from B (country of consignment) or from A (country of origin) with no counterpart export report. Table 4 illustrates this problem by comparing the import reports of selected countries using the special system of trade with the counterpart export reports. The measures relating to the country most extensively used for entrepôt trade - the Netherlands - differ, of course, markedly from those for the other selected countries.

Table 4. Ratios of export to import statistics between eight selected countries; a/ the effects of entrepôt trade

Importer Exporter	Germany, Fed. Rep. of			
	France	Italy	Netherlands	
Canada	.72	.77	.83	1.74
United States	.80	.81	.90	1.31
Japan	.72	.97	.95	1.90
Australia	.75	.74	.85	1.89

Source: United Nations, Commodity Trade Statistics (Statistical Papers, Series D).

a/ Average 1968-1970.

Note: No adjustments were made to the valuation of exports f.o.b. and imports c.i.f. The expectation, other things being equal, is that the ratio of exports to imports should be smaller than unity.

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21. Commodity classification inconsistencies contribute much to the discrepancies between counterpart reports of flows for particular products. Although the Standard International Trade Classification (SITC) provides a standard framework for commodity classification, a comparison of export and import figures by commodity yields considerable evidence that full standardization has not yet been achieved. Table 5 illustrates the growth of discrepancies associated with increased detail in commodity classification. (In annex II, section IV, this approach is carried further by examining the change in the standard deviation of three-digit ratios, as successive extreme ratios are dropped).

Table 5. Discrepancies in commodity trade statistics; exports of six a/ selected countries to North America: standard deviation of ratios of counterpart reports b/

<u>Country</u>	<u>At 2-digit SITC</u>	<u>At 3-digit SITC</u>
Belgium	.256	.304
France	.263	.314
Germany, Fed. Rep. of <u>c/</u>	.254	.411
Italy <u>d/</u>	.258	.362
Netherlands	.331	.366
United Kingdom	.345	.518

Source: United Nations, Commodity Trade Statistics (Statistical Papers, Series D).

a/ For the European Economic Community taken as a whole, the  $\sigma$ 's are respectively at two digits .205 and at three .276.

b/ Ratios are calculated by dividing exports by imports. In this case the imports are f.o.b. Where at least one of the reports is smaller than \$US 1 million, the data are excluded from the calculations. Average coverage (of exports) is of the order of 99.5 per cent at two digits, and 96.5 per cent at three.

c/ Excluding transactions in ships and boats (SITC 735).

d/ Excluding transactions in Firearms of War and Ammunition Therefor (SITC 951).

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## IV. THE IMPLICATIONS OF INCONSISTENT STATISTICS

22. Any of the sources of discrepancy described above, commodity classification and country attribution excepted, may affect measures of aggregate trade flows or balances. They may contribute to distortions in the interpretation of changes of economic significance in such aggregates. This is because they are associated with particular components of these aggregates and the weight of these components may shift. Thus, as the figure included in this paper shows, the gap between the two measures of the United States-Canada trade balance seems to be increasing much faster than the trade between the two countries. For the period 1965-1972 inclusive, the United States measure of the average year-to-year improvement in the Canadian surplus was 50 per cent higher than the corresponding measure calculated from Canadian statistics. A major reason for this was the growth in importance of bilateral trade in automotive products. Discrepancies in the measurement of the trade in these products tend to overstate the Canadian surplus as measured by United State trade statistics.

23. Similarly, shifts in the weights of particular commodity flows, for which the rate of error is constant, may affect the measurement of trends or turning points in trade aggregates, particularly in bilateral comparisons. Table 6 compares differences in growth rates as measured from counterpart points of view. If a commodity with a seasonal trade pattern is subject to a significant measurement bias, even quarterly comparisons may be distorted. Because most discrepancies are commodity- or country-related, their effect on aggregates cannot be relied upon to be stable over time. Only a reconciliation of trade statistics between trading partners, leading to a full understanding of the sources of error and bias in published figures, can ensure a proper statistical basis for the analysis of the behaviour of even the most aggregated measures of international trade flows.

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Table 6. Year-to-year per cent changes in selected trade flows  
 Differences between Counterpart reports<sup>a/</sup>  
 (percentage)

Exports To From	Year	European Economic Community	North America	Two Pacific Countries <sup>b/</sup>
European Economic Community	1968	+ .4	- .7	- .5
	1969	- 1.8	+ 4.1	+ 1.2
	1970	+ .9	- 2.7	- 3.5
North America	1968	+ 1.7	-	- .1
	1969	+ 1.9	- .2	+ 2.3
	1970	- 3.4	+ .6	- 2.3
Two Pacific Countries <sup>b/</sup>	1968	+ 2.3	+ 1.2	- .7
	1969	+ 1.3	+ .7	- 3.5
	1970	- 3.2	- .4	+ .5

Source: United Nations, Commodity Trade Statistics (Statistical Papers, Series D).

<sup>a/</sup> Differences in year-to-year per cent changes are defined as the change in reported exports between two areas minus the corresponding change in reported imports.

<sup>b/</sup> Japan and Australia.

## V. ALTERNATE METHODS OF RECONCILING INTERNATIONAL TRADE DATA

24. Inconsistency between counterpart reports of trade statistics may be resolved in two fundamentally different ways, which may be designated "replacement" and "reconciliation". Replacement involves the use of only one of the measures at all times, ignoring the other. This has tended to be the procedure used in the past in tariff negotiations, in that the value of concessions offered by an importing country (that is, the reduction of rate of duty) has been measured by its own import figures, because exports and imports data at the level of national tariff items could not be reconciled.

25. As a practical matter, few countries would be prepared to accept partner import figures as a substitute for their own export figures on a regular basis without at least obtaining a very detailed understanding of the sources, methods and concepts used to compile the import figures in question. But such a systematic understanding - at least at this moment - can only be obtained through a detailed reconciliation programme. Of course, in the future, the conditions for collecting data may change radically. In the context of the Customs Co-operation Council's work on a harmonized commodity code to be used in conjunction with a single administrative set of documents (accompanying the goods transacted through the point of export, international transport, and point of import), the inconsistencies discussed above may tend to diminish. However, this remains very much a long-term project.

26. Notwithstanding the possibilities ultimately offered by consistent documents and codes, the United States and Canada felt that there were immediate practical issues raised as a result of their study. These would best be resolved by exchanging import data with the added benefit of reducing paperwork costs for both the exporters and the statistical agencies concerned. While several technical and legal obstacles remain, one condition for exchange has already been met. This is the ability to predict export figures from counterpart import figures at acceptable levels of commodity disaggregation and with error rates judged acceptable under the present system.

27. The United States-Canada study benefited from several unique advantages, such as being relatively free of failure to credit the right countries or from inconsistent handling of transportation costs (both countries record imports on an f.o.b. basis). Nevertheless, it proved to be a lengthy and labour-consuming effort to arrive at the very detailed level of reconciliation demanded by policy makers and trade analysts in both countries. The reconciliation of other bilateral trade flows may take other forms and in many instances be less exhaustive for comparable levels of benefit. For example, the view is that between Mexico, the United States and Canada, comparatively simple techniques may suffice to eliminate the major inconsistencies highlighted in table 2.

28. In a situation in which country attribution is an important issue, a purely bilateral approach may not be the most promising, at least in the first phase of defining the nature of the problems. But the management of a genuine multilateral exercise is likely to require some form of central co-ordination besides the necessity for a common fund of data. It is here that the United Nations Statistical

Office could fulfil a useful role. It possesses a data file of international trade statistics in computer-readable form and has traditionally been the custodian of two key instruments for standardizing comparisons: the concepts and definitions listed in International Trade Statistics; Concepts and Definitions 7/ and more importantly, the Standard International Trade Classification.

29. The solution to discrepancies in the statistics of international trade, would, of course, be to record identically each transaction both at the time of departure and at the time of arrival. But if that were the case, one of the two records would become redundant. This is not likely to happen in the near future. Since it is not thought to be a practical prescription for most current situations any effective solution proposed has to be second best, taking it for granted that the notion of compiling exports and imports as two independent sets of statistics will not be changed.

30. To define such a solution one would have to rely on conventions which might well vary over time and be a function of individual country interests. For instance, there might be a trade-off between the elimination of discrepancies at a fairly aggregate level, but frequently - perhaps at quarterly intervals, and between eliminating discrepancies at a fine level of commodity detail but only at annual intervals. The conventions adopted to define an effective solution would also vary as to the degree of precision desired. This could range from purely indicative figures to more complex tabulations classifying inconsistencies into commodity groupings and sources of error. Such tabulations were developed in the course of the United States-Canada exercise. Regardless of how it is defined, an effective solution to the problem of discrepancies ought to retain two essential features. The first would be to identify and quantify the causes of discrepancy at some level of aggregation and frequency. The second would be to define a way of monitoring future differences on a continuous basis.

31. The reason for the second condition is that having identified and measured the impact of the sources of discrepancy, a country would, in all likelihood, wish to take remedial steps to prevent future departures from its prescribed concepts and definitions. If, for instance, a country found that it had a problem of undercounting exports, it might wish to introduce administrative controls to prevent it. But in so doing, it will probably design a procedure to monitor the quality of its future statistics by reference to those of the partner countries. The effectiveness of the remedial steps taken would eventually be measured by the elimination of the discrepancies between the published statistics of the same trade flow caused by undercounting. 8/

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7/ United Nations publication, Sales No. E.70.XVII.16.

8/ Reconciliation is not necessarily the only way to detect or correct undercounting of exports (see Trade and Industry, 25 November 1970, for the United Kingdom's experience in this regard and for a description of a technique of matching several sets of domestically produced administrative records).

32. A programme to reconcile discrepancies will consist of several parts. <sup>9/</sup> First, it must include a systematic display of the differences in the statistics. In the Canada-United States experience, this turned out to be critical. It was not only a matter of defining the elementary cell for which to display differences but, more important, a way of highlighting the structure of the differences both over time and in terms of the commodity classification. Subsequent phases in a reconciliation programme are to identify the strategic differences, to advance explanatory hypotheses about them, to test them, and at the end of the process to tabulate the reconciled figures.

33. From an individual country's point of view, a statement of the problem would imply displaying all the differences in the statistics of its trading partners with their trading partners in addition to the differences with its own statistics. Eventually, such a statement would amount to a world matrix of differences in counterpart statistics. Naturally a purely arithmetic statement of differences would not suffice for purposes of reconciliation. It would be necessary to annotate each bilateral flow by the concepts and operational practices that governed its accounting by both the exporting and the importing countries.

34. This reasoning suggests the rôle that the Statistical Office might play in the process of resolving statistical differences. It is important to emphasize how critical it is to store detailed and comparable statistics for most countries and to have access to a fund of knowledge on sources and methods necessary to annotate the world matrix of differences.

35. The Statistical Office of the United Nations, following the above suggestions and the proposals listed in paragraph 4, could initiate a series of consultations on this subject between national statistical offices and possibly regional statistical offices. Ultimately, a far better assessment could be made of the character and reliability of the United Nations International trade data files.

#### VI. POTENTIAL BENEFITS OF THE PROPOSED STUDY

36. The practical and methodological results of a reconciliation exercise should also be of great value to national agencies. Multilateral reconciliation would reveal whether or not there are large and unintended departures from explicit standards. For example, the discovery by Canada - in the context of the United States-Canada trade reconciliation - of freight charges improperly included in a fairly large number of its export documents to the United States played an important role in improving the quality of the estimates of the Canadian balance-of-payments current account. Such an example is not likely to be unique and may well apply to some of the countries that now report their international trade statistics to the Statistical Office.

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<sup>9/</sup> A step which may make reconciliation incomparably easier is related to the enormous increase in the computing facilities in the hands of statistical agencies. This has made it possible for some countries to express their trade statistics simultaneously in terms of several definitional frameworks.



37. Other examples have a greater bearing on the methodological aspects of the compilation of trade statistics. For instance, the United States does not measure directly the segment of its export trade represented by shipments of values under \$251. Rather, it relies on projections based on a sample survey conducted at an earlier time. Since the coverage of Canadian imports includes all values, the comparison of the two measures makes it possible to assess the reliability of the projection by reference to an independent source.

38. From the point of view of the programme of the United Nations Statistical Office, benefits fall into the same pattern. As discussed above, the matrix of world trade is at present incomplete. Many countries do not have the resources to produce regular reports on the detail of their international trade, either in internationally comparable form or on a timely basis. Accordingly, there are empty cells in the matrix due to no reporting or very late reporting. For some purposes, however - particularly for the regional analysis of world trade flows - there should be a statistical technique to estimate empty cells on the basis of counterpart reports. To estimate such cells by direct application of the counterpart statistics could carry an unacceptable margin of error. A more refined technique would correct the counterpart statistics by the adjustment factors derived from multilateral reconciliation.

39. Systematic comparisons between counterpart statistics could also yield a better estimate of the c.i.f. component of merchandise trade. At this point, the c.i.f. component can only be derived by the straight subtraction of f.o.b. statistics from their c.i.f. counterpart. This is at least true for countries which, unlike the United States, do not produce international trade statistics on different systems of valuation. However, since many other sources of discrepancy play equally important parts in any direct comparison, such estimates could only provide the roughest of measures. Much more systematic comparisons, disaggregated by country and commodity, and possibly by mode of transport, would be required before estimating the c.i.f. component with tolerable precision.

40. Multilateral reconciliation should also provide an assessment of the comparability of use of the Standard International Trade Classification (SITC). A heavy international investment was made in creating and instituting the SITC, and that investment was matched by the efforts of national agencies to amend their classification procedures to conform to the international standards. And yet, there has been little opportunity, other than the discussion of nomenclature, to test whether in practice the understanding and application of the SITC are internationally consistent. Testing of this kind can only be done directly by following through the documents of a transaction from departure to arrival or indirectly by the reconciliation exercise described in this paper.

41. Finally, there is the opportunity to measure the impact of the variety of national concepts on other national statistics, particularly on countries' national accounting systems. These have to do with the treatment of the country of origin or destination, with the system of valuation of imports and exports, and with the scope of what is defined as merchandise trade, including the treatment of special types of transactions (for example, imports for repair or improvement, exhibition, etc.).



Annexes

I. STUDY OF INCONSISTENCIES IN INTERNATIONAL TRADE STATISTICS

1. The Statistical Commission may wish to recommend that the state of international trade statistics, in view of the many inconsistencies between counterpart reports, warrants a study in greater depth. The Commission may further recommend that in the first instance, such a study should be conducted by the United Nations Statistical Office.

2. The Statistical Office sees a possible continuation of the analysis of differences in international trade statistics as follows. The Statistical Office would endeavour to carry out a more detailed study of the patterns of inconsistencies in the statistics of international trade flows along lines illustrated by the tables and charts contained in annex II. This study would be based on the data available to the United Nations, data which - it should be emphasized - are standard in terms of commodity classification (the SITC), the unit of currency (the United States dollar) and units of quantity (the metric system).

3. To conduct such a study, the Statistical Office would have to extend the data files suitable for reconciliation studies to 1973, so as to provide both more up-to-date data and a more extensive set of observations required for the analysis of time series. This study would not be limited to the three-digit level of the SITC as is presently the case, but would extend to the commodities at the four- or five-digit levels, which are interesting because of their importance in world trade or because they create particular problems. An example would be ships for which the country of the flag of convenience is too frequently reported as the partner country. Aside from devising an analytical framework, the unit would also be charged with keeping a record of the most striking problems found for each country studied. It would eventually contact national statistical agencies so as to bring their expertise to bear on the inconsistencies identified.

4. The work conducted within the Statistical Office would in no way preclude interested countries from devising their own schemes for bilateral reconciliation with their trading partners, especially as only national statistical agencies can actually reconcile data wherever the solution depends on access to customs records. Bilateral comparison of individual customs records by countries, if done in a complete and very detailed manner, may be an expensive process. Therefore, the countries, taking into account their resources and the importance of the existing discrepancies, will have to determine how far they intend to go in verifying the reconciliation of trade with their partners. Should such studies get under way, the Statistical Office would seek to keep a record of the scope, methodology, and results of such studies. The information collected by the Statistical Office could eventually be used as a guide for other countries ready to embark on reconciliation studies.

5. In addition, a meeting of a small group of national experts in 1976 or, if possible, in 1975 may be needed. The experts would be asked to assess the methodology used by the Statistical Office of the United Nations and to recommend possible refinements or developments in the techniques chosen. In view of the findings at that time, the experts might wish to consider possible revisions to the recommendations contained in International Trade Statistics; Concepts and Definitions, a/ particularly those which relate to the definition of partner country and to the system of trade adopted. The combination of findings by the Statistical Office, and recommendations by the experts should prove invaluable to the work undertaken by the Customs Co-operation Council on a harmonized classification code and on a standardized international trade document.

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## II. ANALYTICAL TECHNIQUES

1. The purpose of this annex is to illustrate several analytical techniques that could be used in a study of the multilateral reconciliation of trade statistics. These techniques are designed specifically to identify and classify the various kinds of discrepancies between counterpart trade statistics. They are not appropriate for the detailed kind of analysis necessary to reconcile trade in a particular commodity between two countries. Rather, they can be used to discover patterns in discrepancies either between pairs of countries or in the treatment of particular commodities by groups of countries.

2. The starting point in any study on reconciliation is a matrix in which counterpart statistics are brought together. In analytic terms, there is a matrix A, in which each element  $a_{ij}$  is a pair of figures  $x_{ij}$  and  $m_{ji}$  corresponding respectively to exports by the  $i^{\text{th}}$  country to the  $j^{\text{th}}$  destination reported by i, and imports into the  $j^{\text{th}}$  country from the  $i^{\text{th}}$  origin, reported by j. Such a matrix, arranged to cover some commodity  $c$  at time  $t$  is illustrated by the various tables in section I below, where each table relates to a particular group (3 digits) of the SITC.

3. The elements of the matrix described in paragraph 2 can be thought of both in terms of value and of quantity. In other words, each cell contains

two pairs of numbers:  $x_{ij}^v$  and  $m_{ji}^v$  and  $x_{ij}^q$  and  $m_{ji}^q$ , where the superscripts v and q stand respectively for value and quantity. Ratios for each pair:

$\frac{x_{ij}^v}{m_{ji}^v}$  and  $\frac{x_{ij}^q}{m_{ji}^q}$  can be calculated and plotted against orthogonal co-ordinates.

Scatters of such plots for a selected number of SITC groups and the countries that report trade in these groups are shown in section II below.

4. The following remarks may help in the interpretation of the scatter diagrams. In a world where both exports and imports are compiled on an f.o.b. basis, a perfectly matched report ( $x = m$  for both values and quantities) would be denoted by the pair (1,1). The Northeast quadrant, starting from (1,1) would be the set of all pairs for which  $x > m$  in terms of both value and quantity. The Southwest quadrant contains all cases where  $x < m$ ; and the remaining two quadrants, cases where the relation between values and quantities is not symmetrical. Furthermore, the  $45^\circ$  line would be the locus of all points

where  $\frac{x^v}{x^q} = \frac{m^v}{m^q}$ .

North of the  $45^\circ$  line are the points for which the unit value of exports exceeds the unit value of imports. In a world where most or all countries report imports on a c.i.f. basis ( $m + c.i.f.$ ), the above remains true except that the point of perfect matching is  $(1, 1-\alpha)$  where  $c.i.f. = x \frac{\alpha}{1-\alpha}$  and the line of matching unit values has an angle  $\tan^{-1} \frac{1-\alpha}{1}$  rather than  $45^\circ$ . (It also follows that if the angle formed between  $45^\circ$  and the line of matching unit values is  $\beta$ ,  $c.i.f. = x \frac{2 \tan \beta}{1 - \tan \beta}$ ).

5. It stands to reason that clusters of points in one quadrant or other have a specific meaning in terms of sources of discrepancy. For example, a scatter diagram for all commodities traded between two countries clustering well above the  $45^\circ$  line would indicate the probability of valuation problems with at least one of them. A cluster of points in the SW quadrant would indicate a likelihood of either undercounting of exports or of systematic misclassification of partner countries or of incompatible conceptual frameworks between the two trading partners.

6. The approach represented by the scatter diagrams can be carried at least one stage further, as shown in section III. The tables in this section group

together the ratios of either values  $\left( \frac{x^v}{m^v} \right)$  or quantities  $\left( \frac{x^q}{m^q} \right)$  for groups

of countries, active in the trade of the commodities selected. For each column (or row), mean ratios have been calculated. A systematic approach based on the analysis of variance - or a related statistical technique with similar power of discrimination - would assist in determining whether discrepancies are attributable to one or more of the following causes:

- (a) faulty identification of the country of destination;
- (b) faulty identification of the country of consignment; and
- (c) some form of persistent under- or over-counting or misclassification, by an importer or an exporter.

7. In section IV, a series of charts illustrates yet another form of detecting sources of discrepancy. Each chart is related to the trade between a pair of countries. (Actually, in the case of North America, Canada and the United States are combined as one single country of origin and of destination.) For each flow, the standard deviation of ratios between exports and imports for each group (three-digit) of the SITC is calculated, as extreme ratios are successively dropped. The plot is shown as a logarithmic function of the remaining coverage of total trade, every time an extreme group is dropped. Each chart also shows the distribution of ratios about their mean. In order to avoid the bias resulting from the fact that ratios smaller than one are compressed between 0 and 1, the reciprocals of such ratios have been considered for the determination of extremes.

8. The commodities and countries selected reflect in no way an a priori judgement by the Statistical Office of the validity of the corresponding statistics. The criteria that guided the choice of commodities were the availability of a large number of importing and exporting countries and also the availability of quantity statistics expressed in the same units. In the case of countries' trade with North America illustrated in section IV, the availability of measures of imports f.o.b. in one direction was the deciding factor.

9. Throughout these analytical exercises, no use was made of the time dimension. This is not because time is thought to be less consequential than commodities or countries. Rather, it is because computer files suitable for mathematical manipulation and containing time series have not yet been created. Besides, the techniques required to treat time without over-burdening tabulations which are already complex are not yet fully developed.

SECTION I - WORLD TRADE MATRIX

WORLD TRADE MATRIX OF (041 ) WHEAT ETC UNMILLED YEAR 1970

WORLD TOTAL EXPORTS - QUANTITY		50670555 (M )													
- VALUE		3110078		(1000 US DOLLARS)											
WORLD TDAL IMPORTS - QUANTITY		39570470 (M )													
- VALUE		2966035		(1000 US DOLLARS)											
MAJOR IMPORTING COUNTRIES															
MAJOR EXPORTING COUNTRIES															
	U.S.-AMER	CANADA	AUSTRAL.	USSR	FRANCE	ARGENTINA	GRMNY.FR	NETHLNDS	ITALY	HUNGARY	BULGARIA				
PER CENT	32.54	21.18	13.06	11.08	8.41	4.05	3.17	1.56	1.33	1.15	0.61				
CUM P C	32.54	53.72	66.78	77.86	86.27	90.32	93.49	95.04	96.37	97.52	98.13				
EXP Q	17442509	10746247	7802360	4700000	3446381	2301756	1449538	490221	638680	579800	211100				
EXP V	1012070	658772	406065	344610	261682	125889	98437	48410	41231	35700	19000				
TMP Q	14325415	5902610	3174035	518496	3308196	1855376	664238	532415	272836	208612	84149				
TMP V	1008705	438009	207142	119626	283284	125372	72340	39455	15372	13334	5866				
UNTD KGD															
	4188491	742438	1418807	1249859		352629	12932		109896						
	238499	43011	88243	64453		18998	757		5888						
11.38	4927771	684807	1534501	1178513	187102	396468	16094	31349	367211	79013	25937				
11.38	337499	47425	113636	76935	13281	23583	1113	1933	24374	5038	1898				
JAPAN															
	4845310	2758561	1181101	897498			8150								
	280023	157486	74294	47849			393								
10.73	4684545	2586050	1195201	903292											
22.11	318389	173712	87220	57456											
INDIA															
	3221892	2323409	664220	91820			79021	63422							
	194256	134927	42914	5077			4062	7277							
9.03	3538076	2627704	673400	110018			79000	47250							
31.14	267864	199589	52109	7373			5297	3427							
GRMNY.FR															
	1698614	508812	328758	305		478084	1000		338593						
	140264	31840	21190	15		45365	53		37871						
5.99	2209155	755287	644344	7912	78352	539271	12474		126345		3737				
37.13	177654	53744	48236	541	5574	53288	824		11640		216				
GRMN D R															
	45747			25747											
	2300			1200											
4.74	2094000														
41.88	140700														
NETHLNDS															
	1799772	439927	450299	94878		512433	23267	206398							
	141625	26584	28387	5268		50316	1294	22578							
4.67	1593861	519579	145946	84916	17753	535517	7574	214466							
46.55	138590	35276	10103	5417	1185	55888	482	23467							
BRAZIL															
	1950337	623372	302050				1024915								
	104331	34477	17555				52300								
4.34	1969300	646503	302050				1020748								
50.89	128660	41284	21467				65909								
BELG.LUX															
	1194519	88038	278570			785022	24783	1749	16276						
	99627	5319	17719			73218	1346	177	1837						
3.94	1259041	182214	214621	14557	2643	809044	16676	2062	17120						
54.83	116780	13700	18041	1215	251	80386	1219	213	1741						
USSR															
	1375717		1375717												
	83013		83013												
3.91	1846300														
58.74	116050														
PAKISTAN															
	1601892	1151836	149242	154418		29981		85240	2900	28275					
	98049	63784	9453	8626		2998		9782	315	3091					
3.74	1558246	1209202	85295	134732	2032	15241		74742	13481	11939					
62.48	110956	87105	4658	11121	176	60		5302	1138	815					
CZCHSLVK															
	21184								21184						
3.48															
65.95	103085				82384			20506							
ITALY															
	1192901	179323	262526			107356	643696								
	77408	10497	16991			11870	38050								
3.03	1164180	187859	305641		71433	103019	467536								
68.98	89785	13458	23076		5456	11690	34153			10347	612				
POLAND															
	117164		65031			2526		49606							
	6376		3773			95		2508							
2.70	1098500														
71.68	80125														
KOREA RP															
	1272245	1235496	36749												
	71285	68893	2392												
2.68	1178066	1160071	13048												
74.36	79528	78366	835												
TURKEY															
	795574	630505						90146	9062	54920					
	52443	34203						10084	1017	6448					
1.84	886530	818916				12960		38210		9687					
76.20	54467	49228				742		3554		559					
EGYPT															
	1755919		444361	335384		191031		274592	4002	477526					
	92362		29425	16015		8884		12092	422	23783					
1.60	850745		15577		108539	336618		132859		226621					
77.80	47337		1090		7182	17847		7222		12274					
VENZUELA															
	610244	575971	34273												
	38387	36163	2224												
1.43	690293														
79.22	42287														
SWITZRLD															
	541628	263151	78323	2619		122058		32711		420					
	33638	15853	4804	154		7597		1999		29					
1.23	497317	127854	153077	4086	250	119094	6774	32687		362	51813				
80.45	36450	9811	12736	309	20	7413	508	1978		24	3487				
FRANCE															
	178967	52650	19993				40461	2126	6479						
	12590	3182	1099						782						
1.21	449524														
81.66	35820														
TUNISIA															







WORLD TRADE MATRIX OF (1044 ) MAIZE UNMILLED YEAR 1970  
 WORLD TOTAL EXPORTS - QUANTITY 29216079 (M )  
 - VALUE 1762665 (1000 US DOLLARS)  
 WORLD TOTAL IMPORTS - QUANTITY 27400078 (M )  
 - VALUE 1936980 (1000 US DOLLARS)

MAJOR IMPORTING COUNTRIES

MAJOR EXPORTING COUNTRIES

	U.S.AMER	ARGENTINA	FRANCE	THAILAND	BRAZIL	S.AF.C.U	NETHLNOS	BELG.LUX	ROMANIA	YUGOSLAV	BULGARIA
PER CENT	46.77	15.06	10.92	5.07	4.57	4.31	2.88	2.38	2.34	1.14	0.99
CUM P C	46.77	61.83	72.75	77.82	82.39	86.70	89.58	91.96	94.29	95.43	96.42
EXP Q	14408806	5232347	2455379	1371474	1470620	1217757	547988	479118	580000	297532	250300
EXP V	824411	265498	192492	89280	80594	75909	50765	41946	41200	20052	17500
IMP Q	13293398	4788551	2393502	689055	1179235	865609	244475	172901	581998	302151	164950
IMP V	935449	318061	197644	46934	80576	63885	17814	15130	35651	19009	10365
JAPAN	5884674	4193512	441797	649689	166054	414349					
	334747	235147	21932	42188	8656	25682					
21.01	6017853	4393596	447328	535804	143499	374651					
21.01	406925	292764	30417	36960	10163	27903					
ITALY	4554904	1084435	2597731	45266	600563	46697				180211	
	241726	59120	132091	4129	32715	2666				11006	
13.95	4216165	901990	2243443	19303	11020	420090	44475		328235	180379	50015
34.96	270241	57664	146199	1922	667	27249	2960		18578	10634	3170
UNTO KGD	2427636	1320746	193143	429703	490	57450	305629	84672	35803		
	140475	74641	10045	26418	30	3057	18039	5851	2394		
10.91	3118886	1552580	202988	429451	101316	307947	222882	37460	102582	10794	35717
45.87	211237	103911	13711	29130	7422	21477	16031	2557	6529	654	2226
GRMNY.FR	2238149	1088849	192300	442117	21683	22897	407200	6700		54663	
	161431	63262	9618	41707	1091	1483	39482	625		3914	
9.83	2600444	1697218	268324	482860	16249	39251	77		11735	52260	
55.69	190390	114120	18107	46740	1181	3053	14		810	3699	
NETHLNOS	2902546	2195132	302481	292003				110239		109	
	176613	124631	15081	26170				10432		21	
9.14	2467318	1838791	169471	310201			490	134900		102	
64.84	177073	123238	11064	29242			36	12513		21	
SPATN	1843353	207533	824941	312327		498451					
	100381	11496	41674	19276		27919					
6.60	1971899	370112	764338	317497	30830	428554	13601		4101	5250	3216
71.43	127806	23280	48891	19788	1969	30075	867		265	309	198
BELG.LUX	1481228	675703	194340	589160				21916			
	103073	39607	9718	51547				2166			
5.82	1362959	573669	224395	538691				21398			
77.25	112712	43907	16135	50544				1724			
MEXICO	767520	494486			31560	222417					
	49377	32905			1501	13751					
3.00	761368	494033				5356					
80.26	58151	36402				449					
FRANCE	398340	26989	7497		296	5059	27377	326243		15	
	34980	2128	385		22	490	2752	28481		19	
2.20	462101	365587	87290		168	3616	119	541	79	33	
82.46	42582	33425	8112		18	314	45	60	26	20	
CANADA	40			40							
	71555	71536		19							
1.49											
83.95	28817	28817									
GRMN O R	219253	165637			53361					255	
	13470	9964			3378					128	
1.42	411000										
85.37	27500										
PORTUGAL	361769	189472	51733	2134		11791					
	21279	10964	2985	164		829					
1.25	335637	106227	51445	5023		41159			400		
06.62	24281	8470	3387	355		2822			23		
USSR	8250			8250							
	540			540							
0.94	303800										
87.56	18230										
DENMARK	109966	751	1913	54600			1661				
	7180	77	100	3314			117				
0.93	257969	152159	28113	58334					17557		
88.49	17933	10836	1935	3825					1211		
CHILE	255642	48561	207081								
	13118	2958	10160								
0.90	263607	63560	199457								
89.38	17348	4305	12973								
POLAND	98417	98417									
	5355	5355									
0.83	249000										
90.21	16080										
KOREA RP	282766	282766									
	15646	15646									
0.78	214185	209866									
90.99	15099	14736									
SWITZRLD	216500	22424	147222							43969	
	14053	1208	9951							2695	
0.74	206264	441	27114	143762						86	
91.73	14265	48	1983	9805							
HONG KNG	91655										
	6162										
0.54				91430							
92				148							















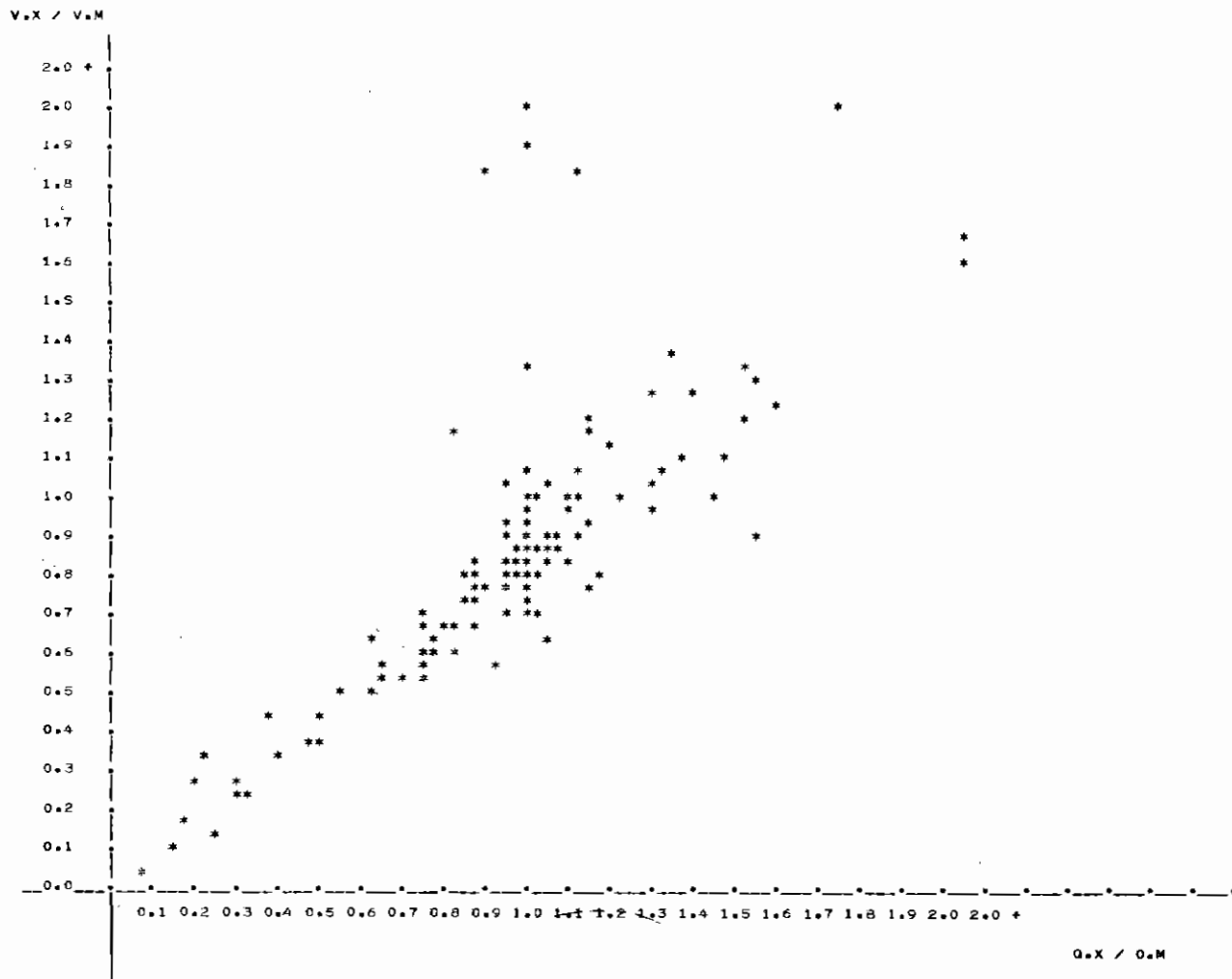


STATISTICS CANADA  
 EXTERNAL TRADE

SECTION II - SCATTER DIAGRAM OF  
 RATIOS OF VALUES AND QUANTITIES  
 OF COUNTERPART STATISTICS

- 1970 -

SITC CTRY X CTRY M  
 041 ALL ALL

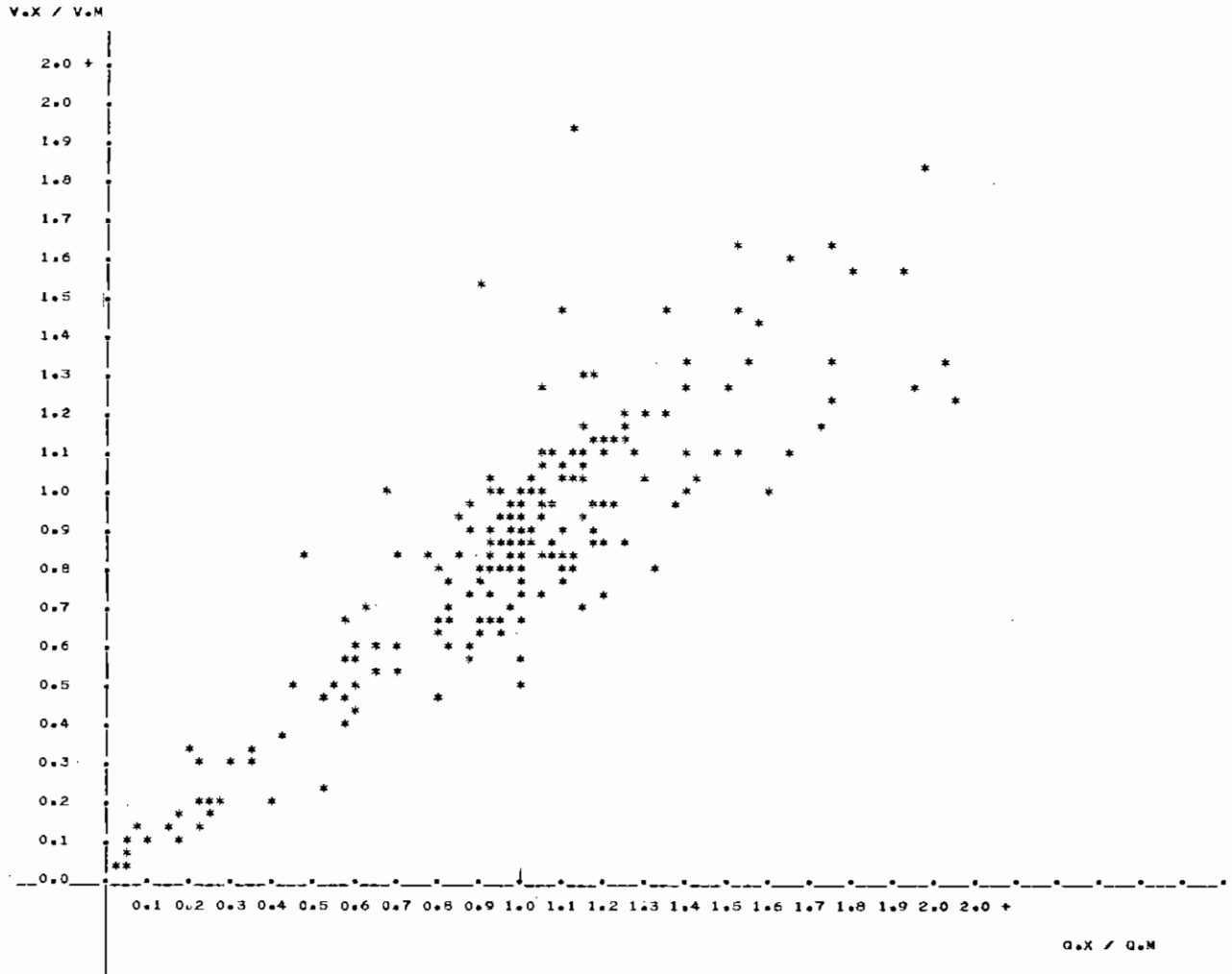


STATISTICS CANADA  
EXTERNAL TRADE

SITC CTRY X CTRY M  
042 ALL ALL

SCATTER DIAGRAM OF  
RATIOS OF VALUES AND QUANTITIES  
OF COUNTERPART STATISTICS

- 1970 -

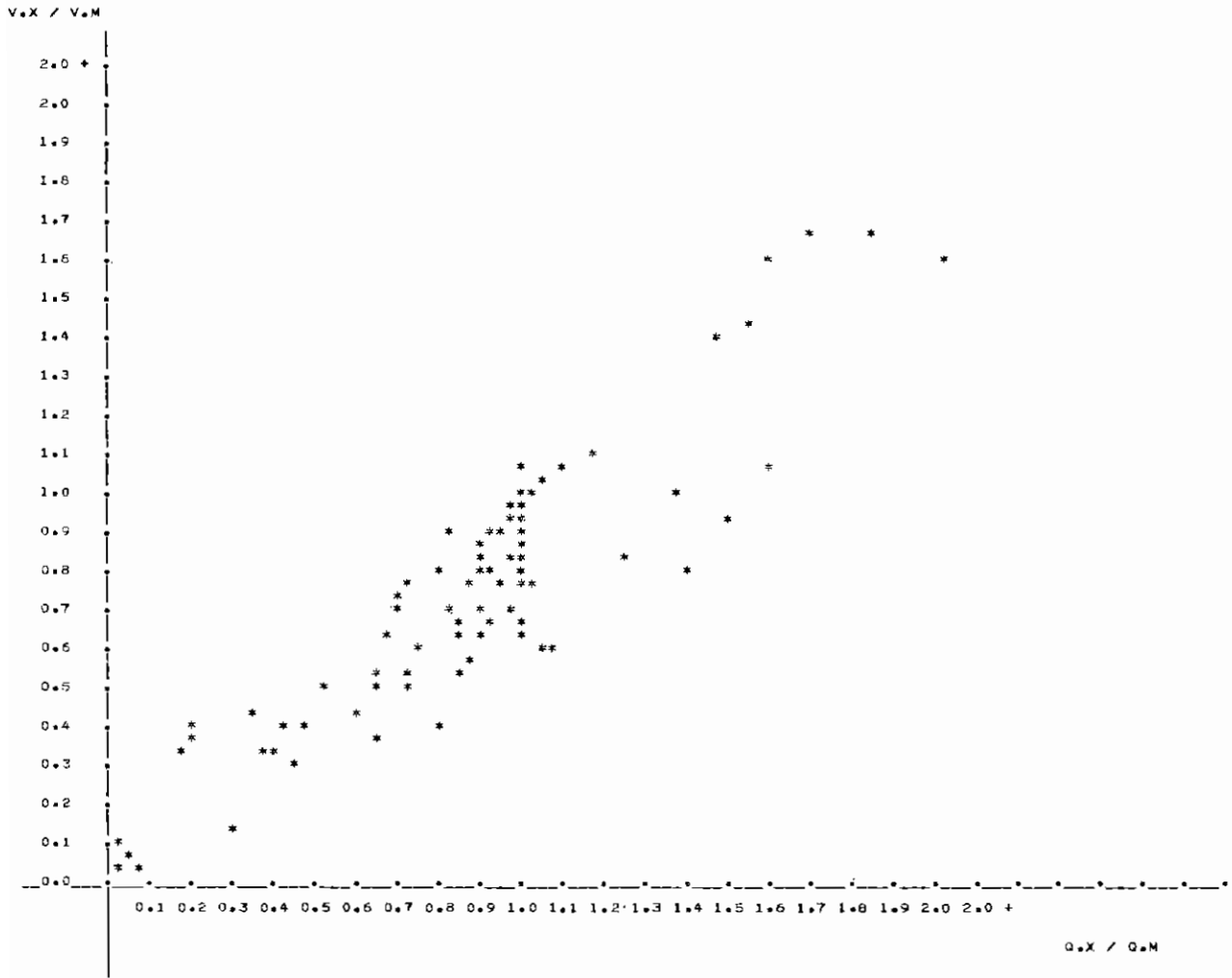


STATISTICS CANADA  
 EXTERNAL TRADE

SCATTER DIAGRAM OF  
 RATIOS OF VALUES AND QUANTITIES  
 OF COUNTERPART STATISTICS

- 1970 -

SITC CTRY X CTRY M  
 043 ALL ALL

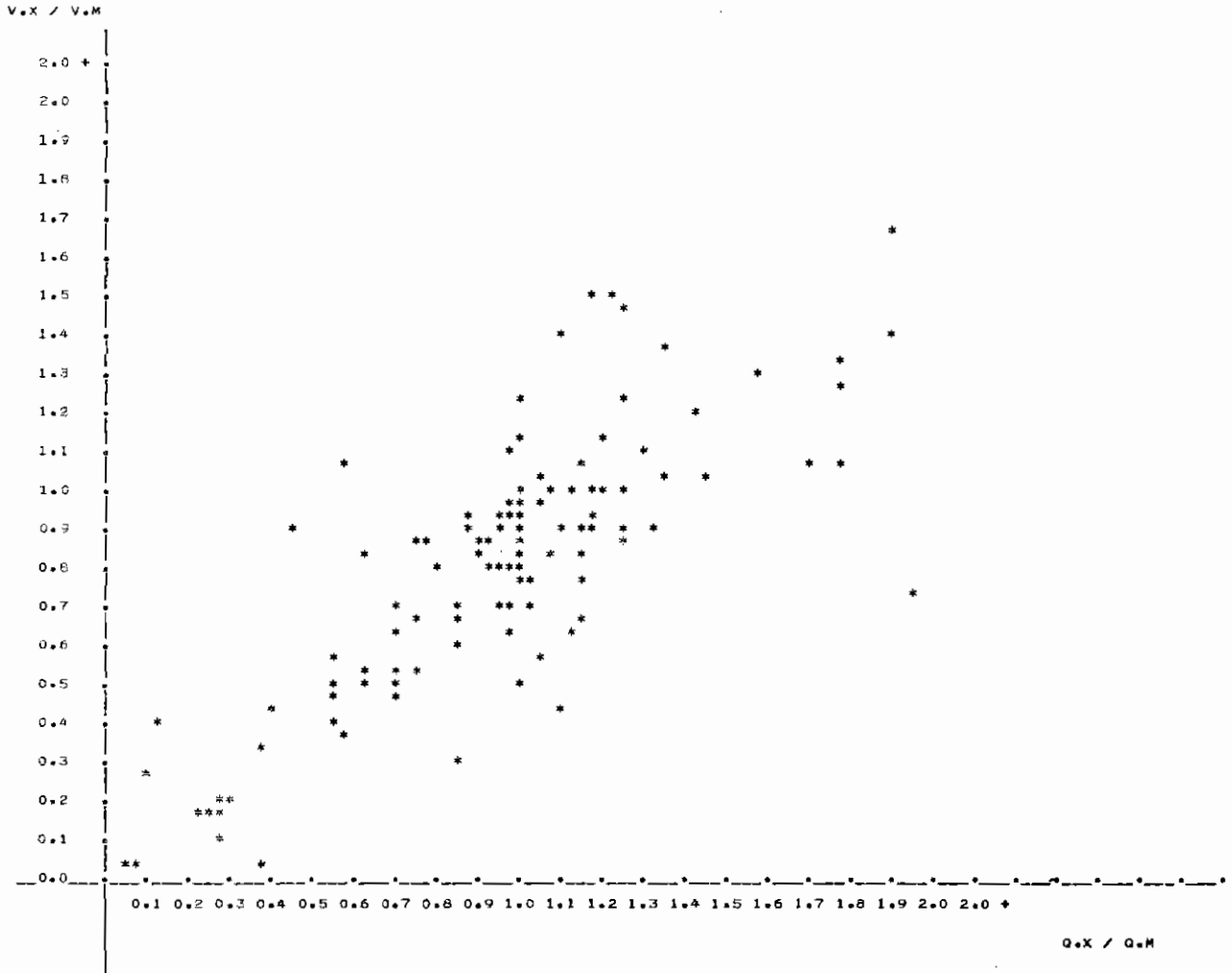


Q<sub>x</sub> / Q<sub>m</sub>

SCATTER DIAGRAM OF  
 RATIOS OF VALUES AND QUANTITIES  
 OF COUNTERPART STATISTICS

- 1 9 7 0 -

STATISTICS CANADA  
 EXTERNAL TRADE  
 SITC CTRY X CTRY M  
 044 ALL ALL



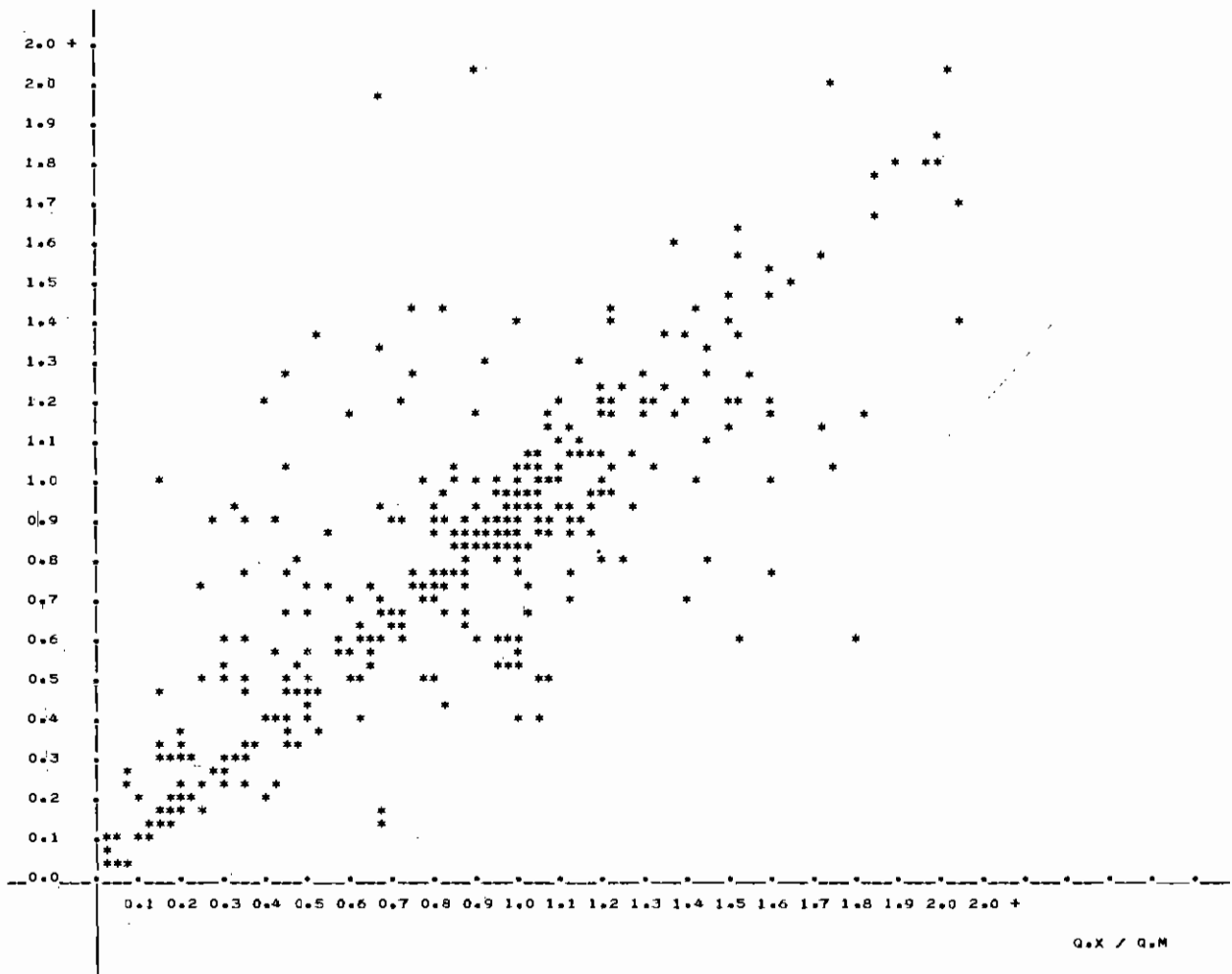
STATISTICS CANADA  
 EXTERNAL TRADE

SCATTER DIAGRAM OF  
 RATIOS OF VALUES AND QUANTITIES  
 OF COUNTERPART STATISTICS

- 1 9 7 0 -

SITC CTRY X CTRY M  
 071 ALL ALL

$V_X / V_M$

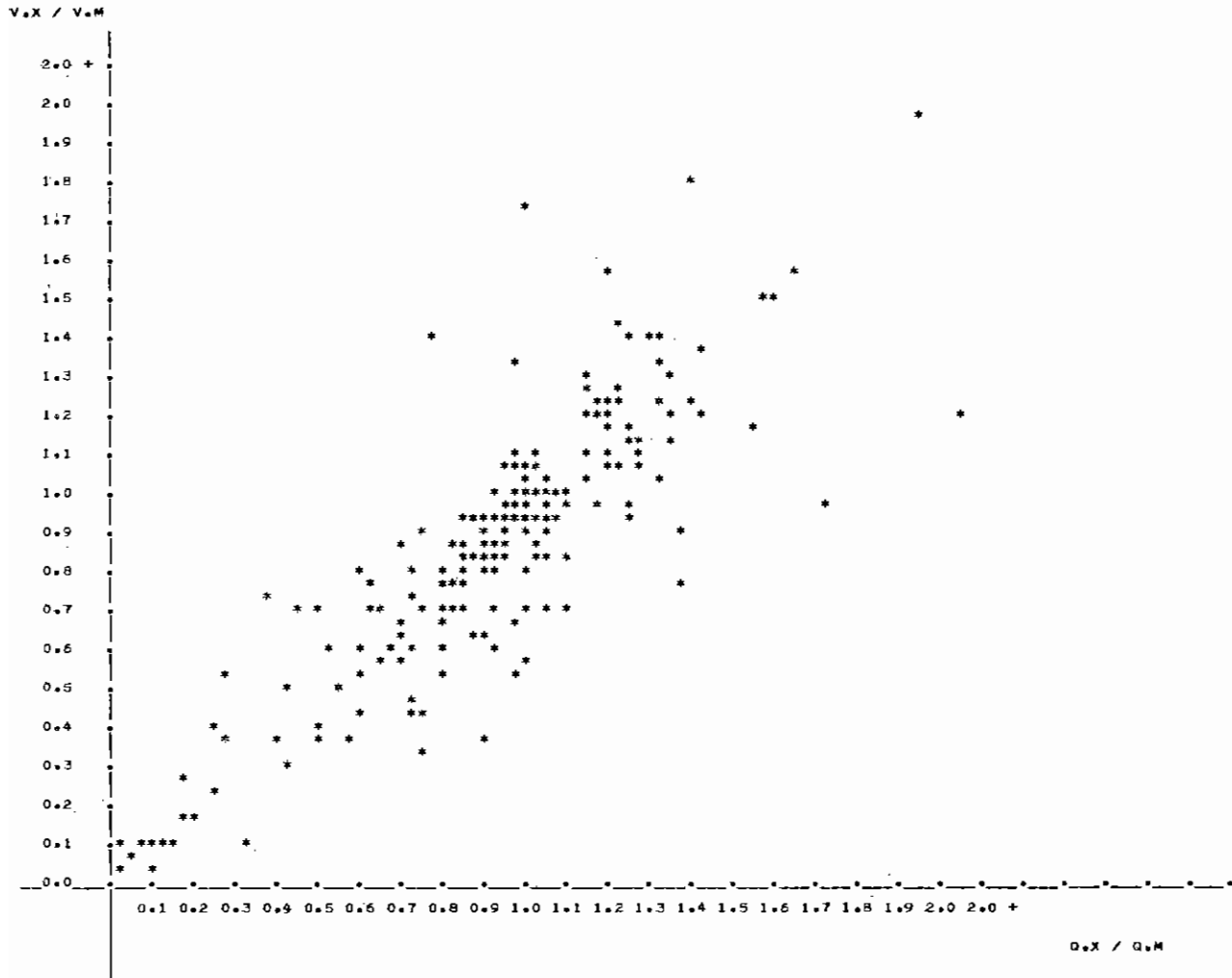


STATISTICS CANADA  
 EXTERNAL TRADE

SCATTER DIAGRAM OF  
 RATIOS OF VALUES AND QUANTITIES  
 OF COUNTERPART STATISTICS

- 1 9 7 0 -

SITC CTRY X CTRY M  
 072 ALL ALL



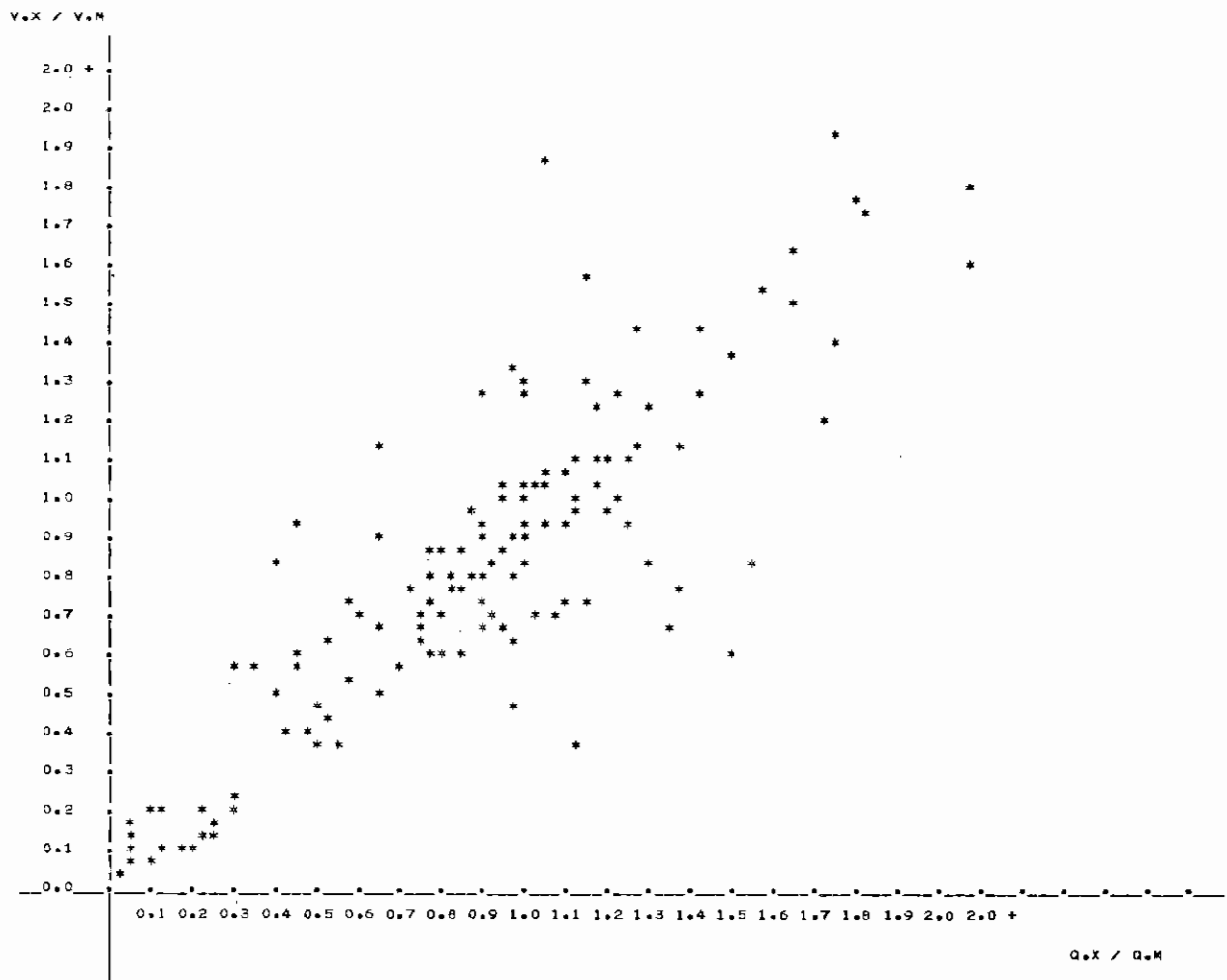


STATISTICS CANADA  
 EXTERNAL TRADE

SCATTER DIAGRAM OF  
 RATIOS OF VALUES AND QUANTITIES  
 OF COUNTERPART STATISTICS

- 1970 -

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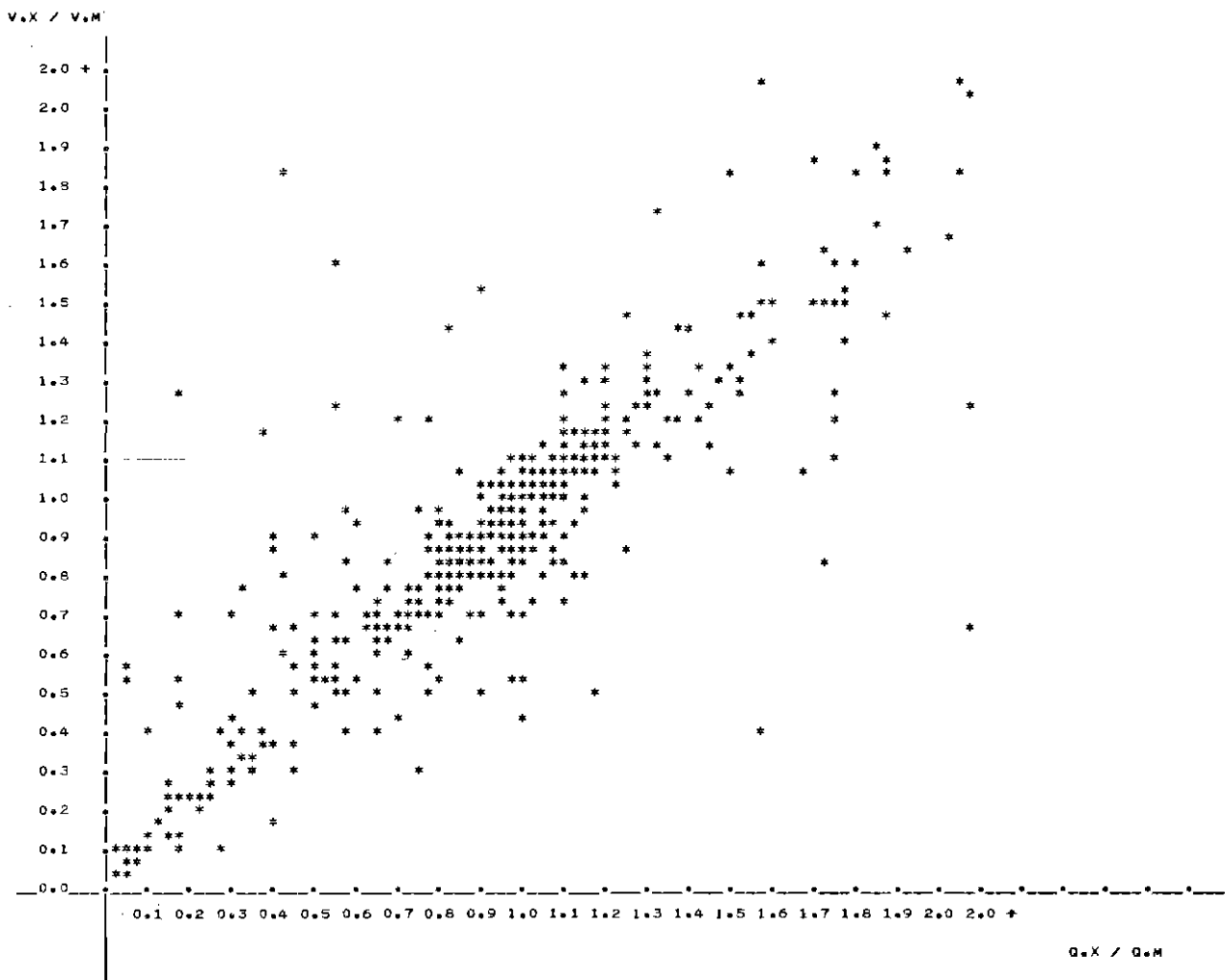


STATISTICS CANADA  
 EXTERNAL TRADE

SCATTER DIAGRAM OF  
 RATIOS OF VALUES AND QUANTITIES  
 OF COUNTERPART STATISTICS

- 1970 -

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 682 ALL ALL

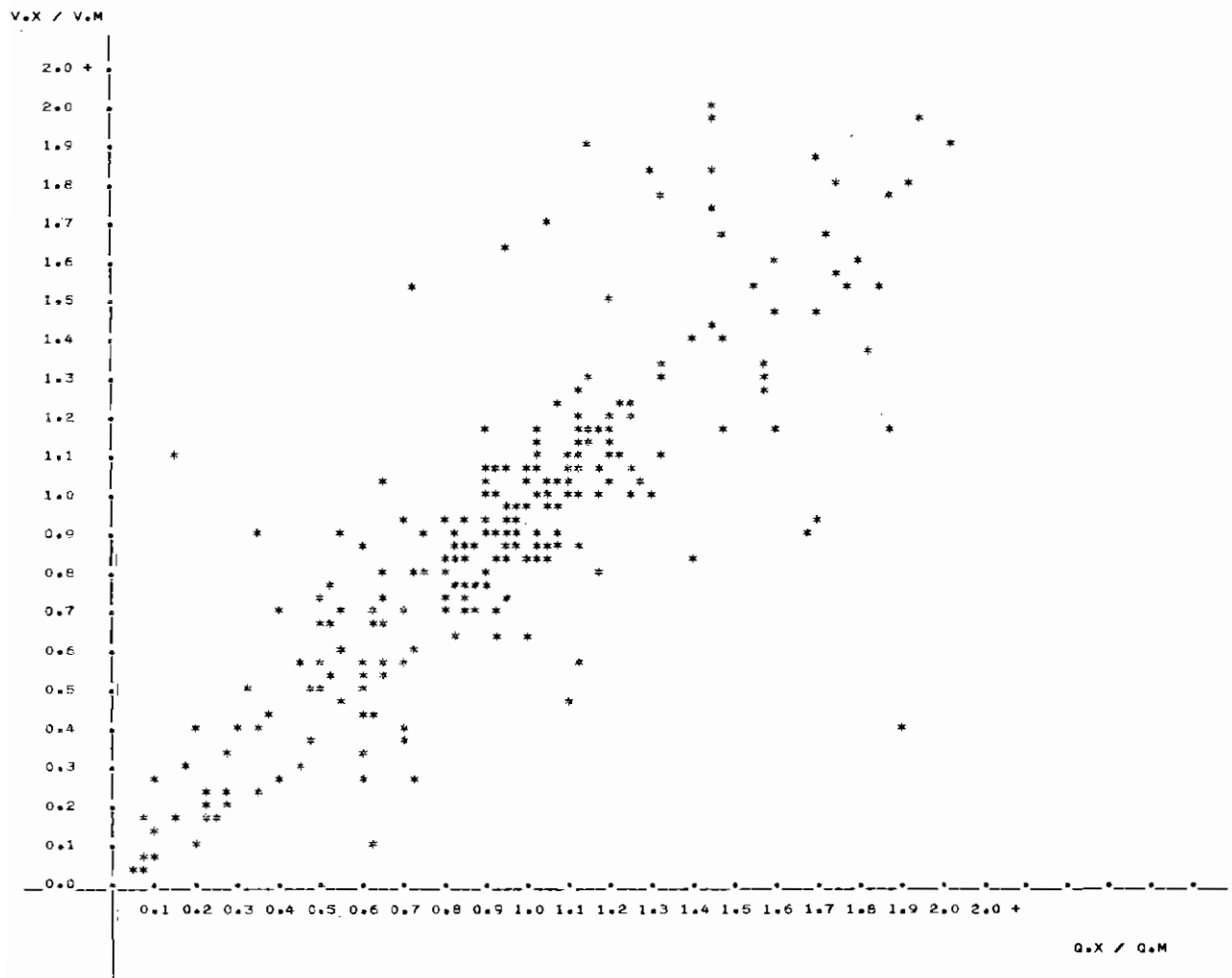


STATISTICS CANADA  
 EXTERNAL TRADE

SCATTER DIAGRAM OF  
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 OF COUNTERPART STATISTICS

- 1970 -

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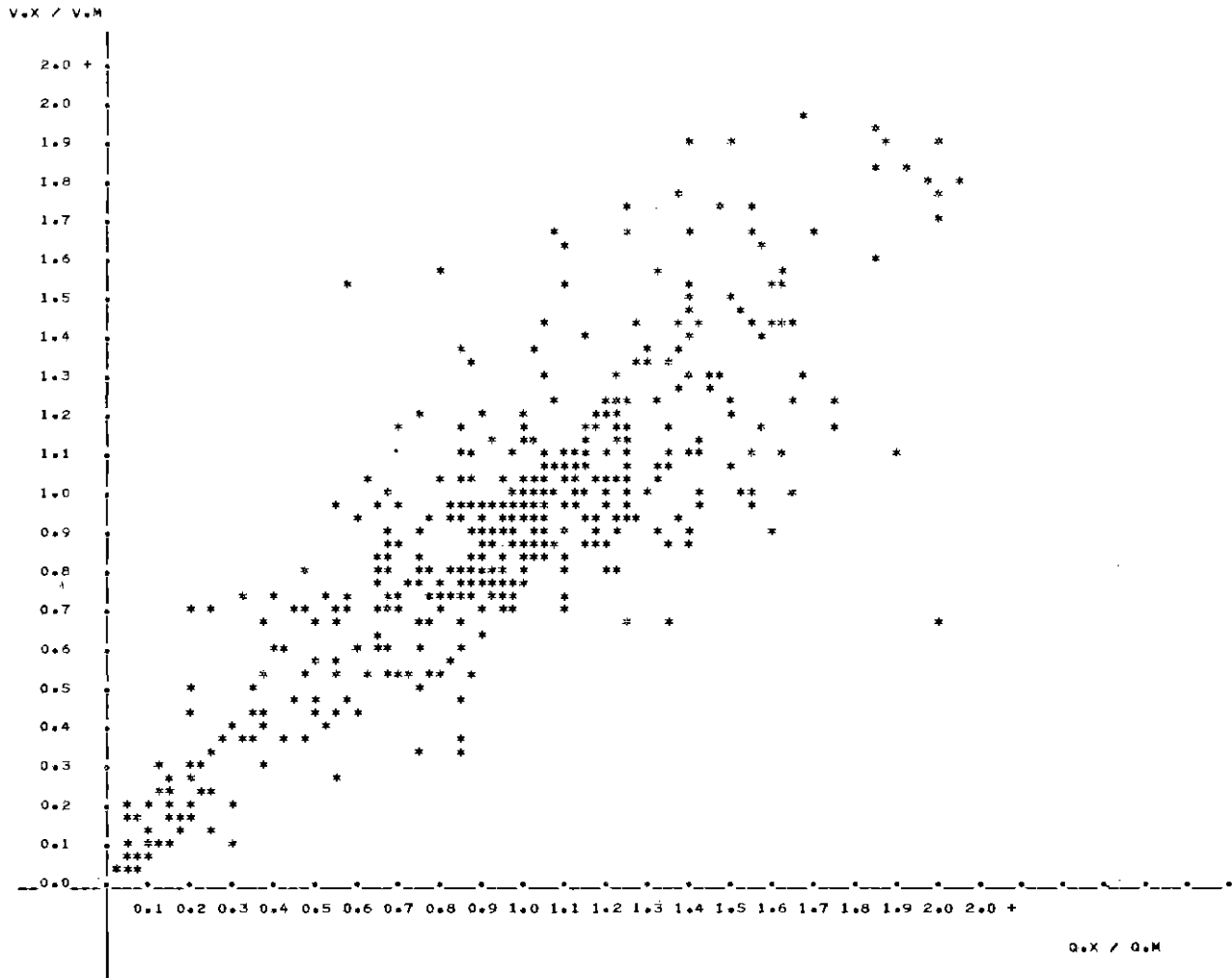


STATISTICS CANADA  
 EXTERNAL TRADE

SCATTER DIAGRAM OF  
 RATIOS OF VALUES AND QUANTITIES  
 OF COUNTERPART STATISTICS

- 1 5 7 0 -

SITC CTRY X CTRY M  
 7321 ALL ALL

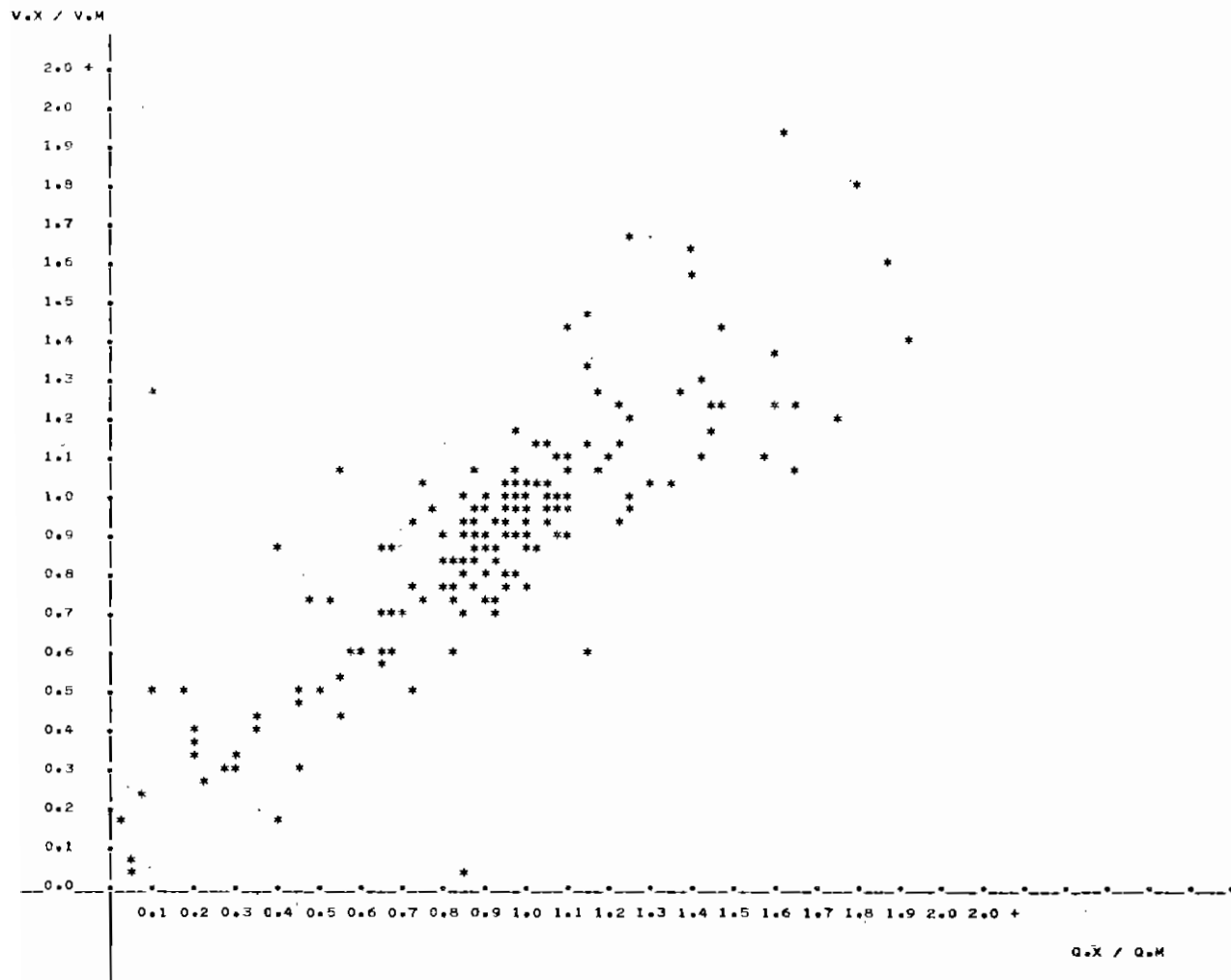


STATISTICS CANADA  
EXTERNAL TRADE

SCATTER DIAGRAM OF  
RATIOS OF VALUES AND QUANTITIES  
OF COUNTERPART STATISTICS

- 1 9 7 0 -

SITC    CTRY X    CTRY M  
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**SECTION III**  
**MAJOR EXPORTING AND IMPORTING COUNTRIES<sup>1/</sup>**  
**VALUE AND QUANTITY RATIOS OF COUNTERPART STATISTICS**

SITC 732.1 - AUTOMOBILES

1970

Importing Country	21124 Canada	21840 United States	53056 Belgium	53250 France	53280 Federal Republic of Germany	53380 Italy	53528 Netherlands	55040 Austria	55208 Denmark	55246 Finland	55578 Norway	55620 Portugal	55752 Sweden	55756 Switzerland	55826 United Kingdom	Mean
Exporting Country																
53056 Belgium	V 0	1.05	0	1.15	.99	.95	1.00	0	0	0	0	0	0	0	1.39	1.09
53250 France	V 1.26	1.23	1.52	0	.99	1.01	.97	1.02	.94	1.42	0	1.01	.88	1.03	.96	1.09
53280 Federal Republic of Germany	V .95	.98	2.10 <sup>2/</sup>	.80	0	1.00	1.11	.95	1.01	1.35	.98	1.26	.92	1.01	.99	1.10
53380 Italy	V 0	1.11	1.06	1.04	1.06	0	1.07	1.00	0	0	0	0	0	1.03	1.04	1.05
55752 Sweden	V 1.00	1.08	2.10 <sup>2/</sup>	0	0	0	0	0	.99	2.10 <sup>2/</sup>	1.13	0	0	1.02	.94	1.29
55826 United Kingdom	V .93	1.45	2.10 <sup>2/</sup>	.68	1.44	2.10 <sup>2/</sup>	1.11	.86	.92	1.05	.79	.99	.94	.98	0	1.17
Mean	1.04	1.15	1.78	.92	1.12	1.27	1.05	.94	.96	1.48	.97	1.09	.91	1.01	1.06	1.18
	1.12	.98	1.76	.90	1.16	1.28	1.12	1.02	1.02	1.54	.93	1.23	1.01	1.05	.93	1.29

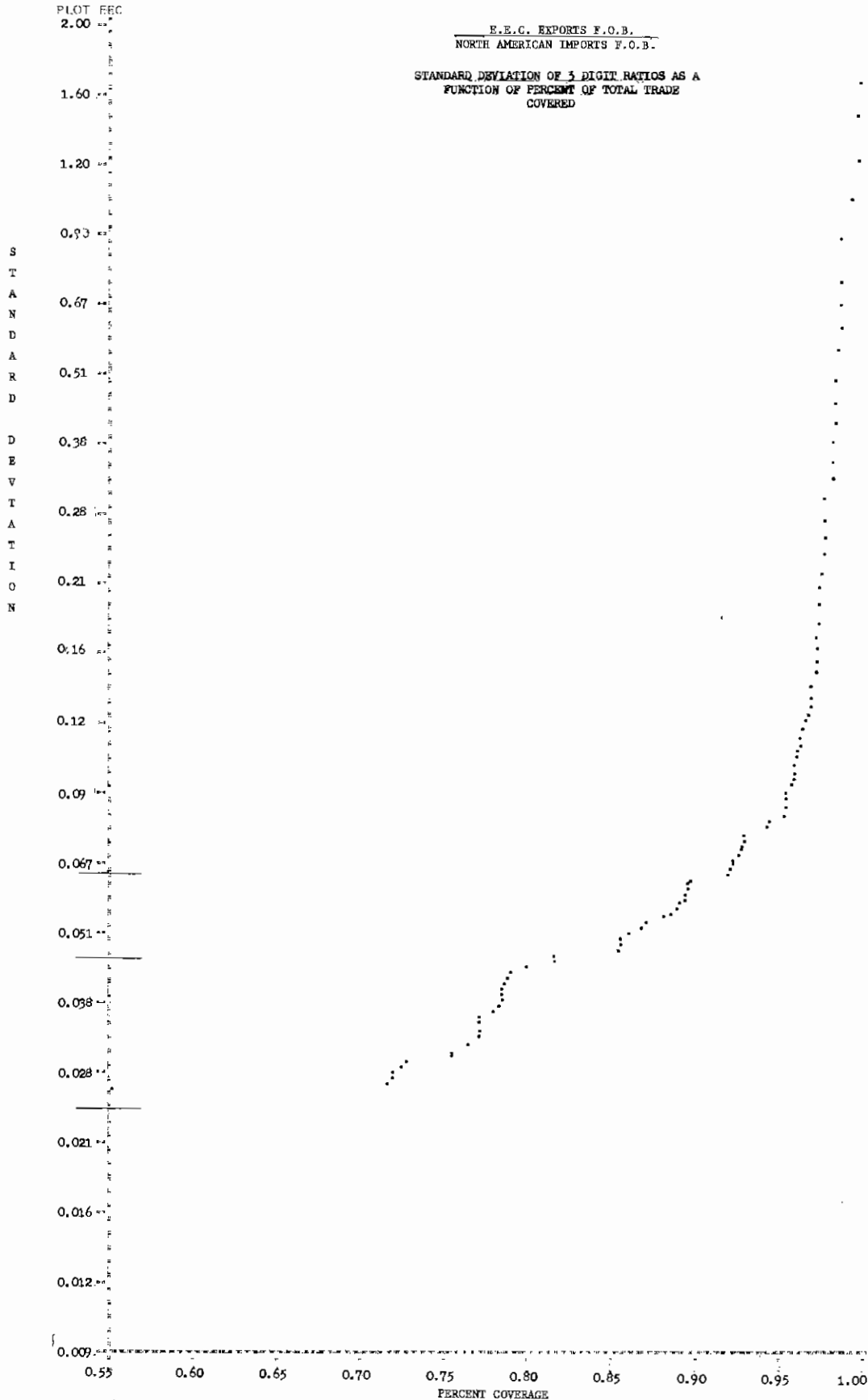
V - Ratio of value of exports to corresponding value of imports.

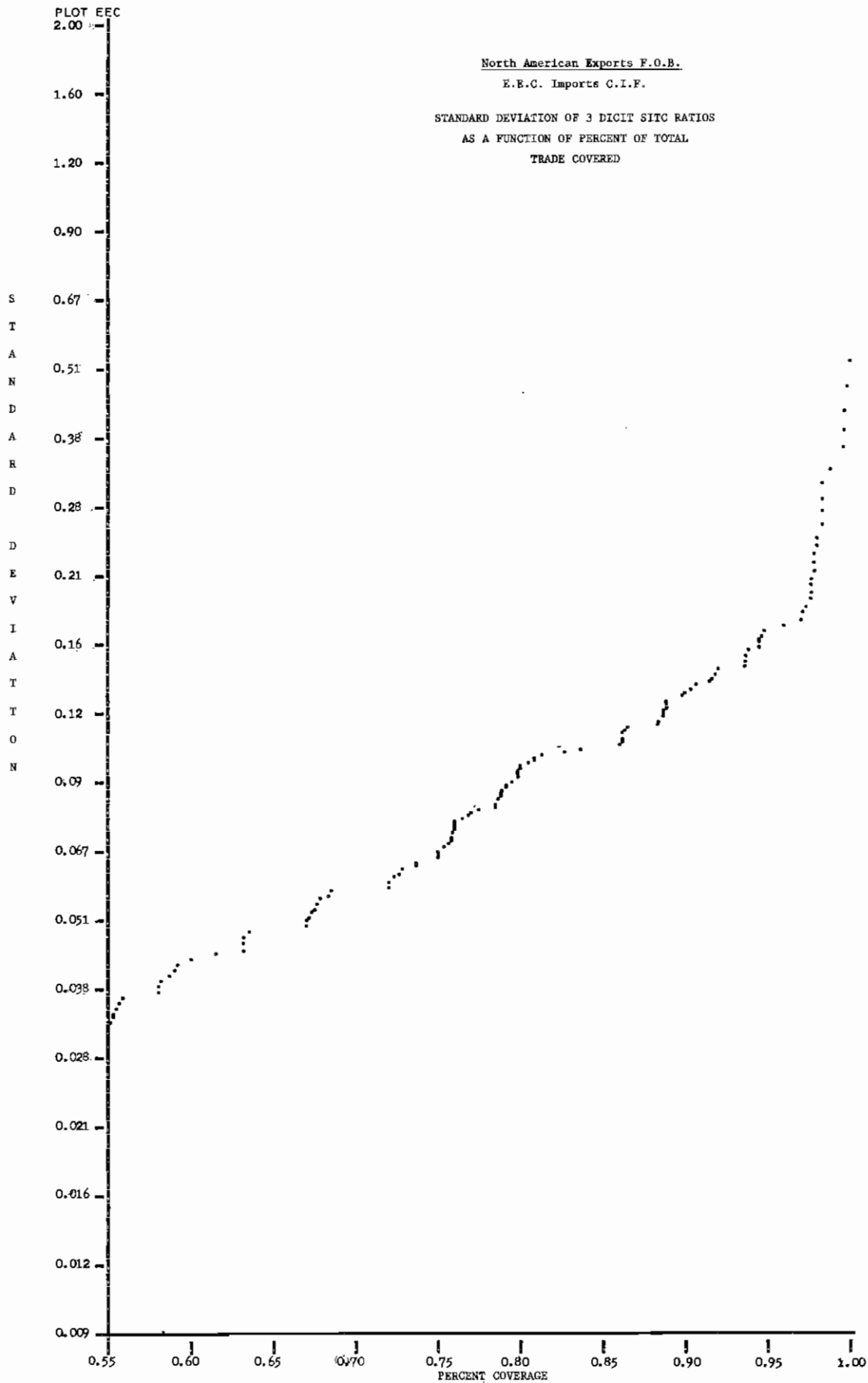
Q - Ratio of quantity of exports to corresponding quantity of imports.

<sup>1/</sup> The countries listed were selected as the more important exporters and importers of automobiles in 1970. They account for approximately two thirds of the value of total trade flows in this commodity.

<sup>2/</sup> In excess of an arbitrary upper limit of 2.10. This limit was specified so as to minimize the distortion of the mean caused by very large ratios.

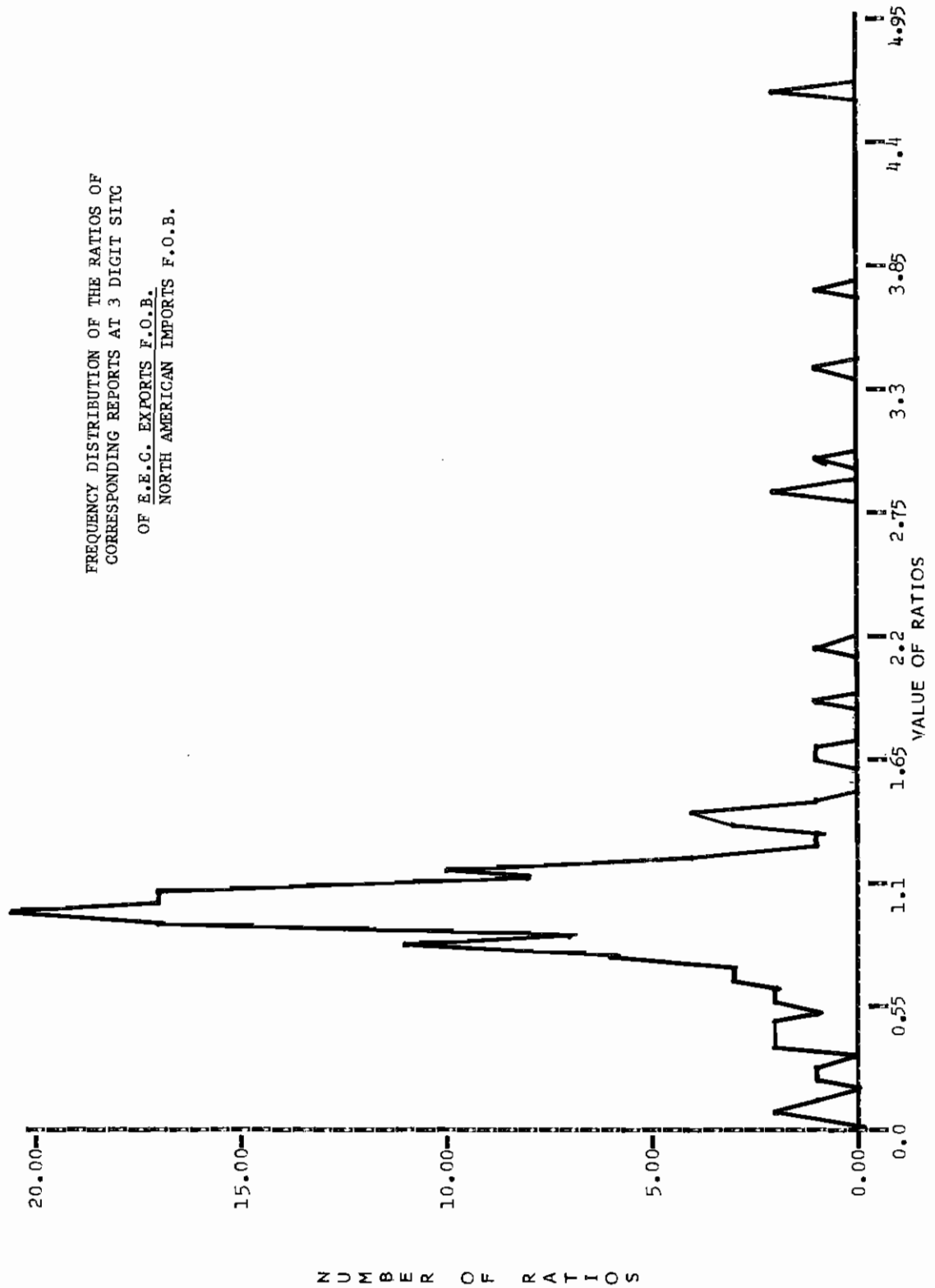
SECTION IV - ANALYTICAL CHARTS



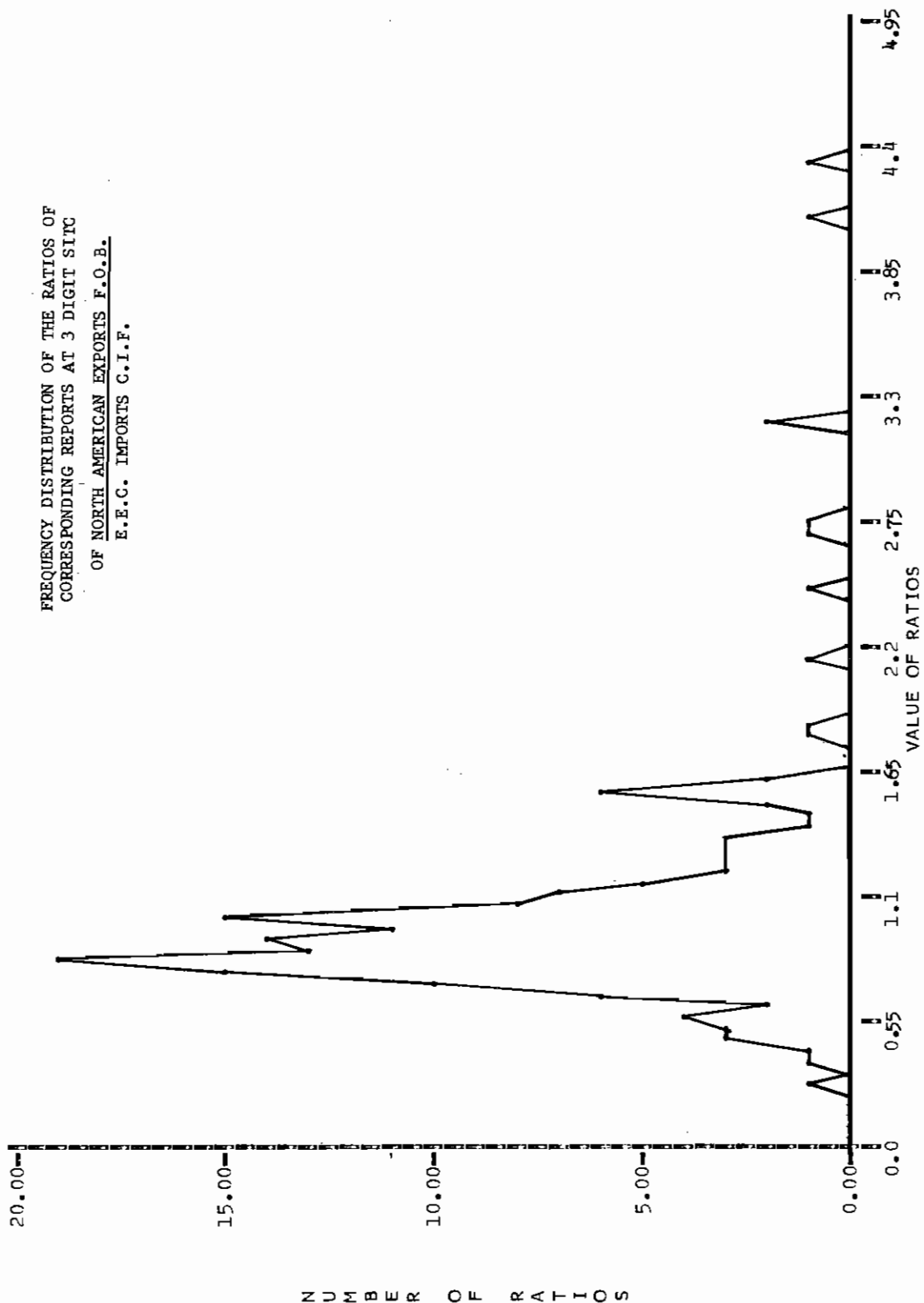




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NORTH AMERICAN IMPORTS F.O.B.



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OF NORTH AMERICAN EXPORTS F.O.B.  
E.E.C. IMPORTS C.I.F.

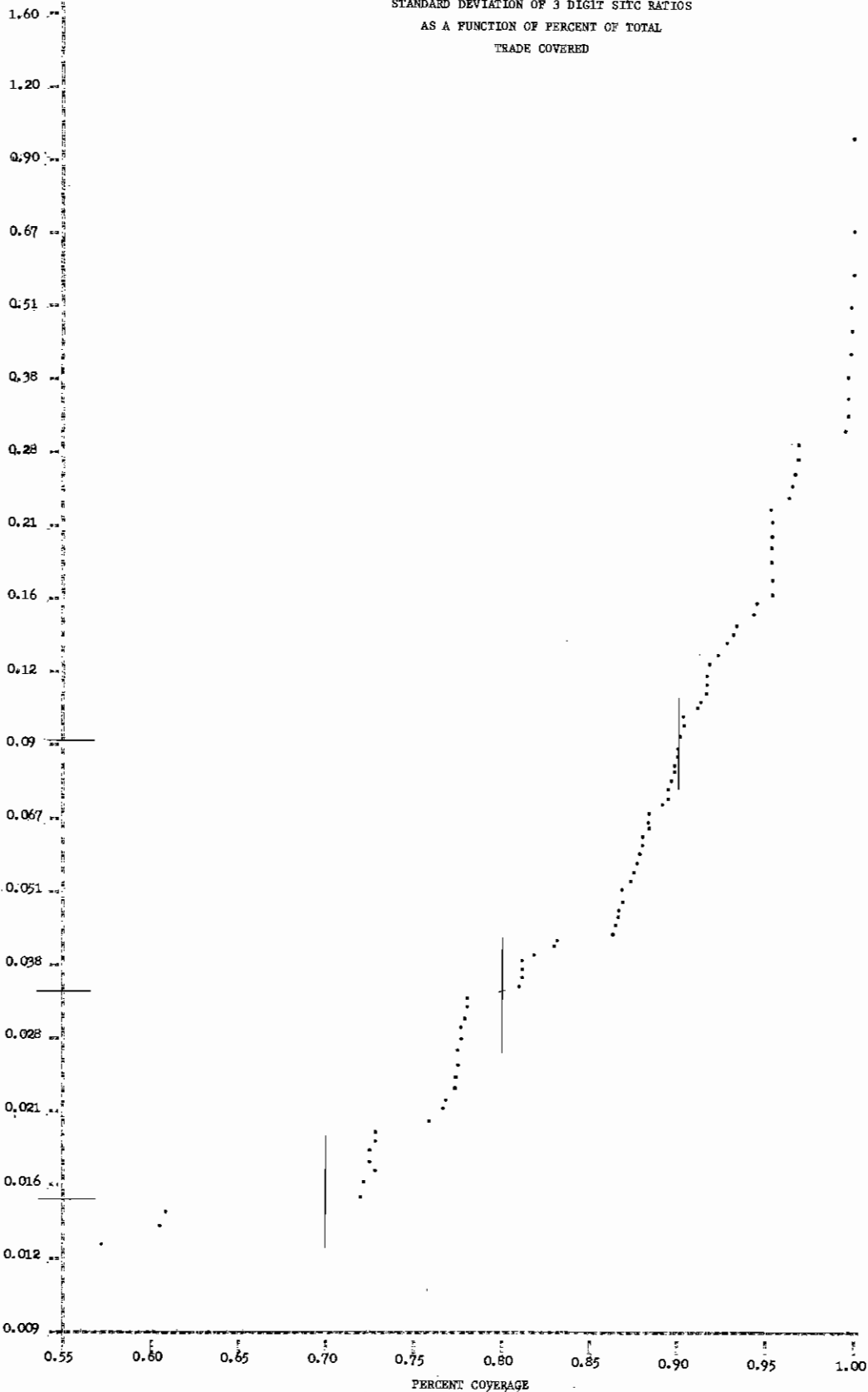


PLOT BEL  
 2.00

BELGIAN EXPORTS F.O.B.  
NORTH AMERICAN IMPORTS F.O.B.

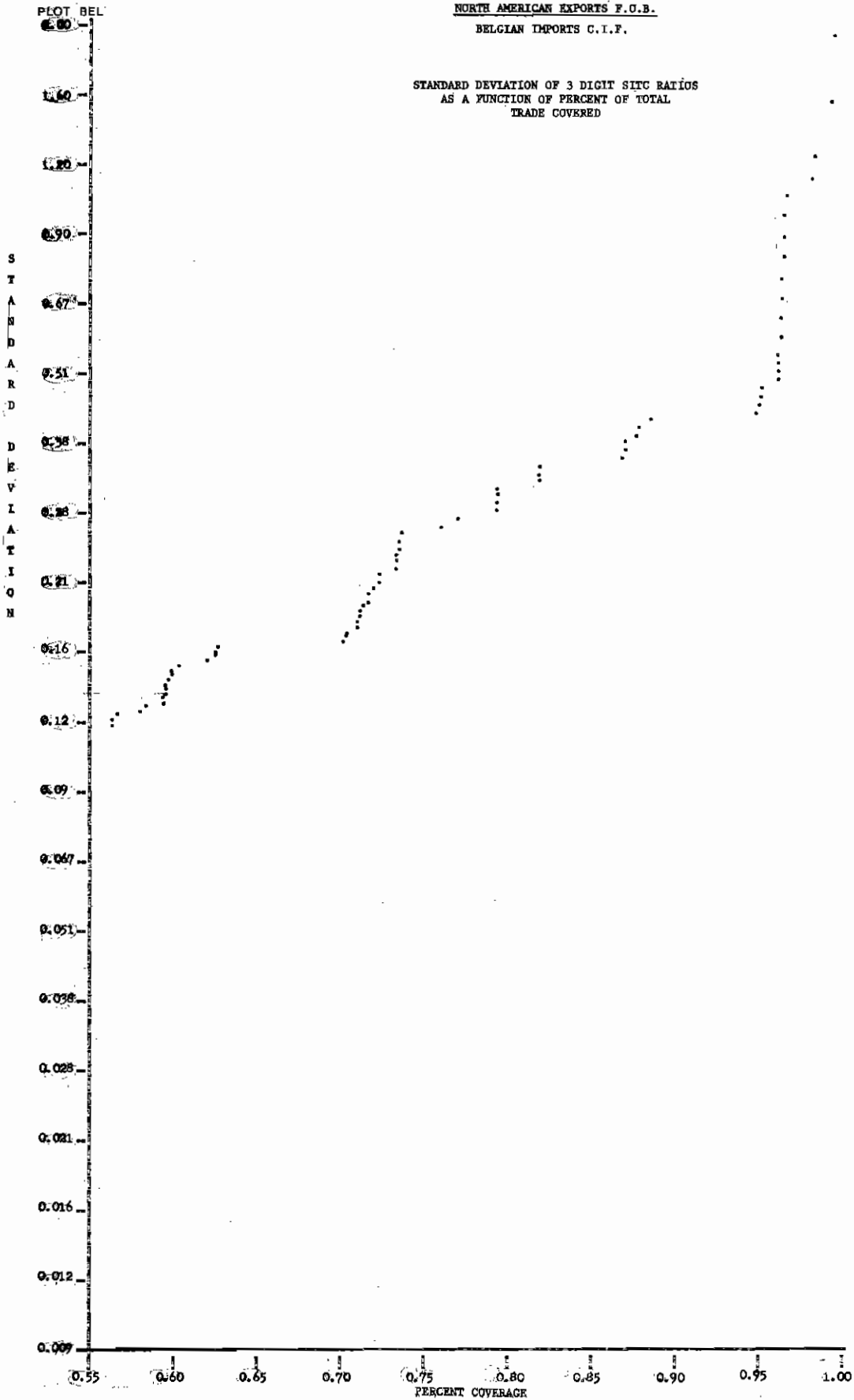
STANDARD DEVIATION OF 3 DIGIT SITC RATIOS  
 AS A FUNCTION OF PERCENT OF TOTAL  
 TRADE COVERED

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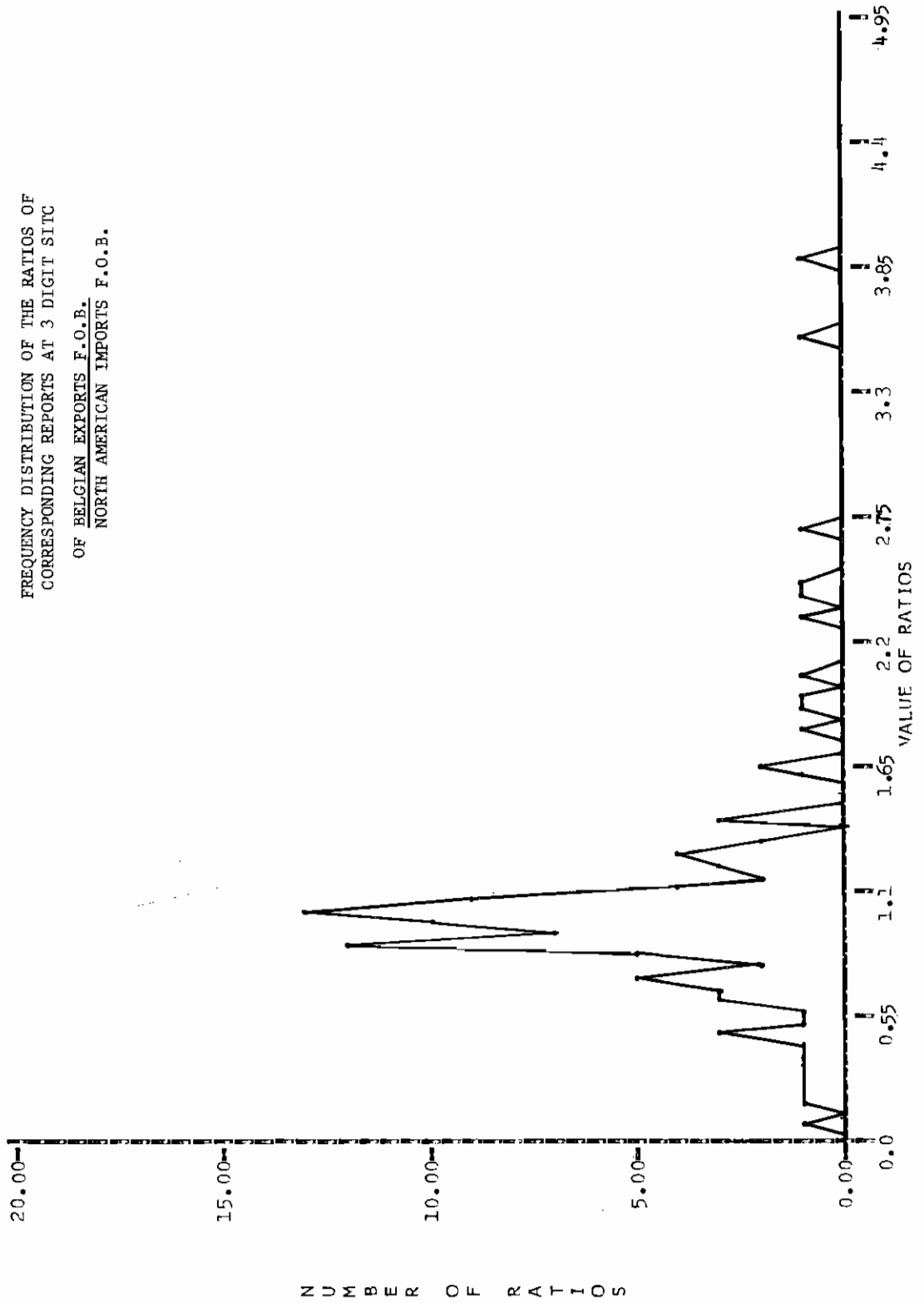


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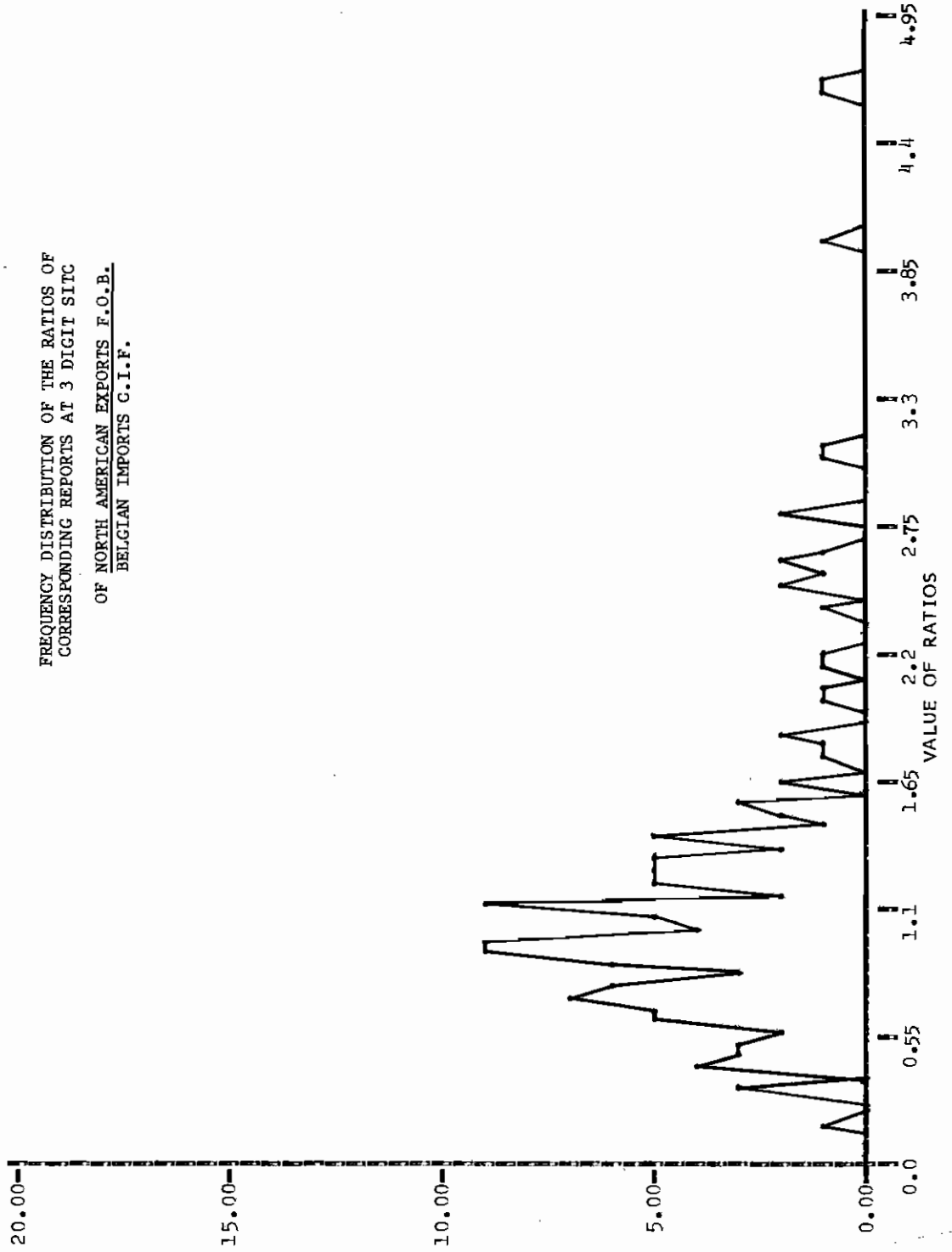
STANDARD DEVIATION OF 3 DIGIT SITC RATIOS  
 AS A FUNCTION OF PERCENT OF TOTAL  
 TRADE COVERED

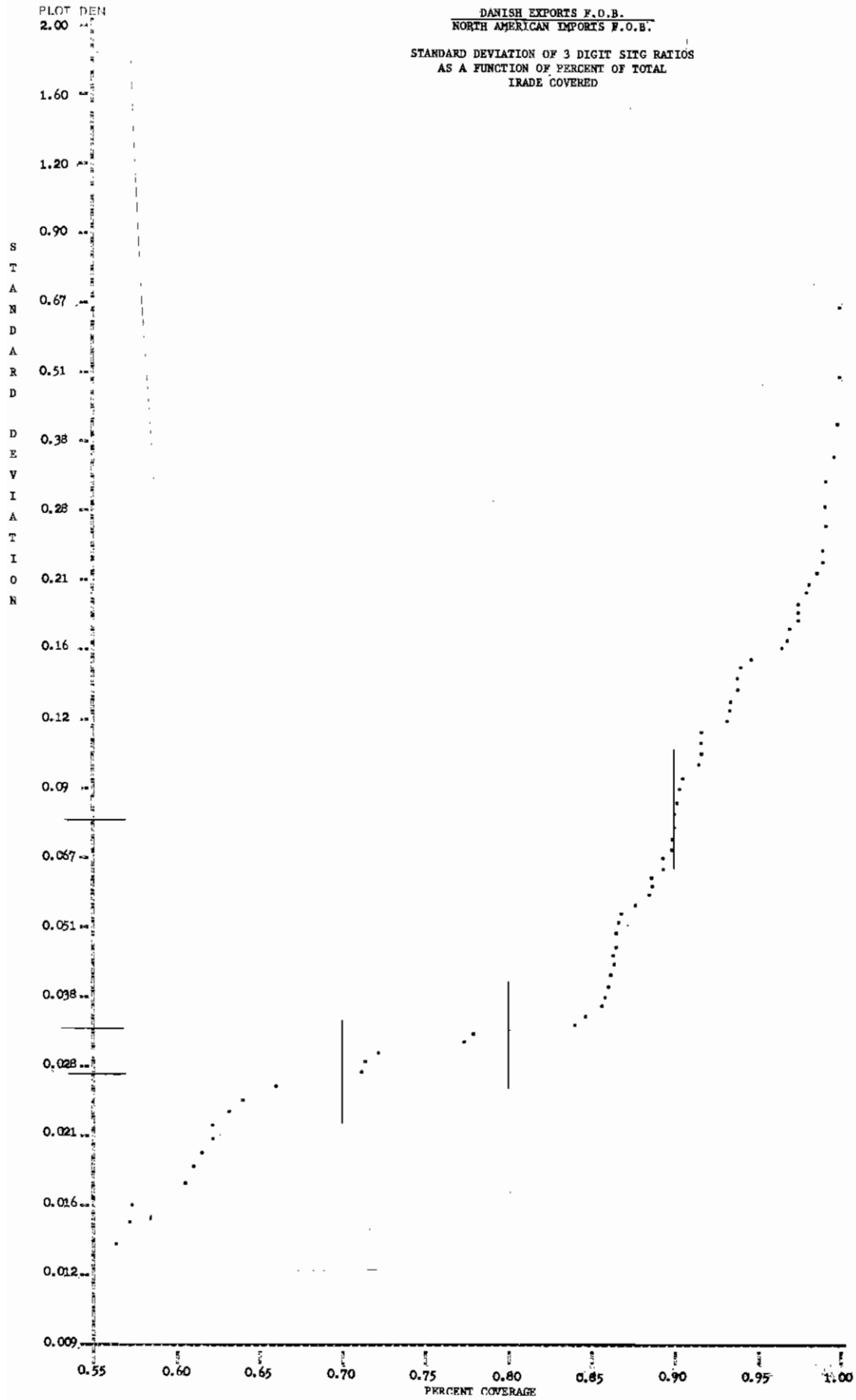


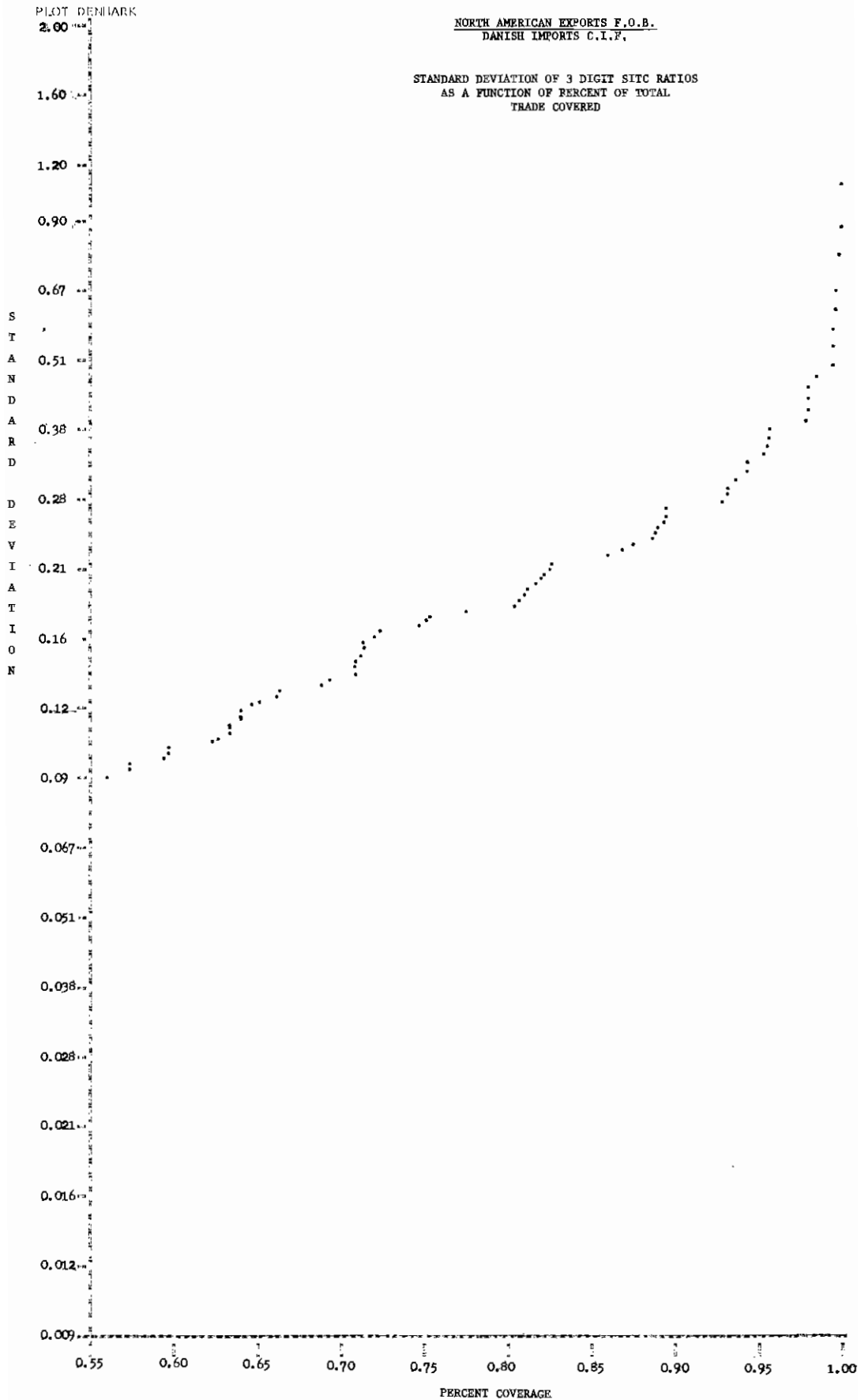
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FREQUENCY DISTRIBUTION OF THE RATIOS OF  
CORRESPONDING REPORTS AT 3 DIGIT SITC  
OF NORTH AMERICAN EXPORTS F.O.B.  
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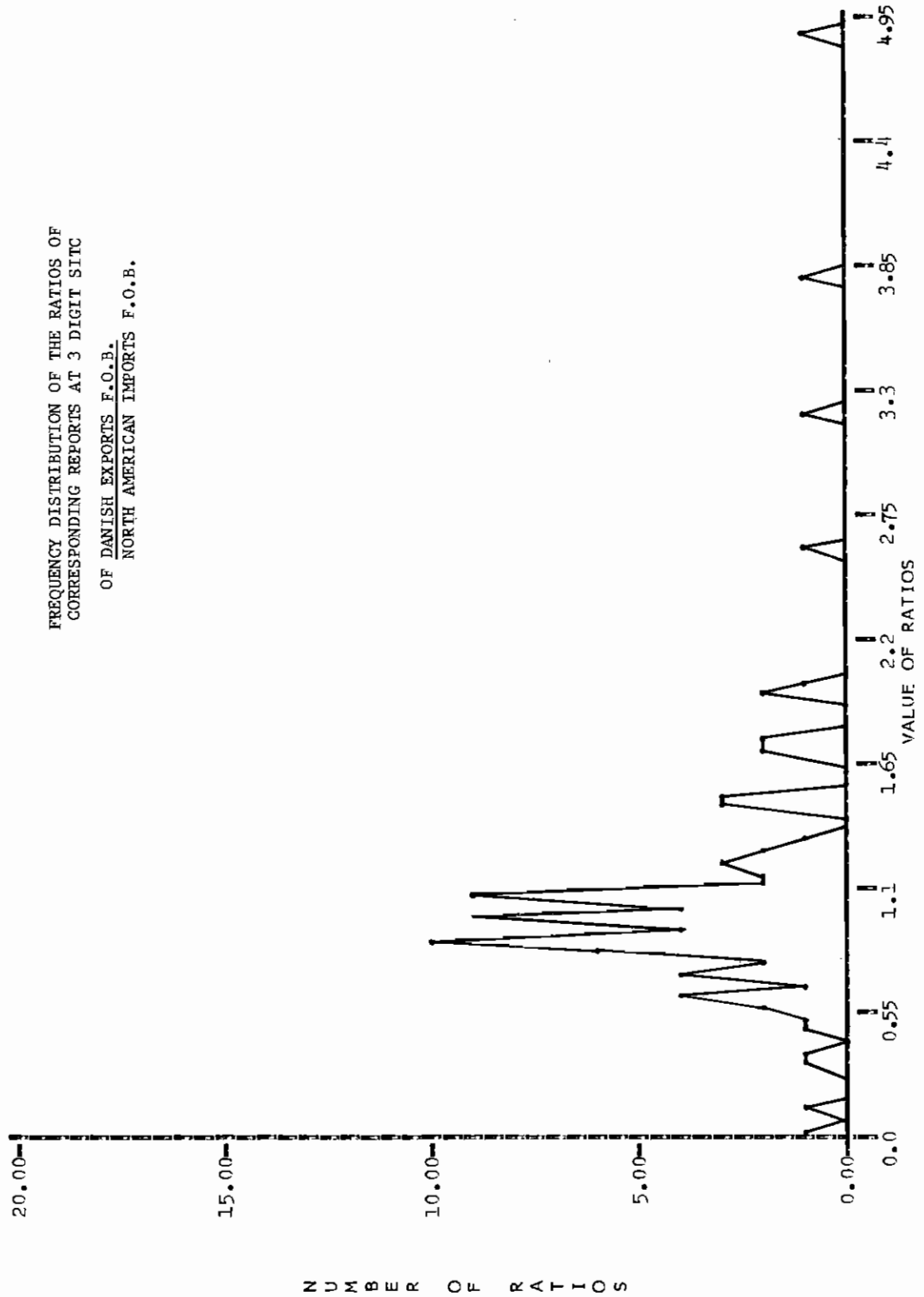




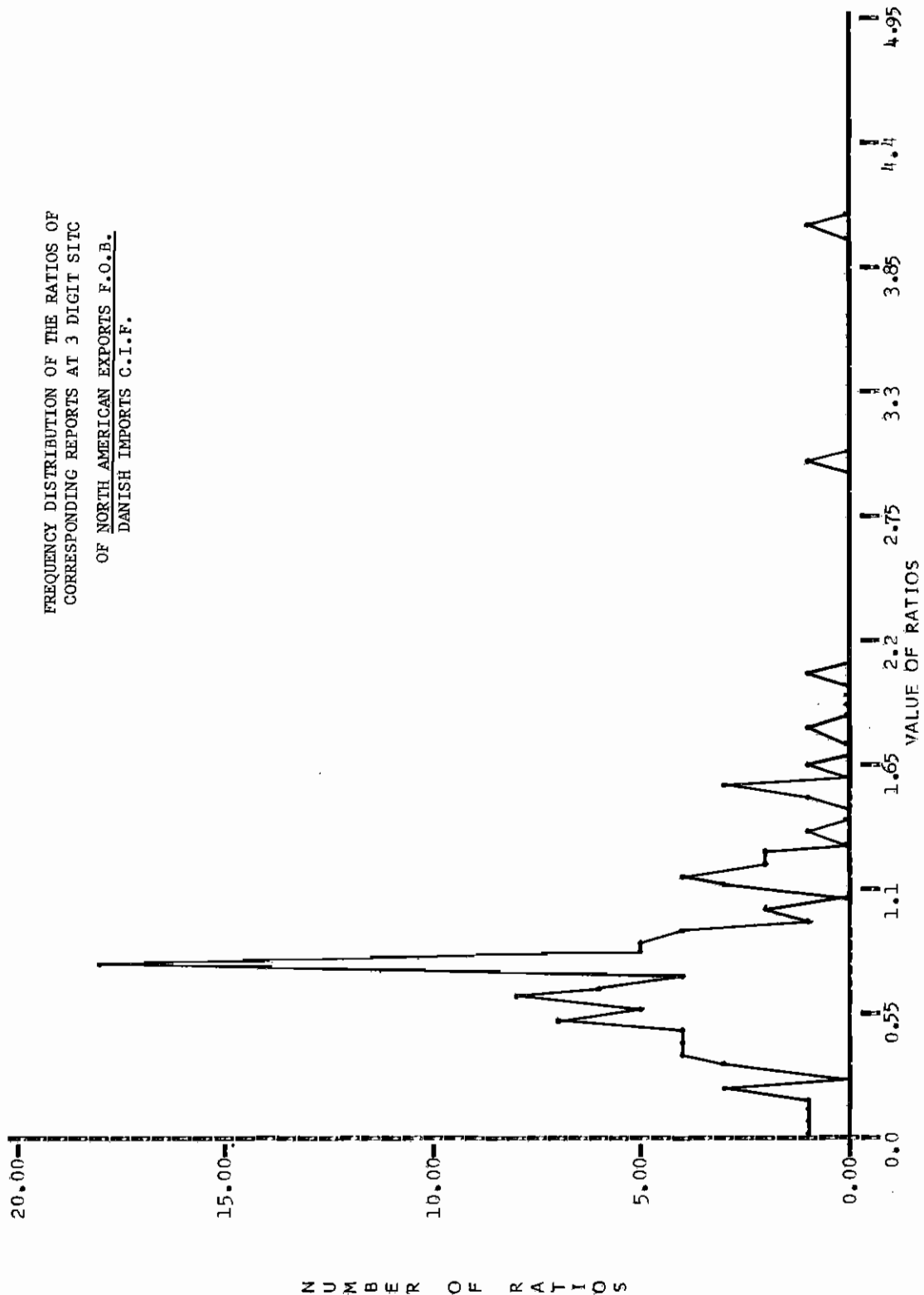




FREQUENCY DISTRIBUTION OF THE RATIOS OF  
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OF DANISH EXPORTS F.O.B.  
NORTH AMERICAN IMPORTS F.O.B.



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CORRESPONDING REPORTS AT 3 DIGIT SITC  
OF NORTH AMERICAN EXPORTS F.O.B.  
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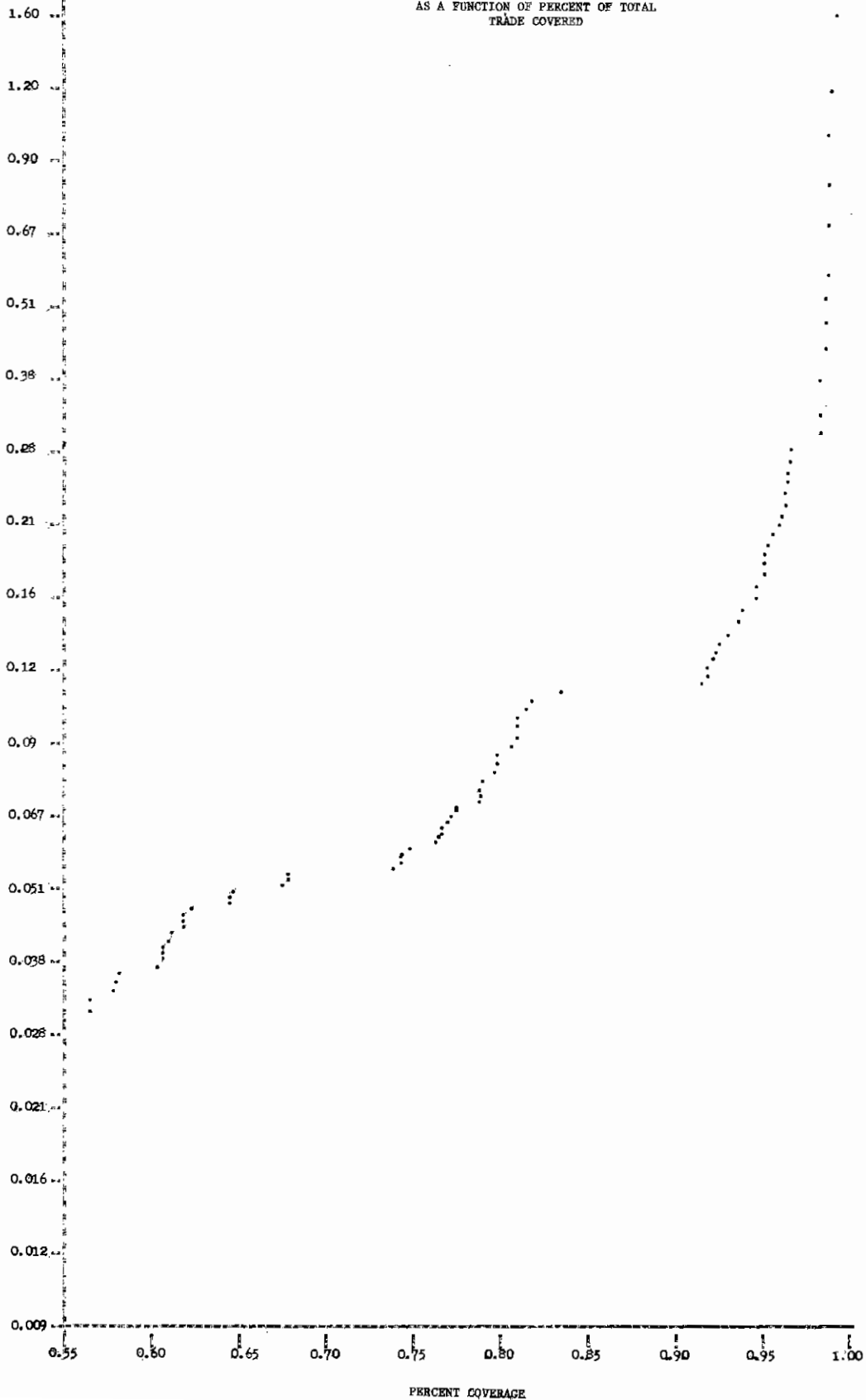


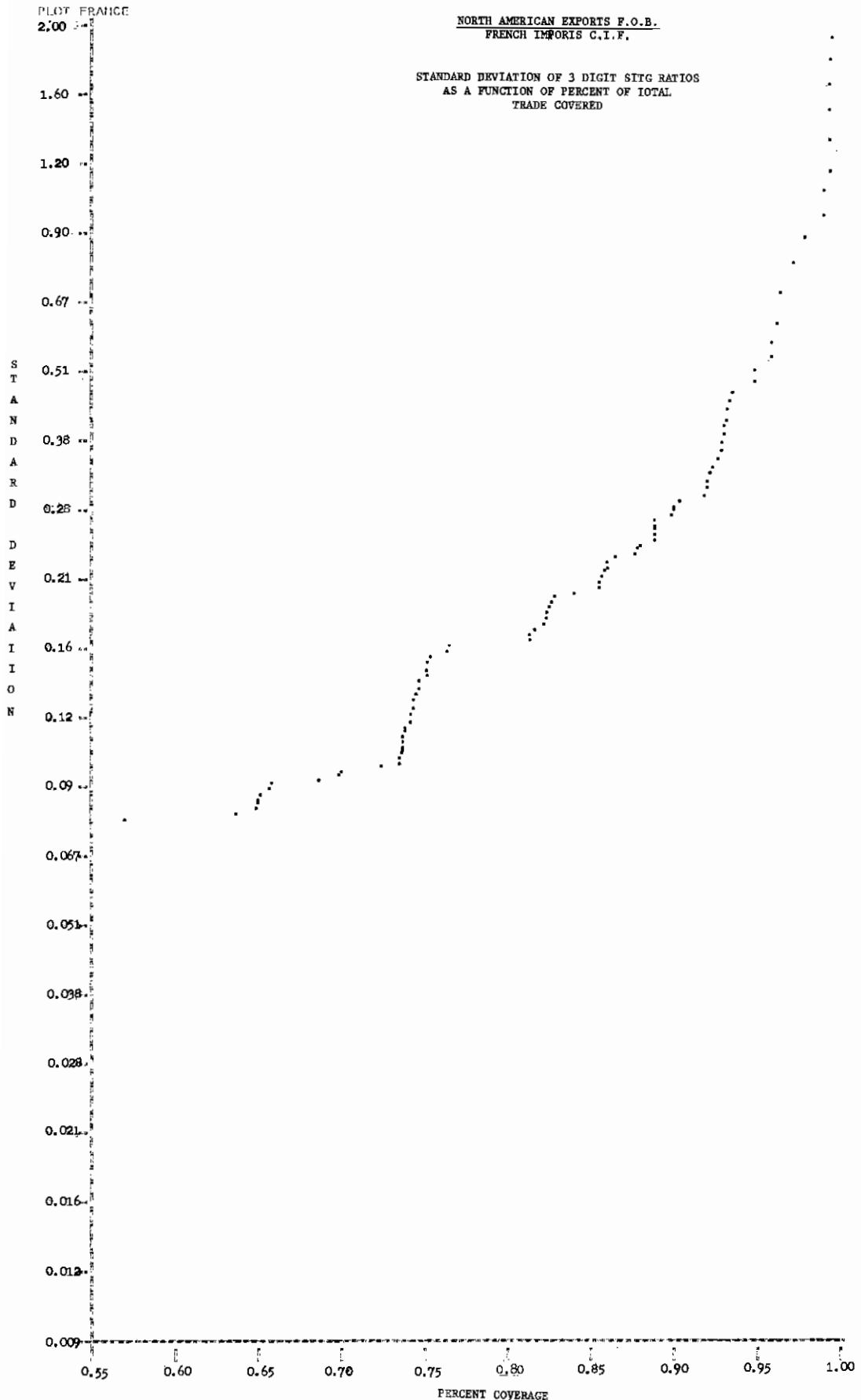
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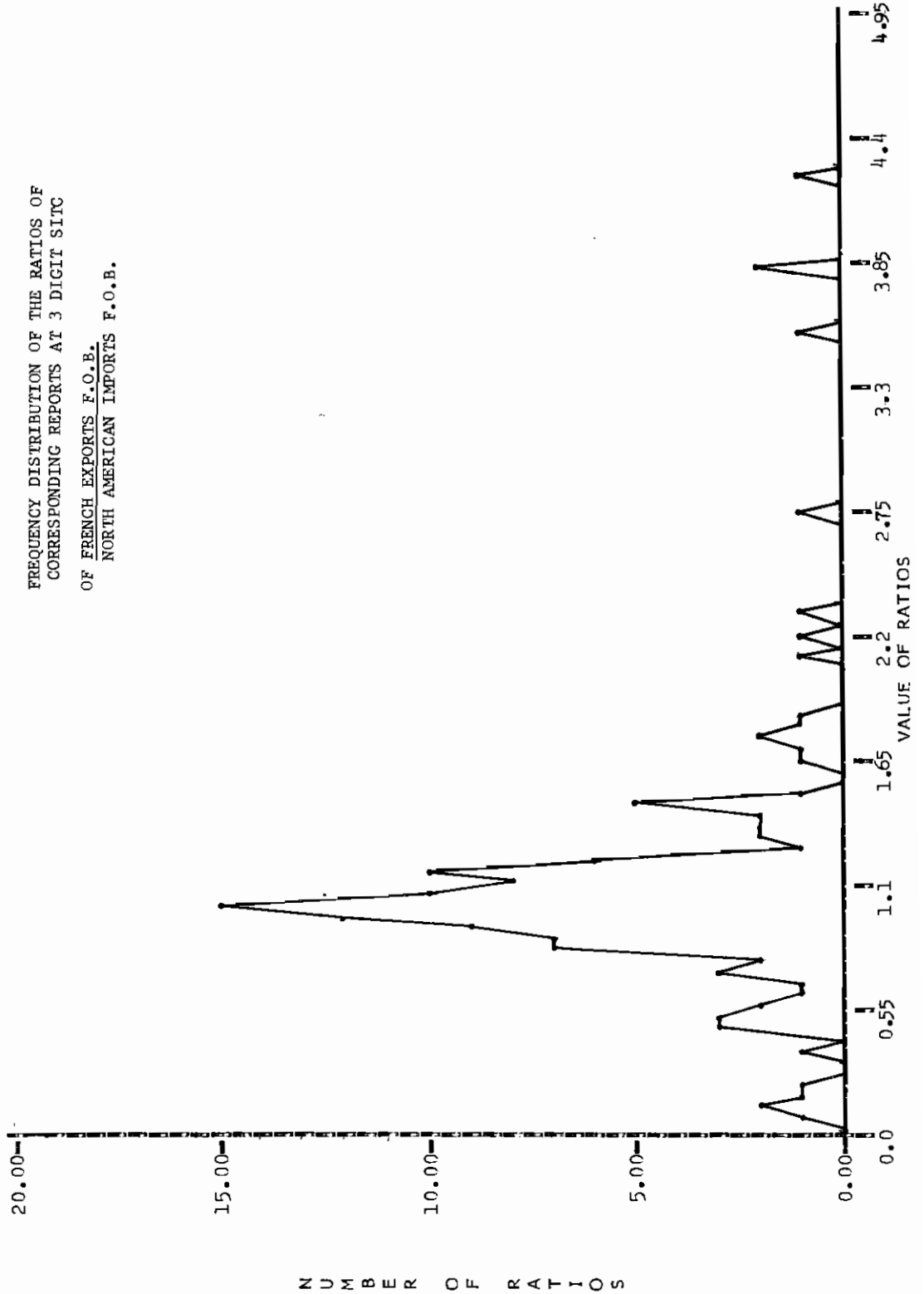
STANDARD DEVIATION OF 3 DIGIT SITC RATIOS  
 AS A FUNCTION OF PERCENT OF TOTAL  
 TRADE COVERED

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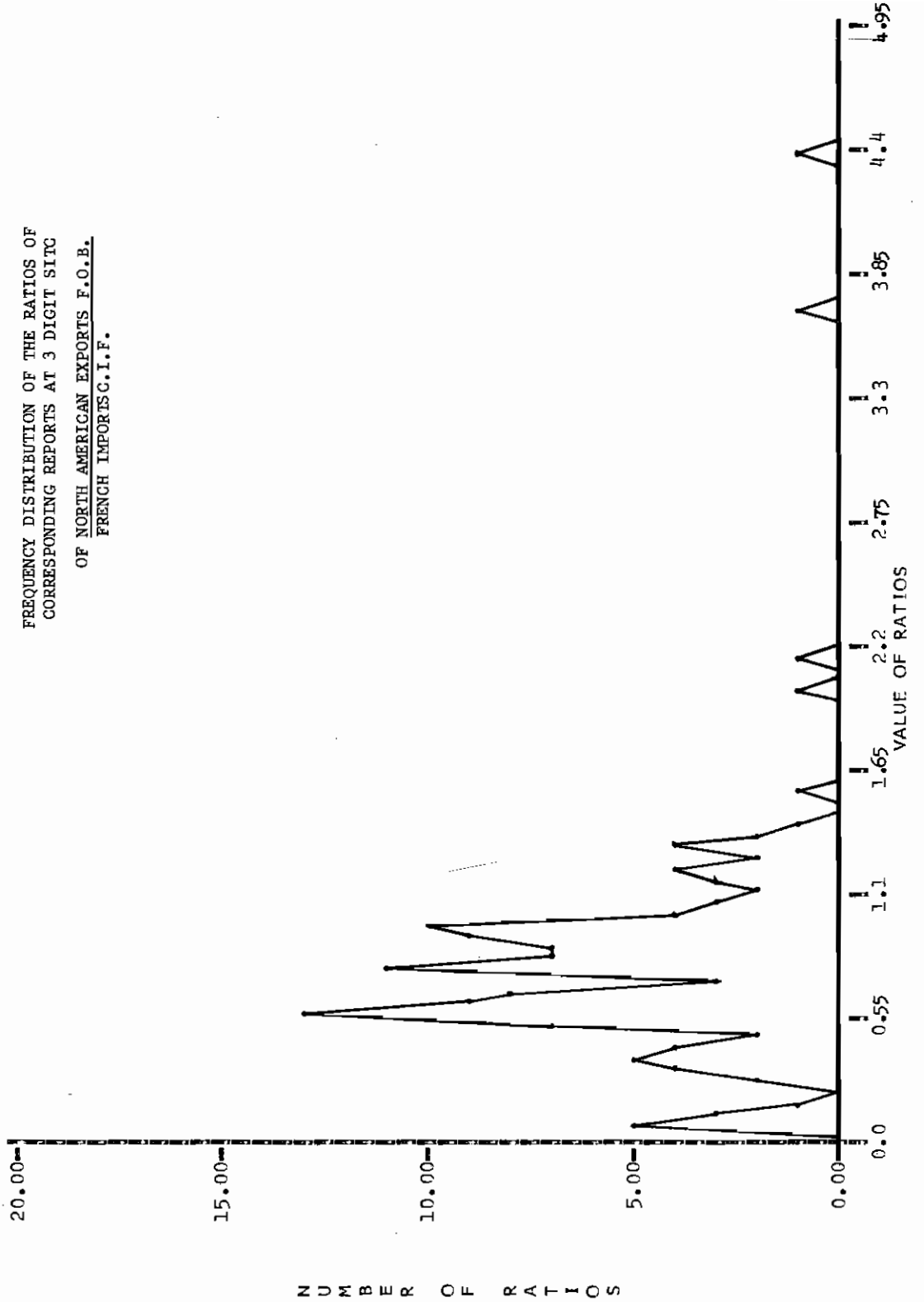




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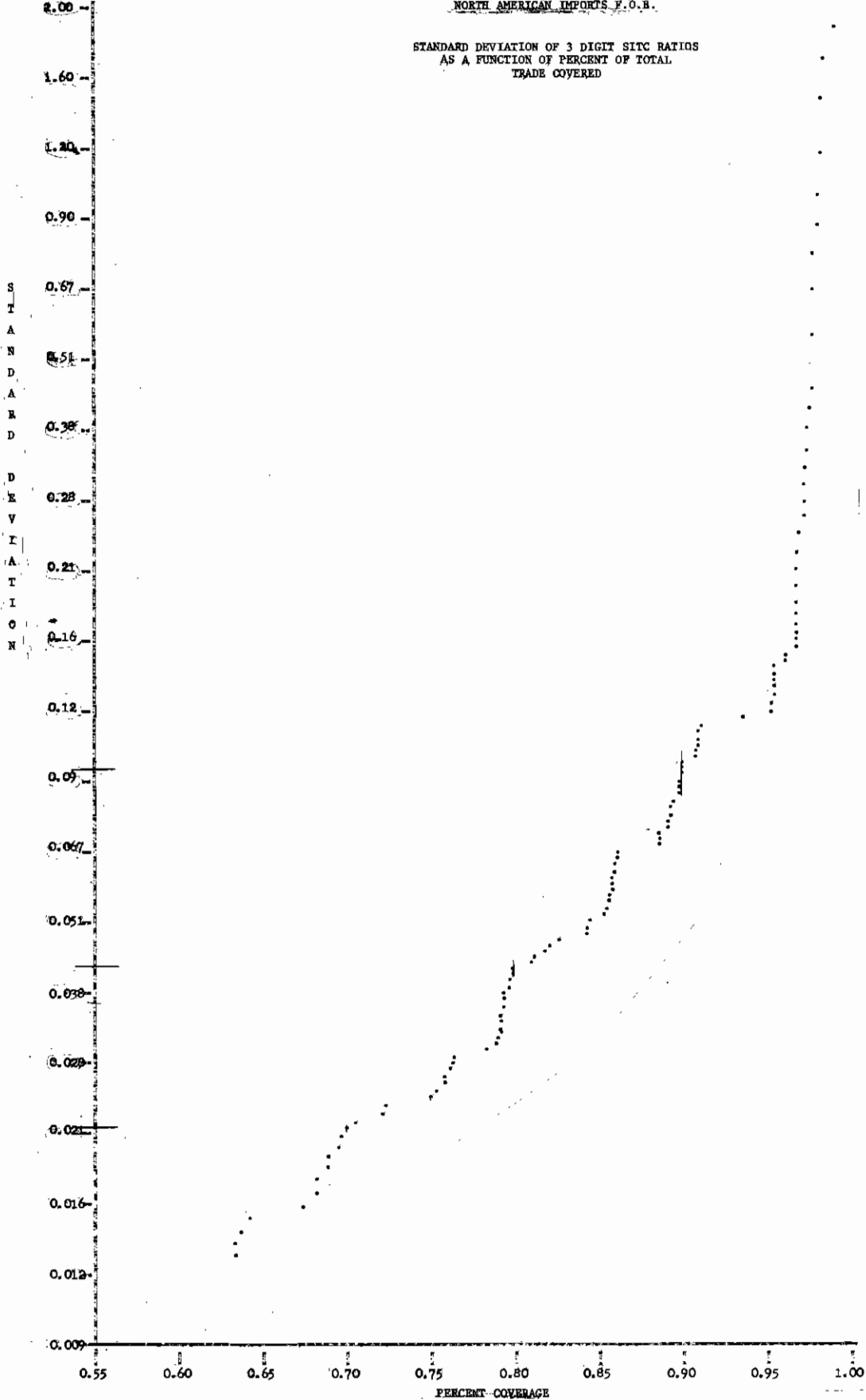
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PLOT GERMANY

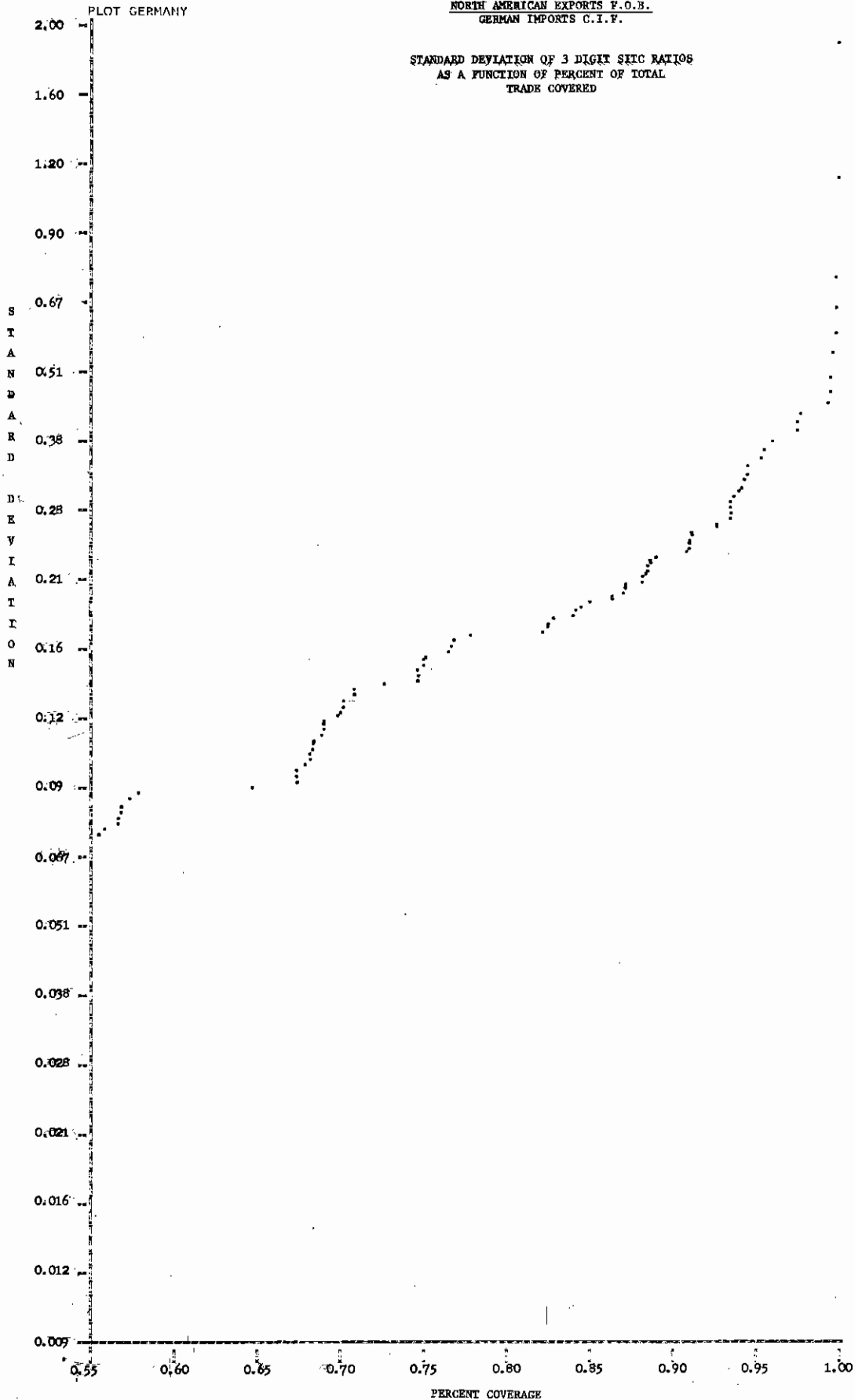
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 AS A FUNCTION OF PERCENT OF TOTAL  
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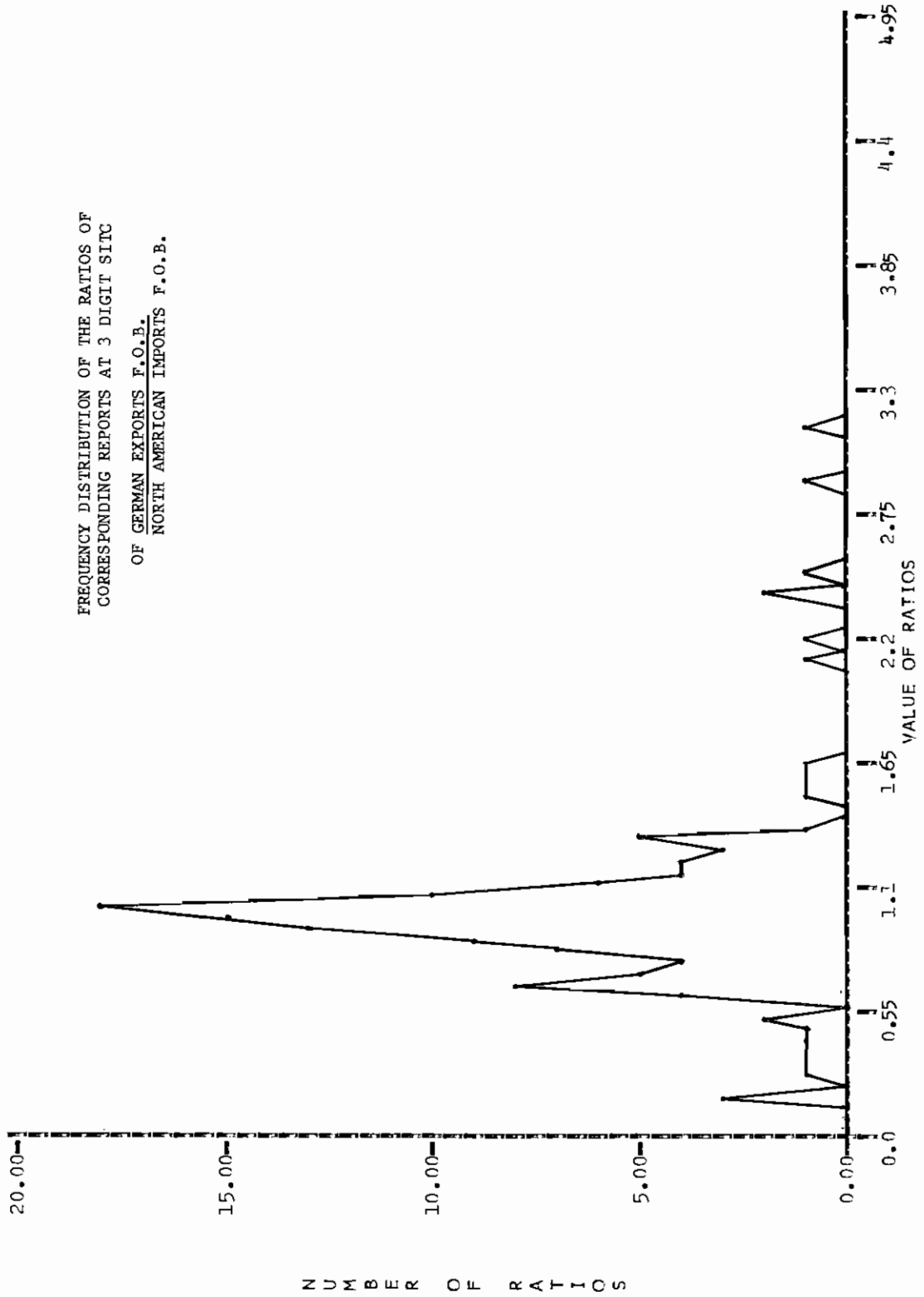
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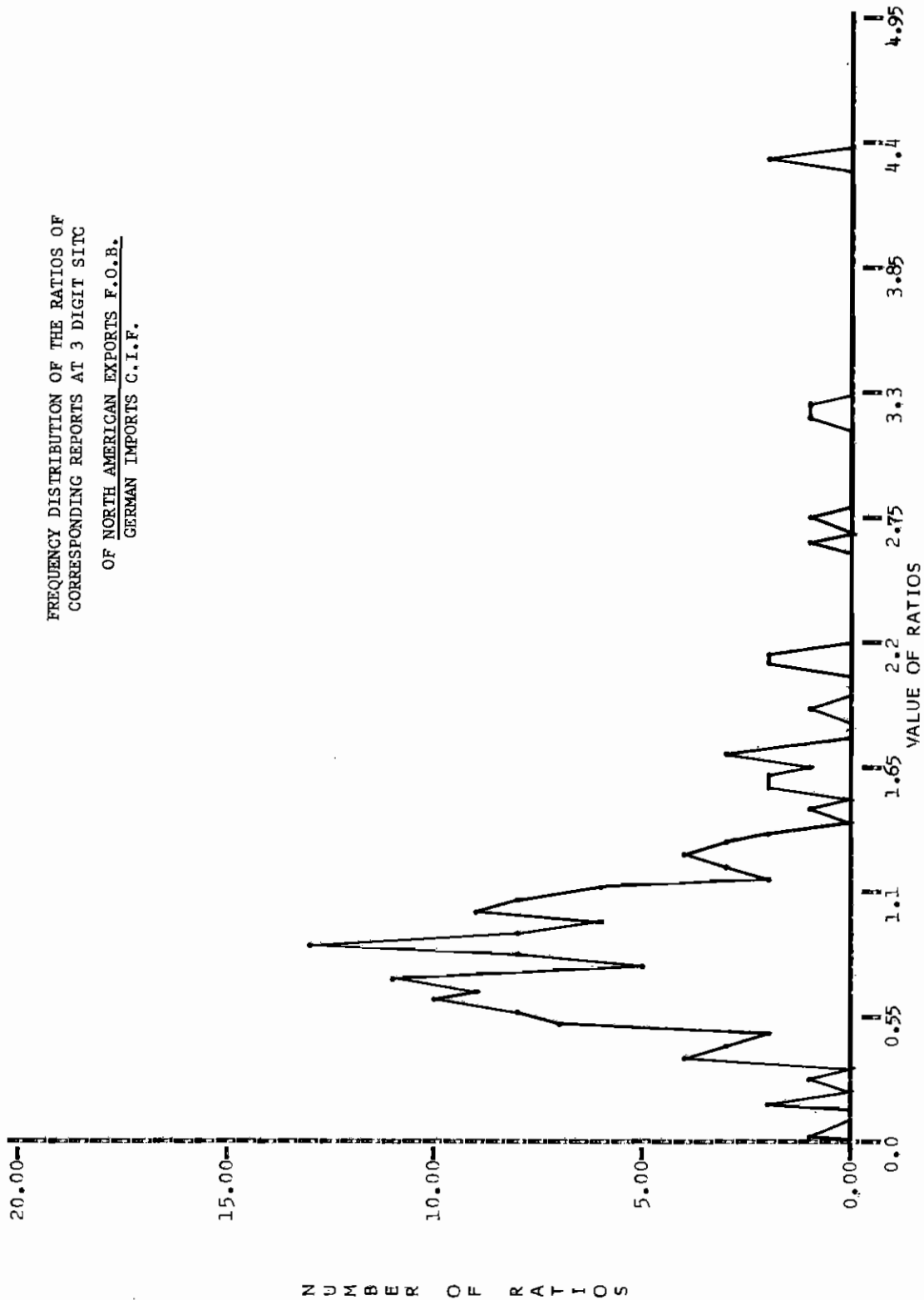


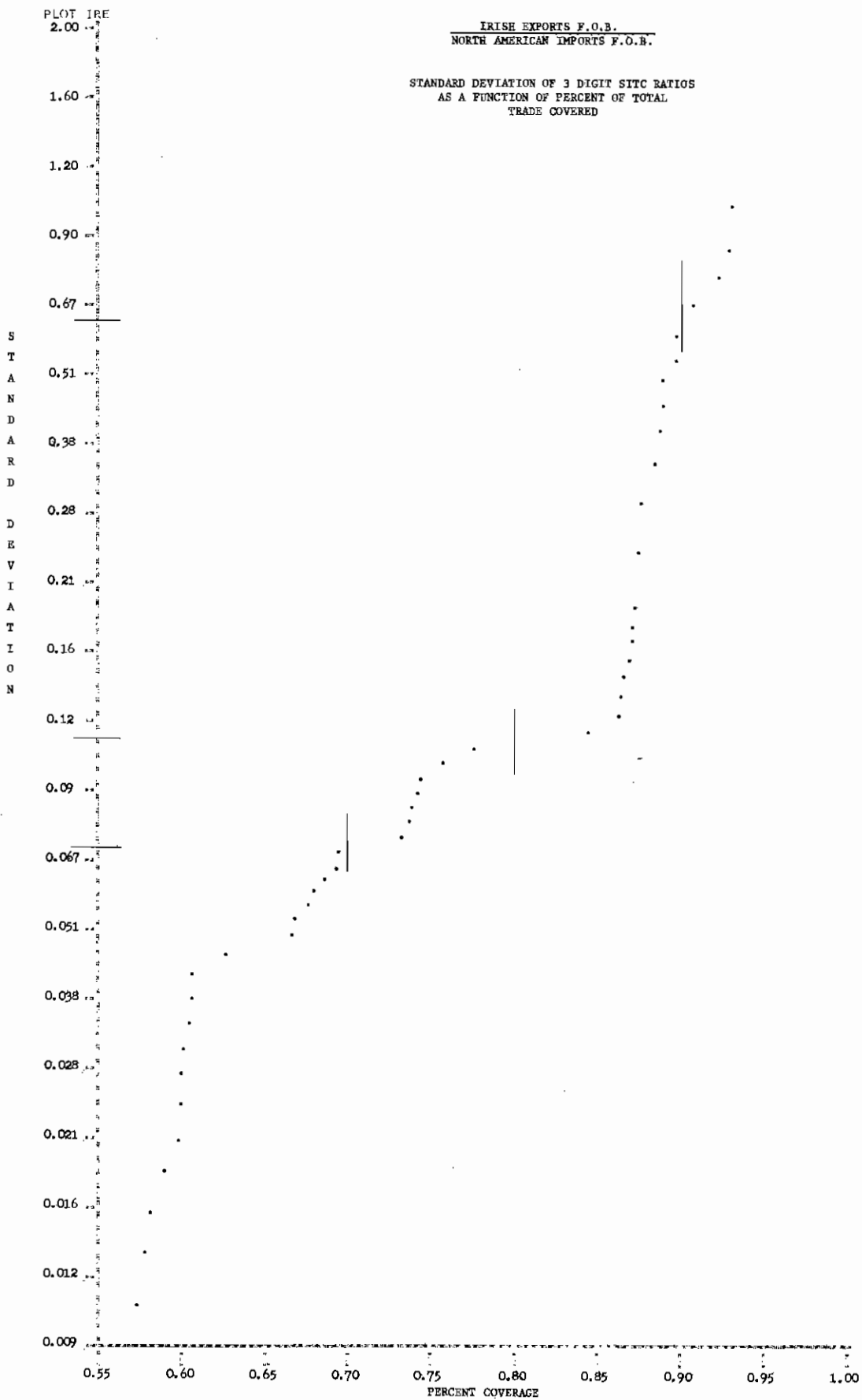


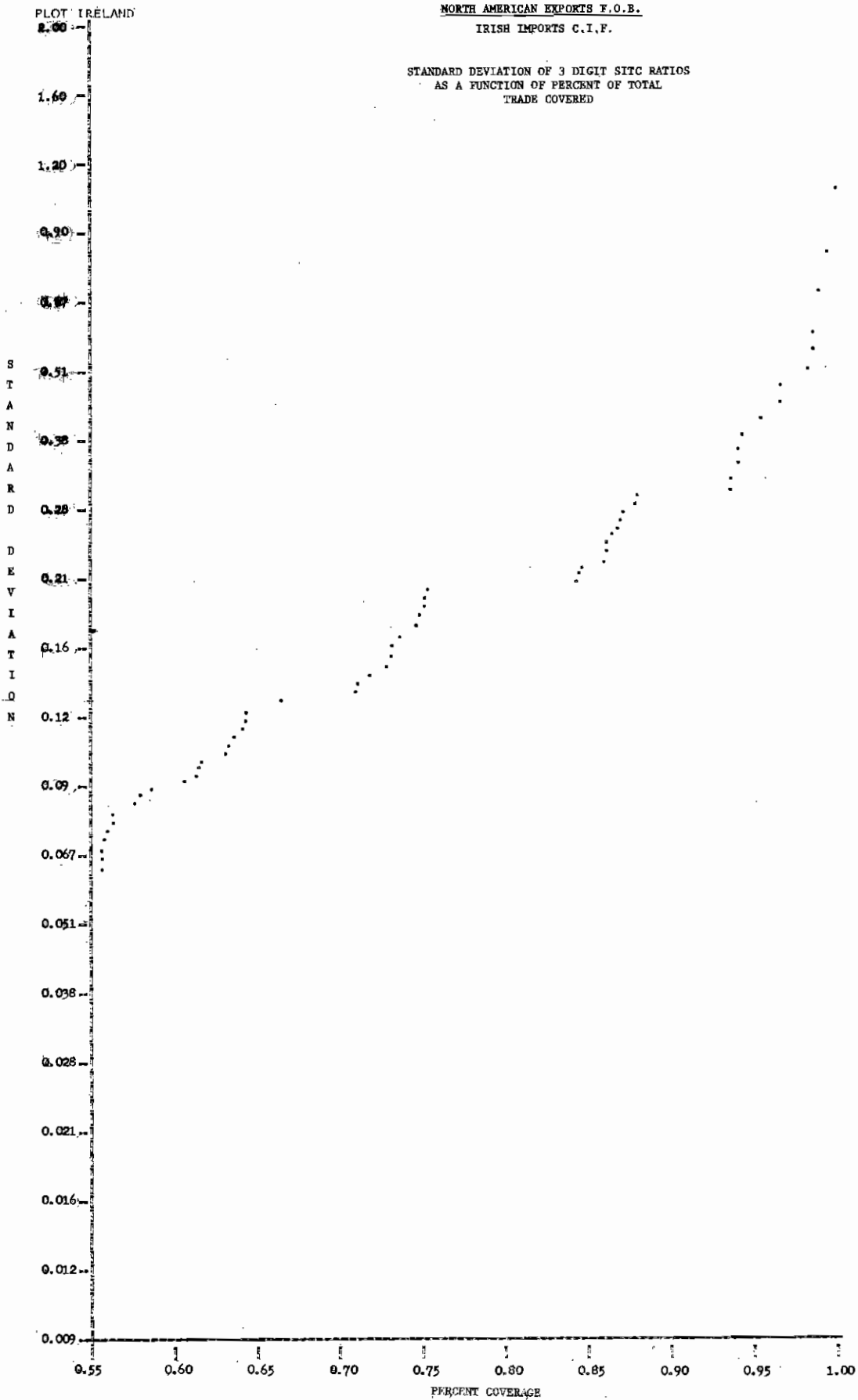
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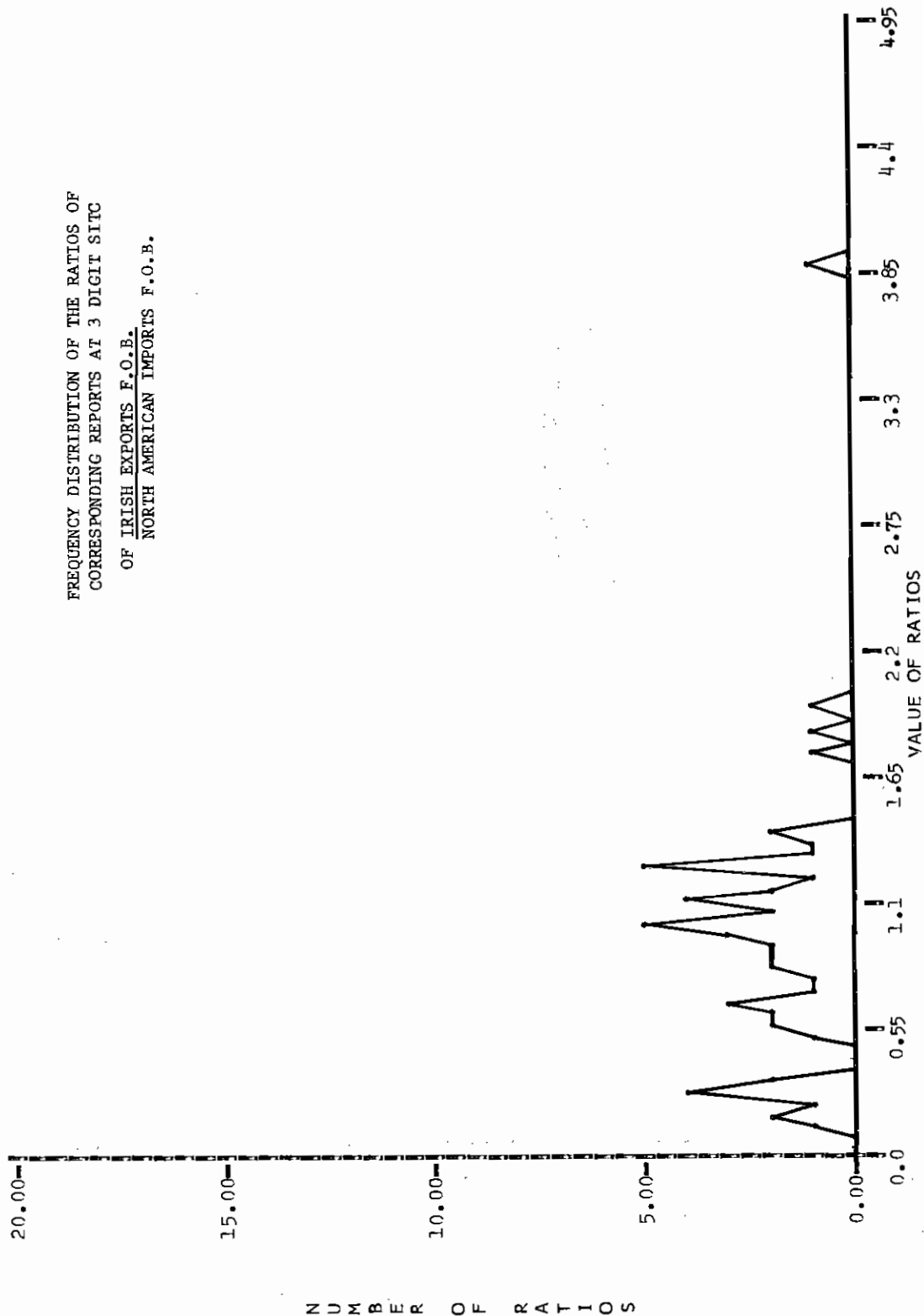
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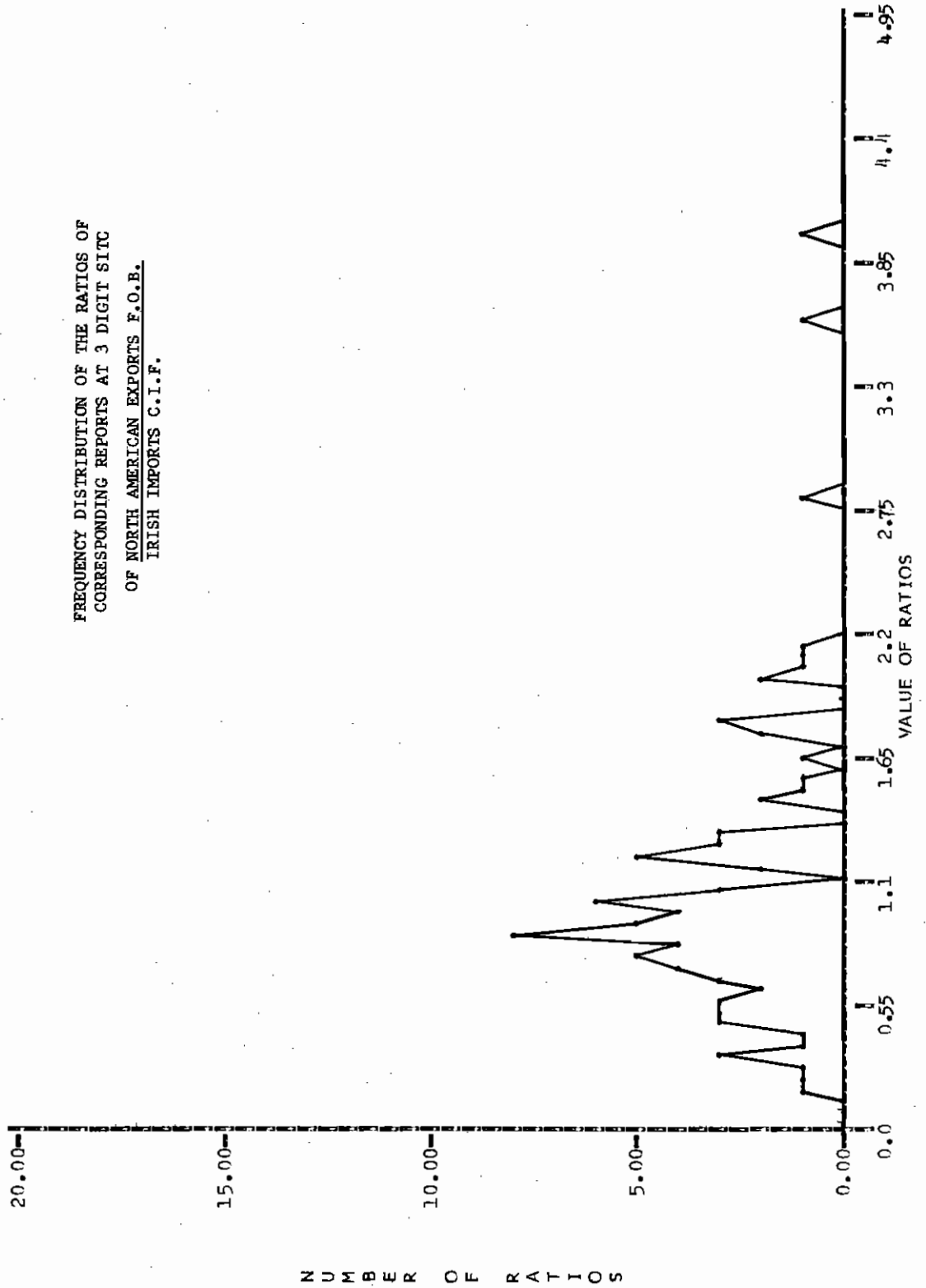




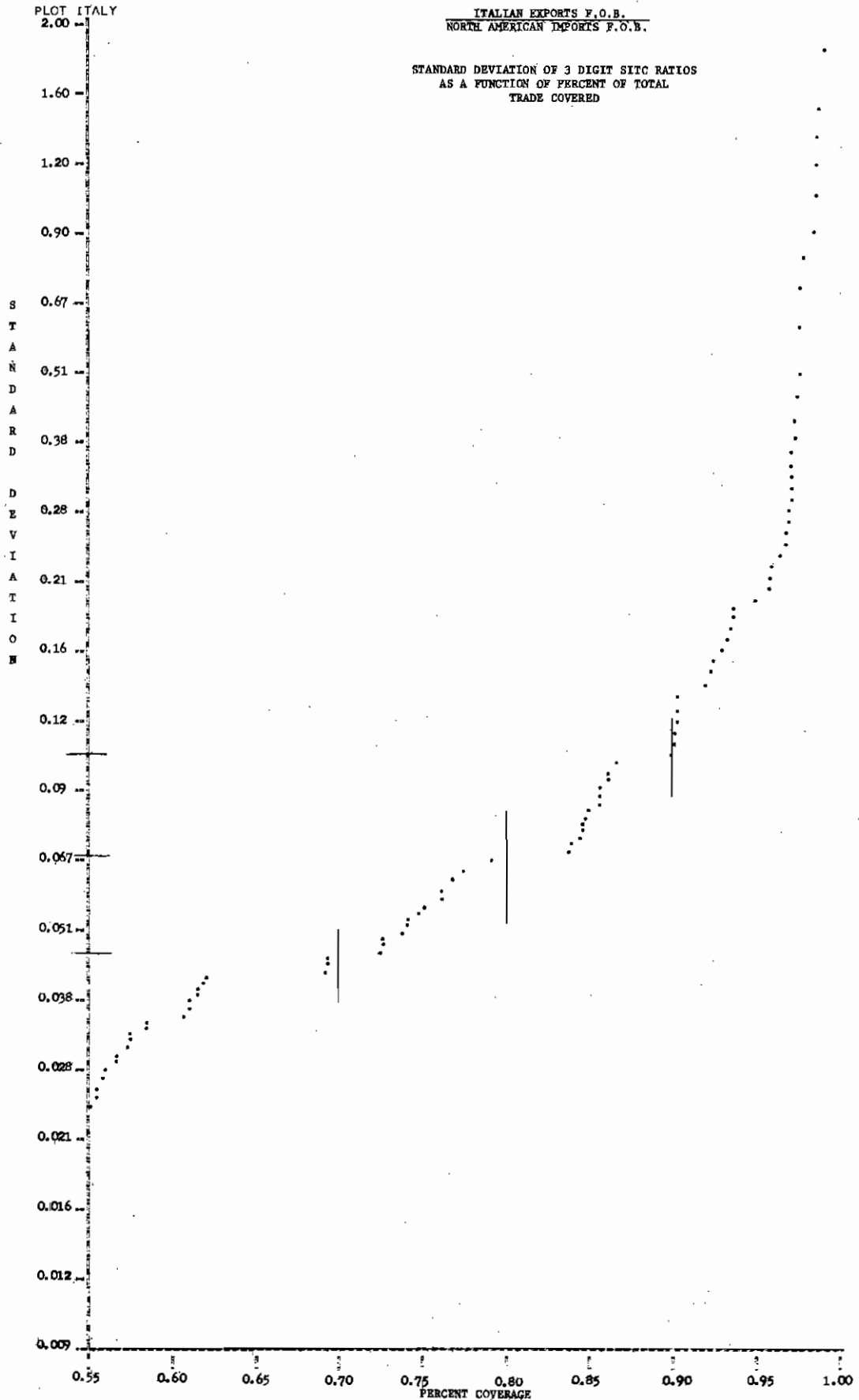
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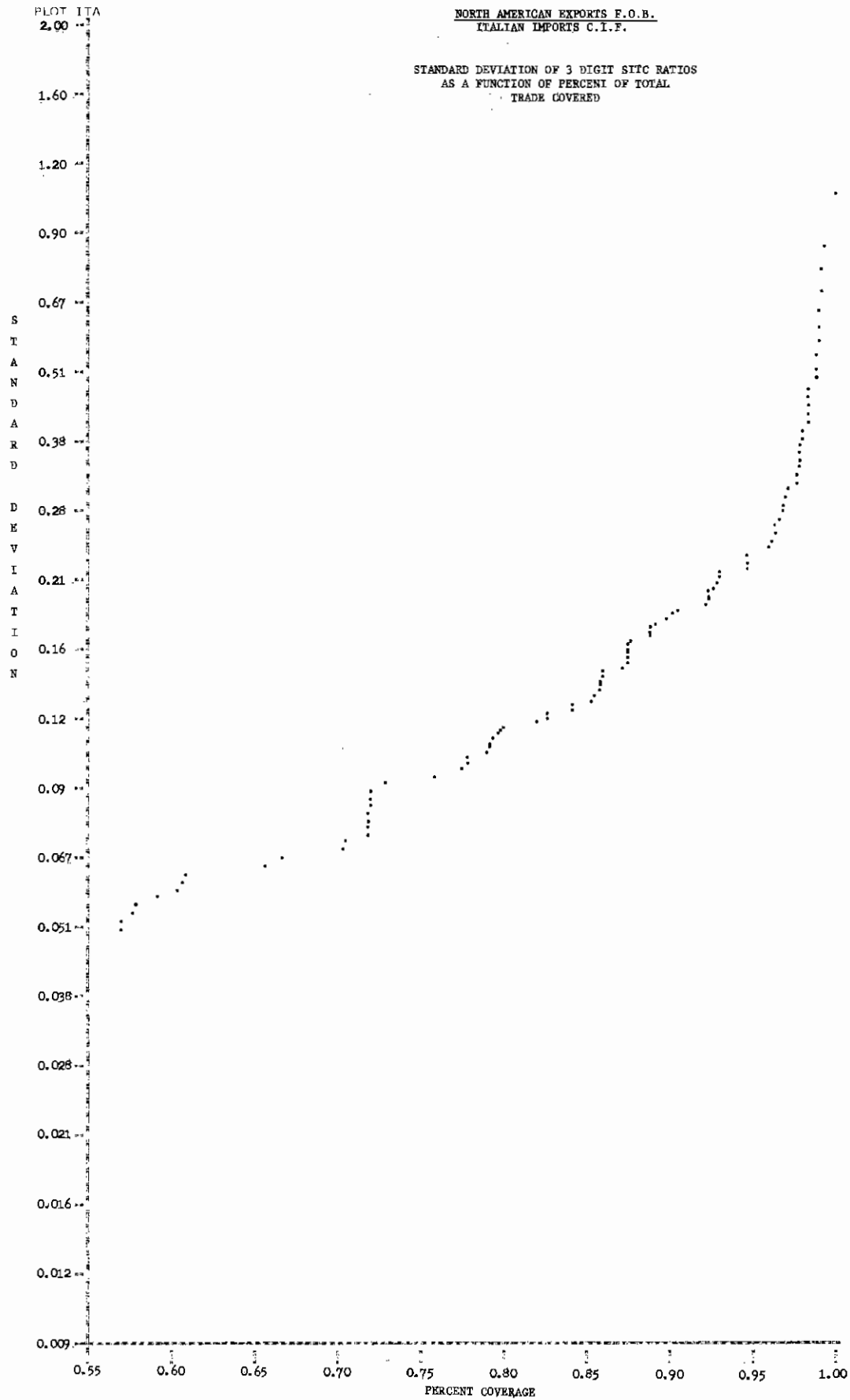


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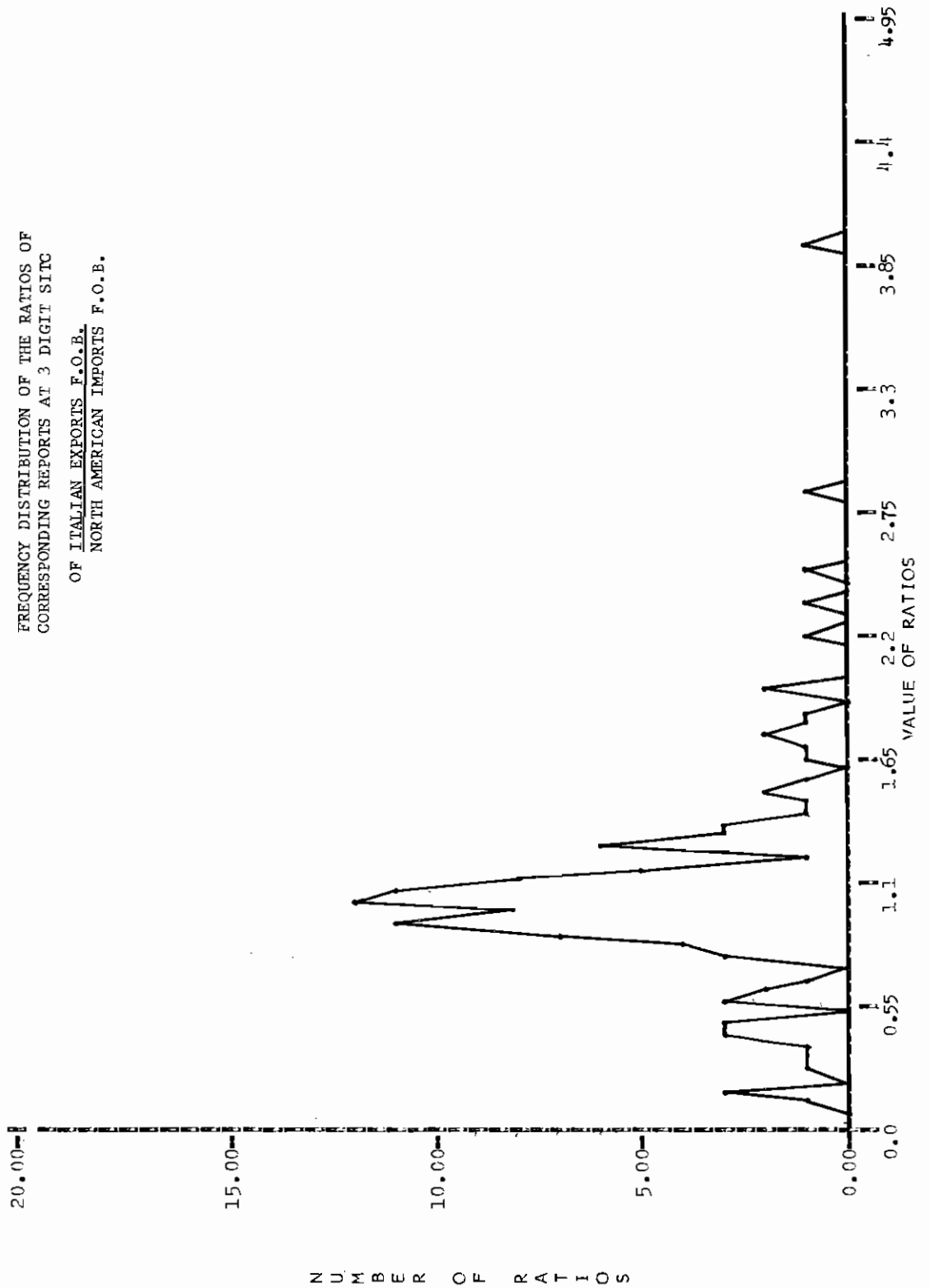
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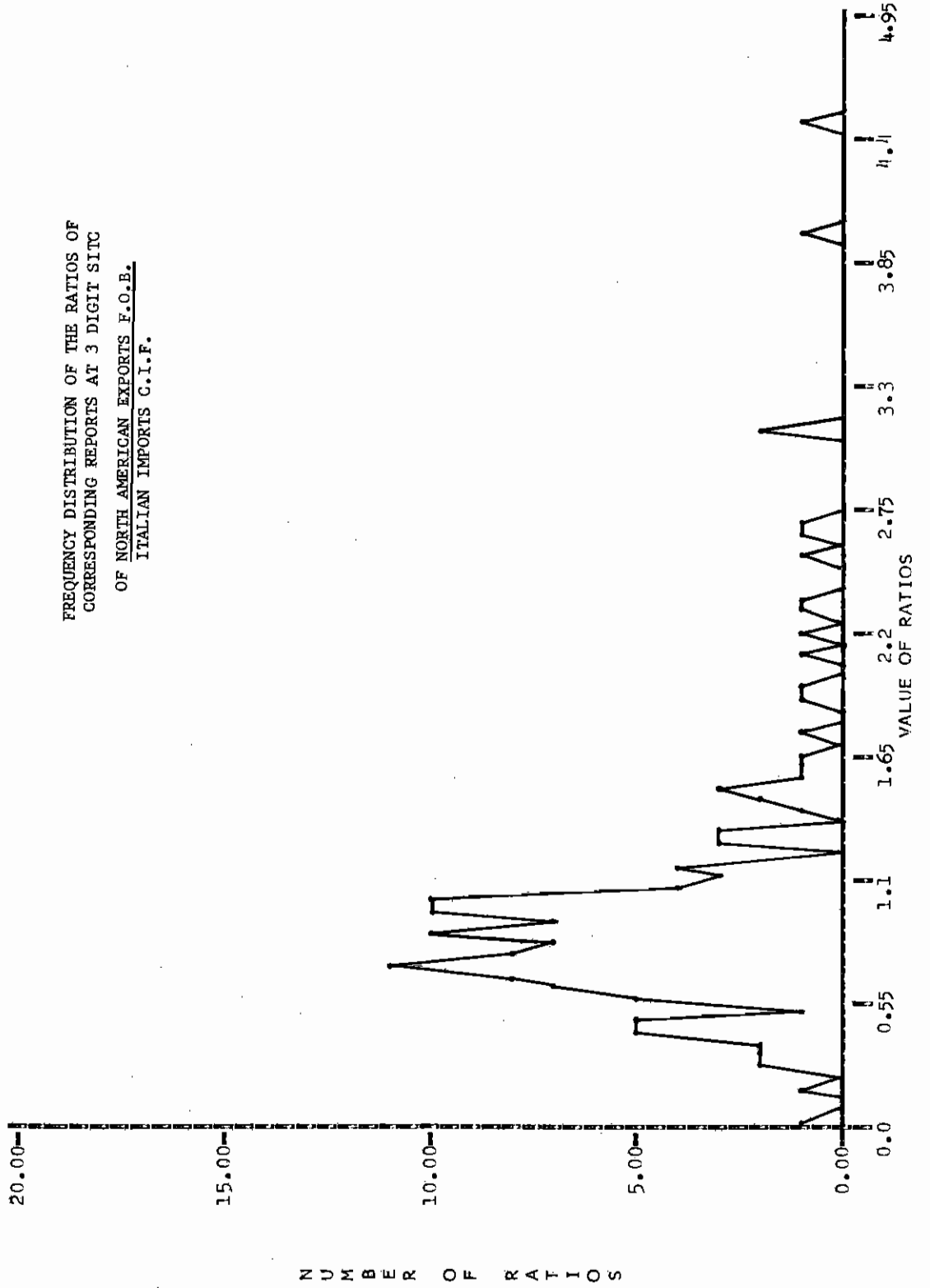




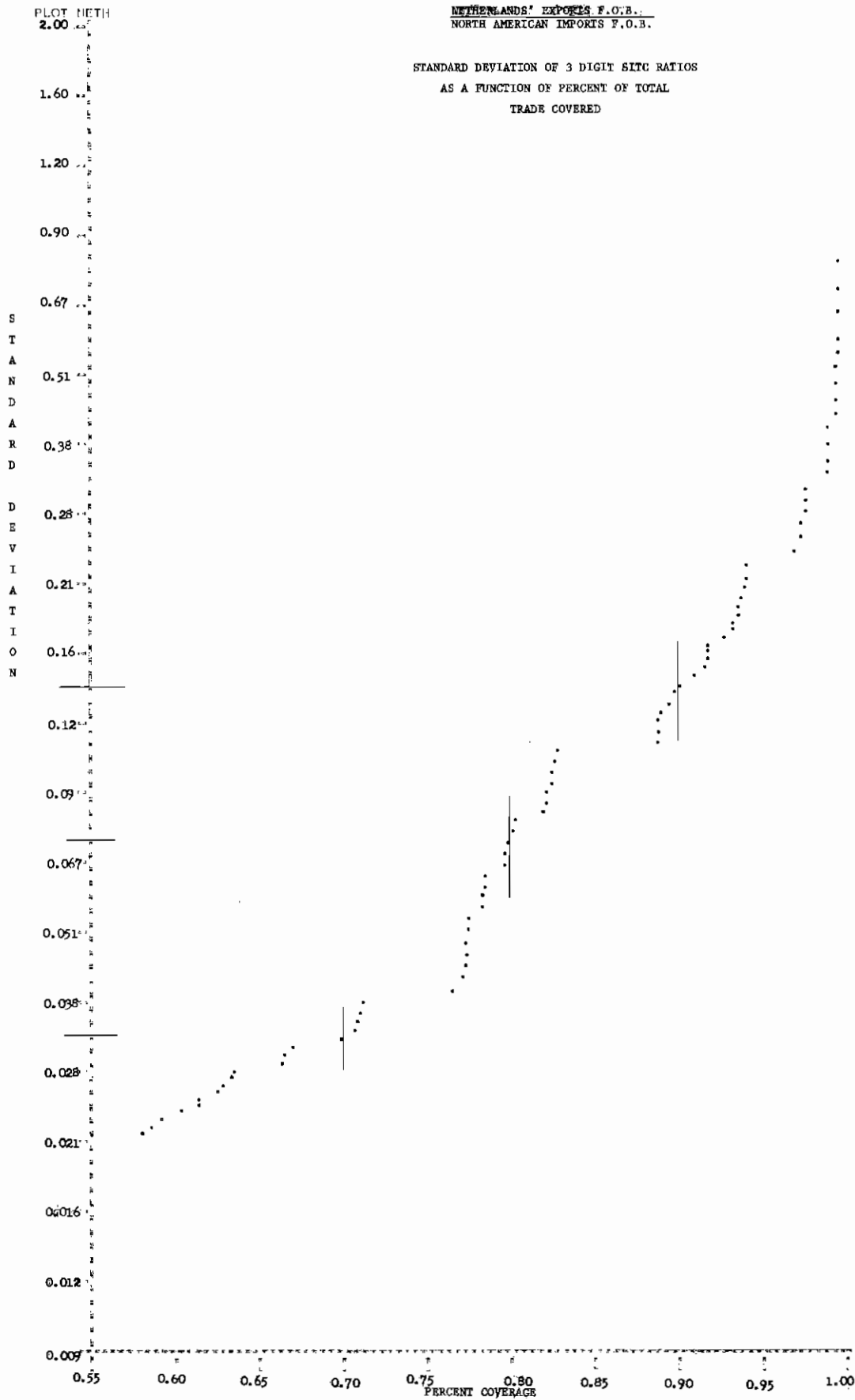
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NORTH AMERICAN IMPORTS F.O.B.



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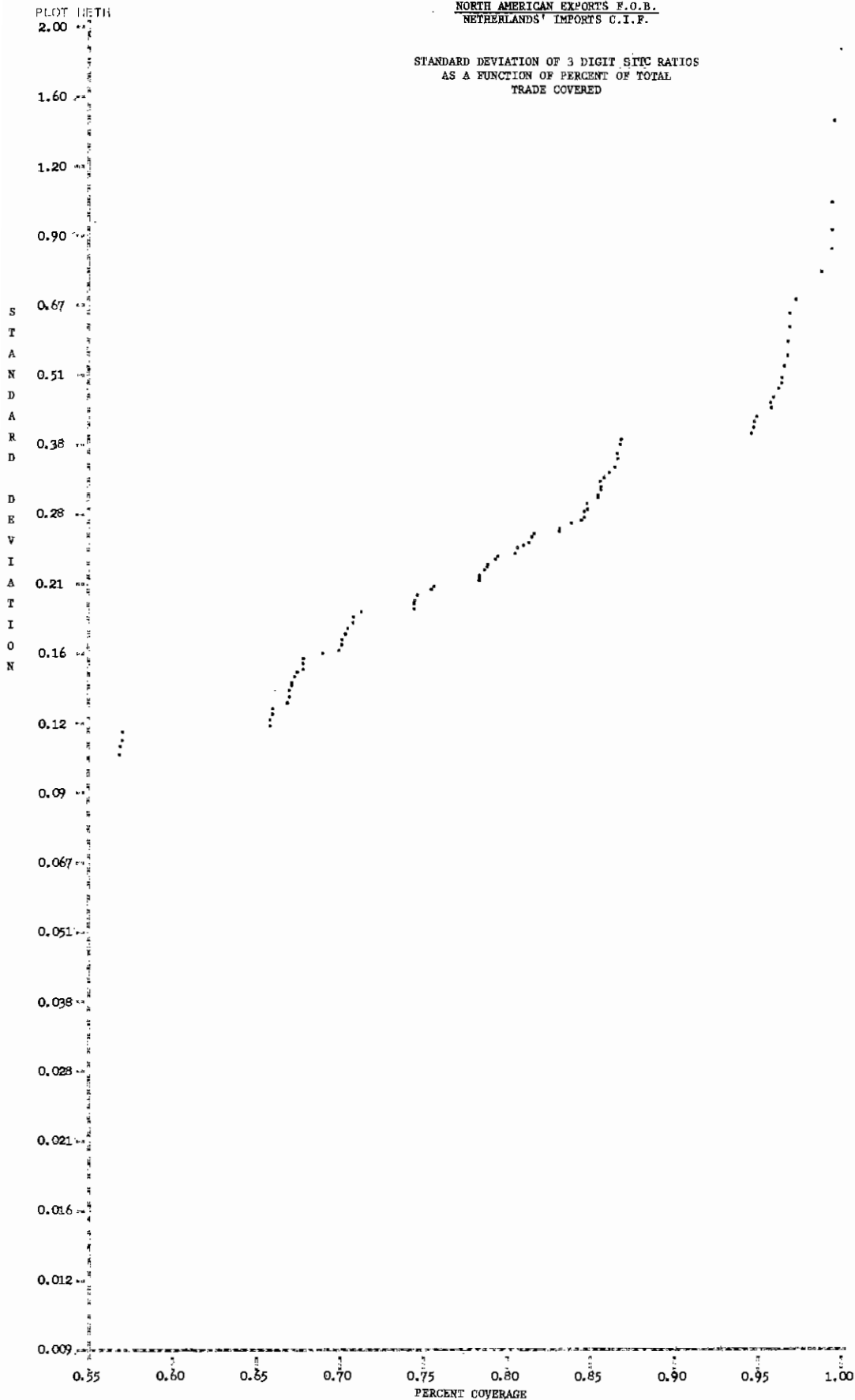


N U M B E R   O F   R A T I O S

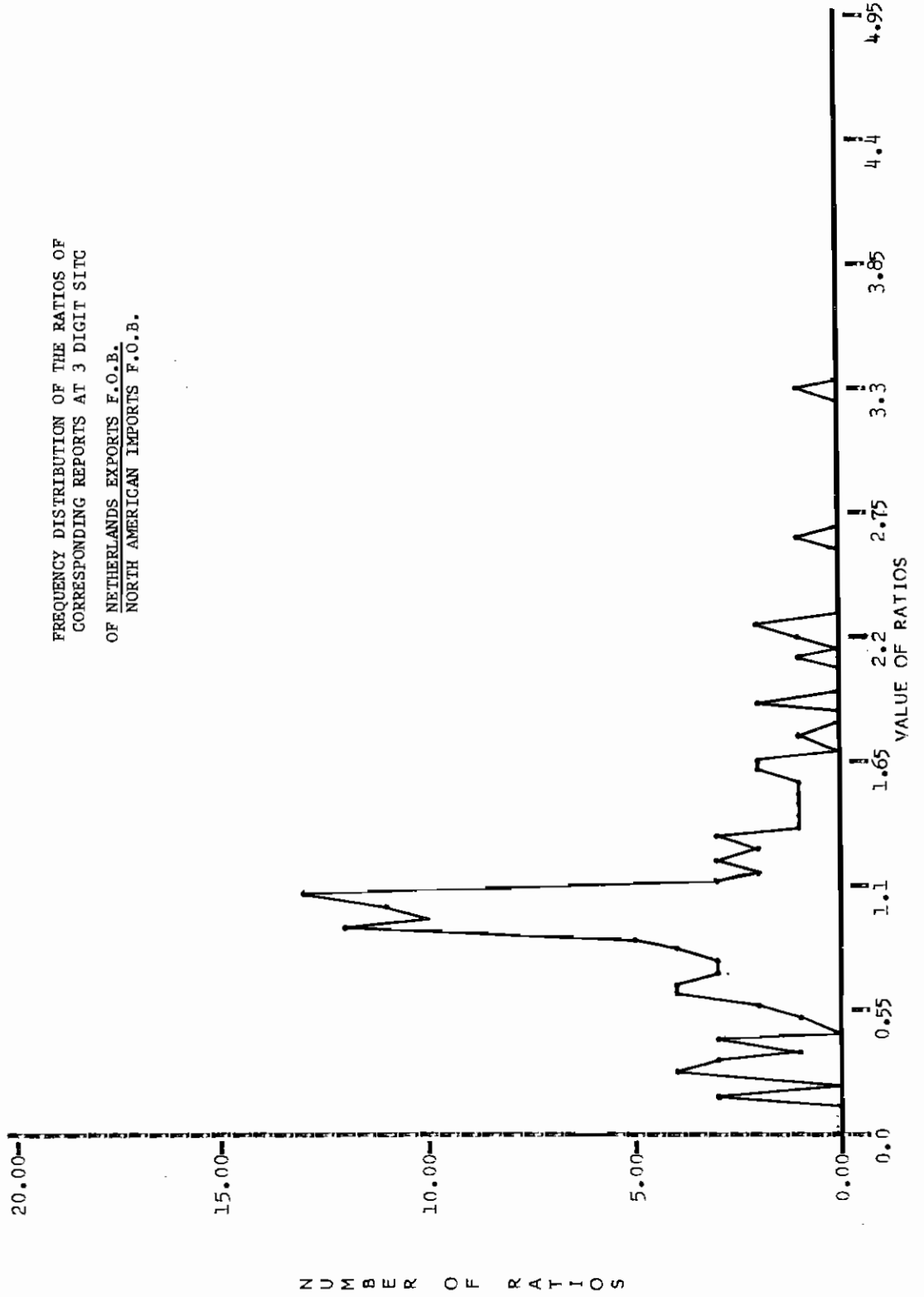


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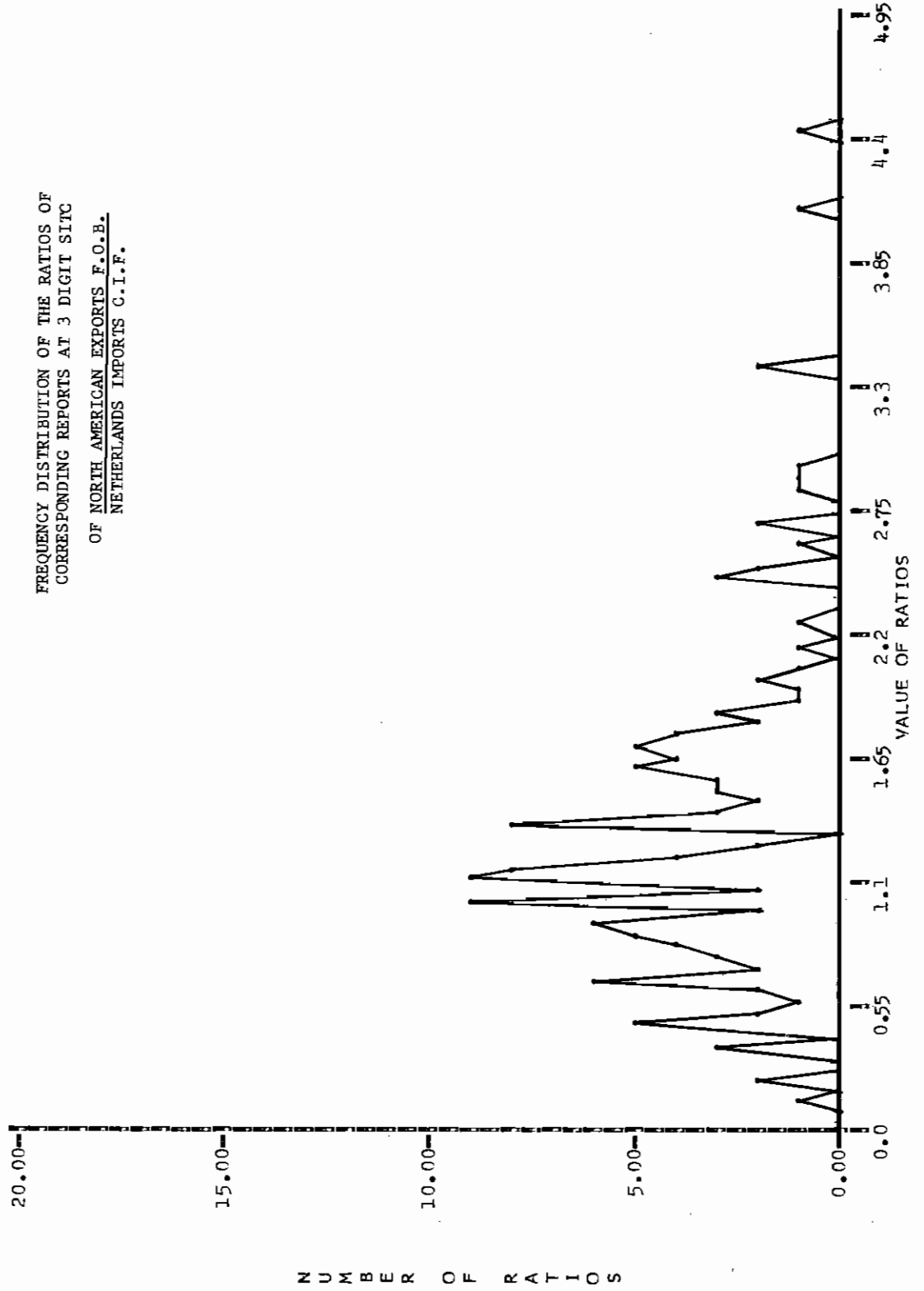
STANDARD DEVIATION OF 3 DIGIT SITC RATIOS  
AS A FUNCTION OF PERCENT OF TOTAL  
TRADE COVERED



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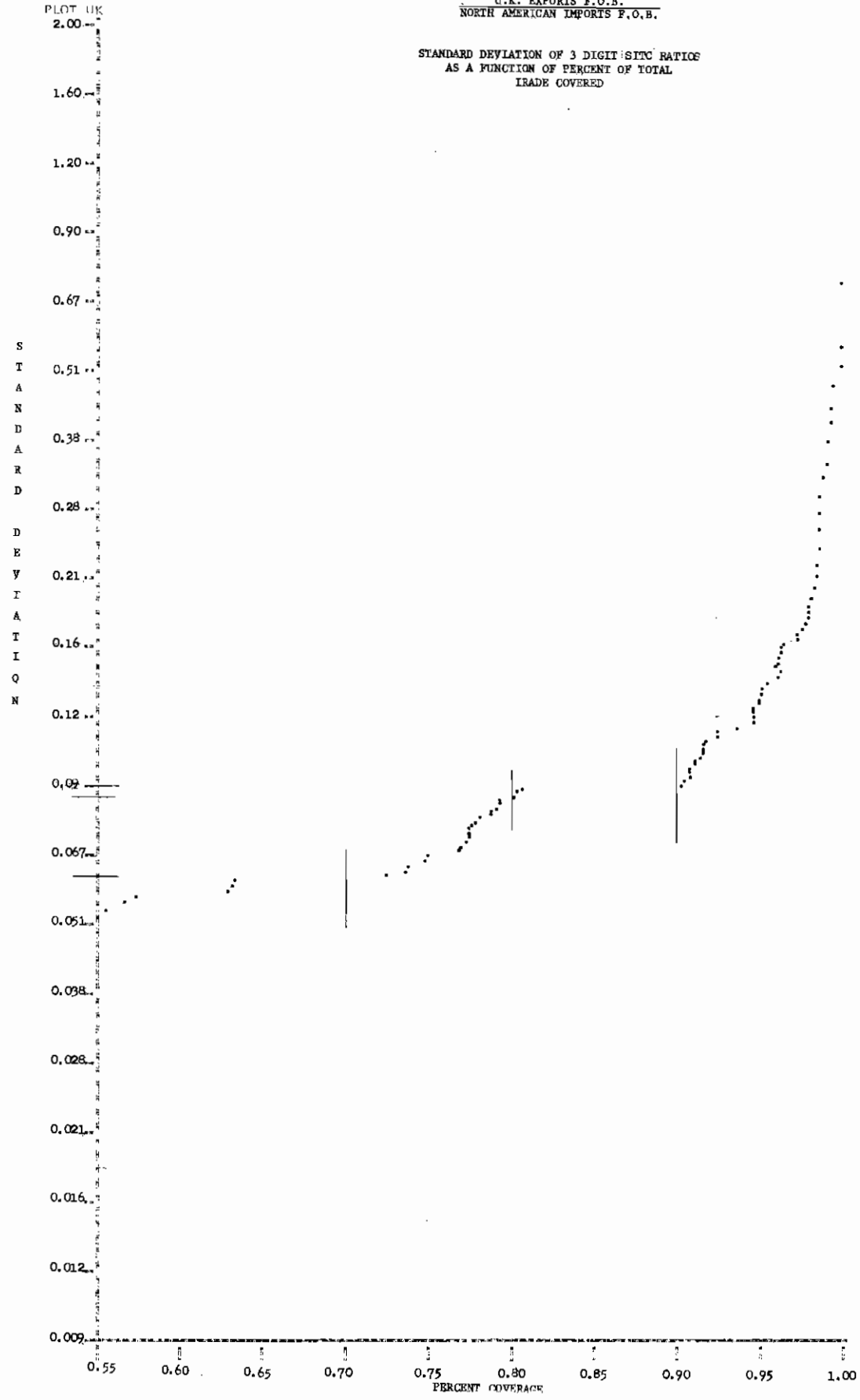


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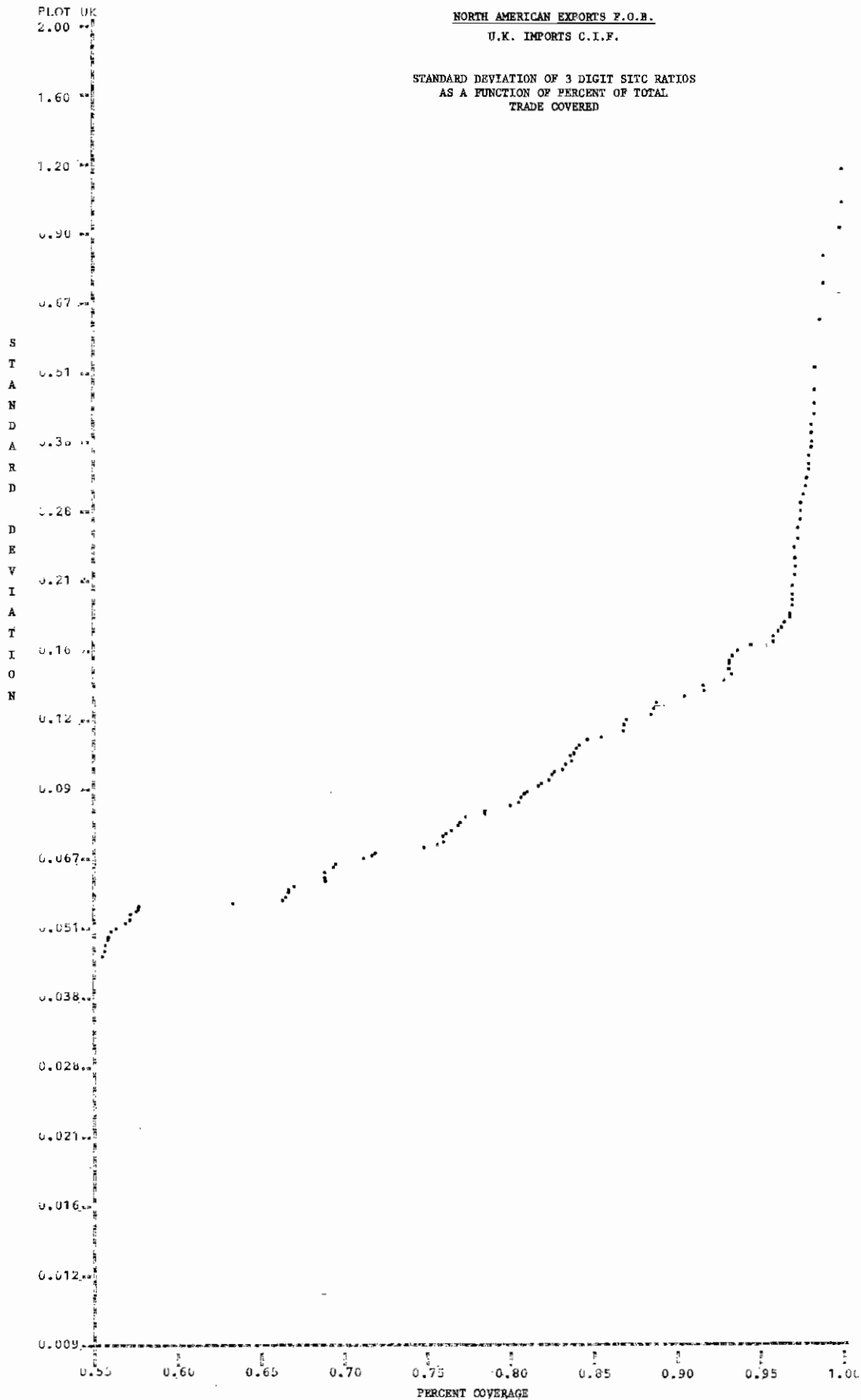
U.K. EXPORTS F.O.B.  
NORTH AMERICAN IMPORTS F.O.B.

STANDARD DEVIATION OF 3 DIGIT SITC RATIOS  
 AS A FUNCTION OF PERCENT OF TOTAL  
 TRADE COVERED



NORTH AMERICAN EXPORTS F.O.B.  
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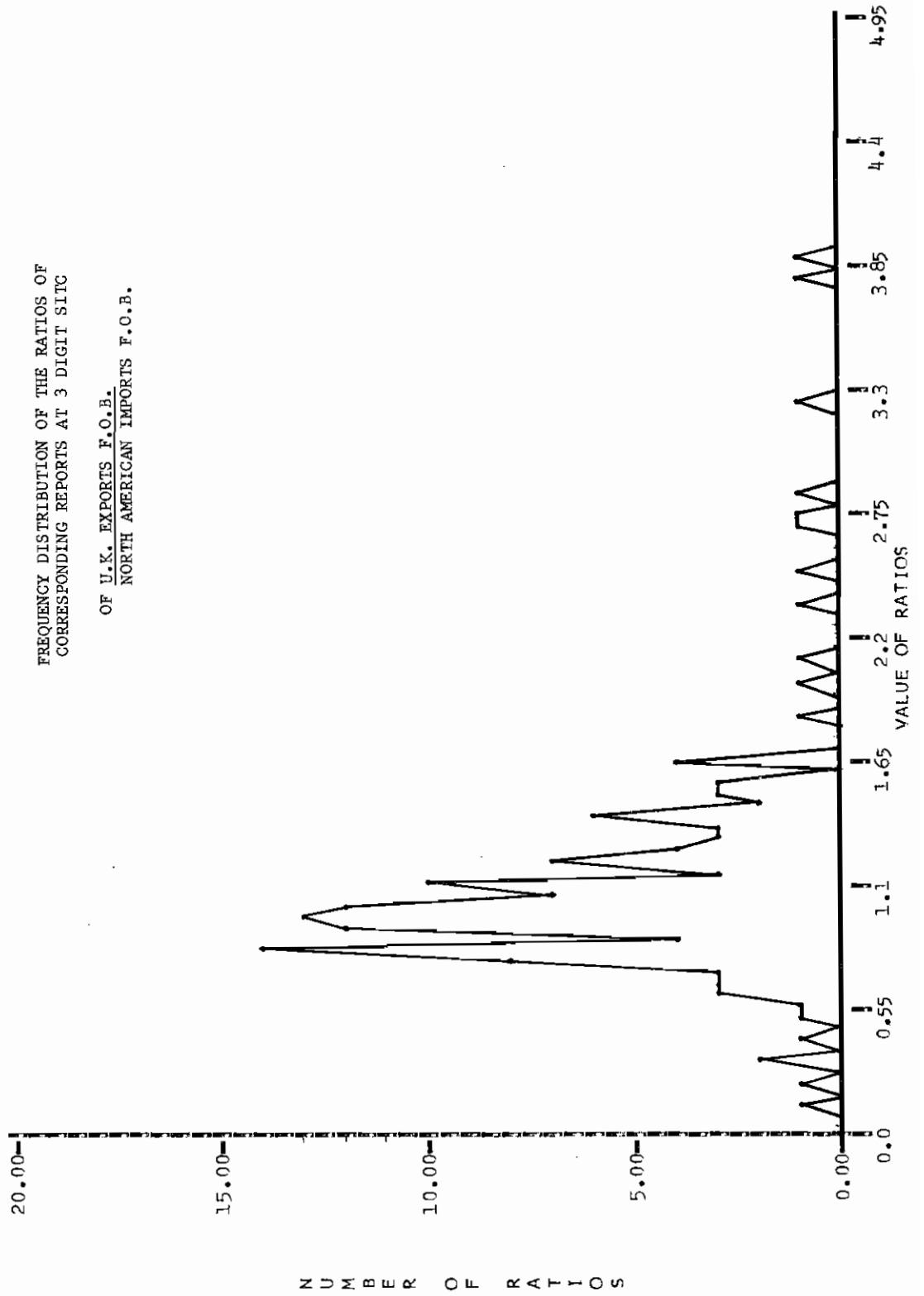
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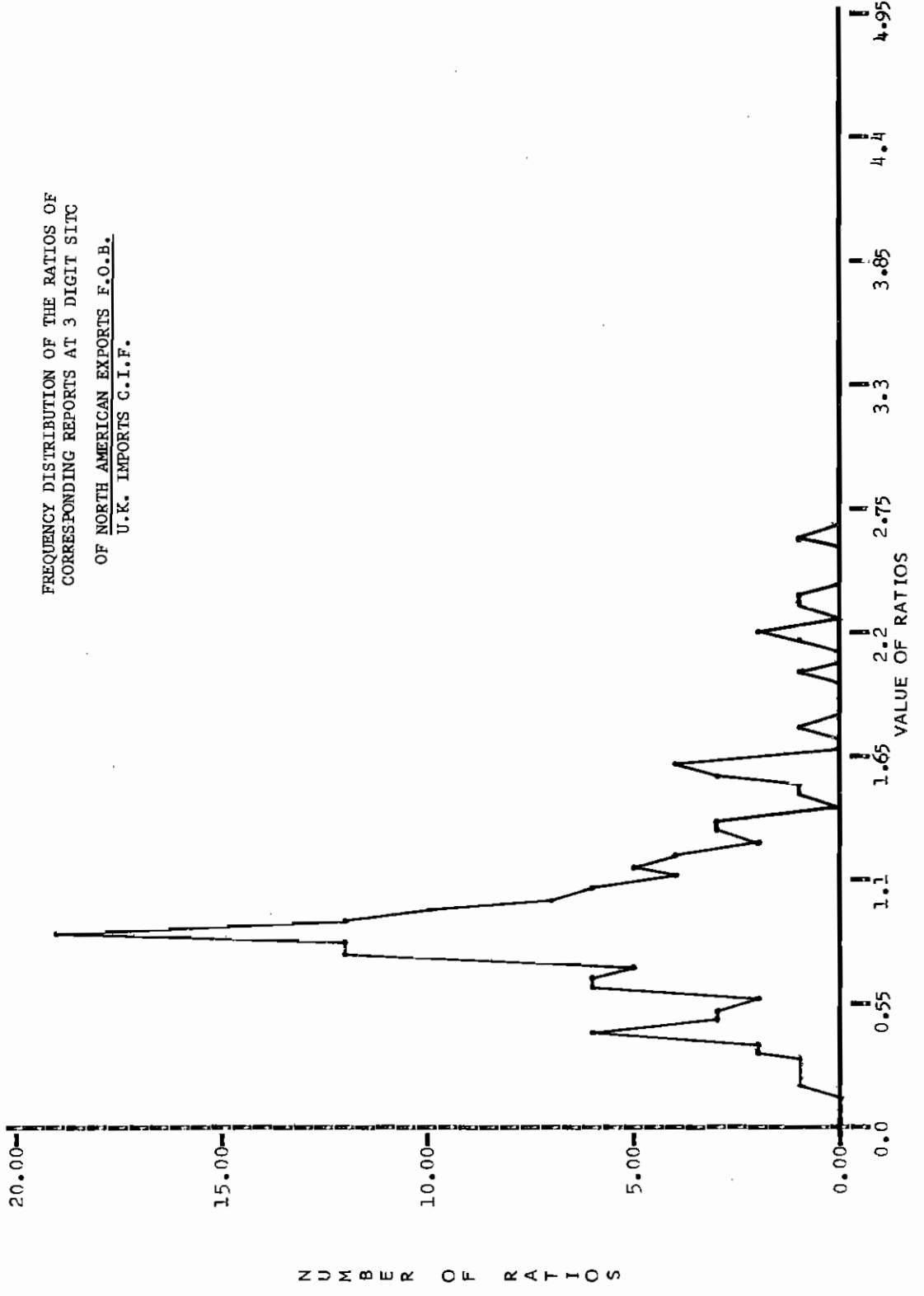


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OF NORTH AMERICAN EXPORTS F.O.B.  
U.K. IMPORTS C.I.F.



NUMBER OF RATIOS