

COMMISSION OF THE EUROPEAN COMMUNITIES

DIRECTORATE-GENERAL COMPETITION

IV/A-3

A STUDY OF THE EVOLUTION
OF CONCENTRATION
IN THE UNITED KINGDOM
PAPER INDUSTRY

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P R E F A C E

The present volume is part of a series of sectoral studies on the evolution of concentration in the member states of the European Community.

These reports were compiled by the different national Institutes and experts, engaged by the Commission to effect the study programme in question.

Regarding the specific and general interest of these reports and the responsibility taken by the Commission with regard to the European Parliament, they are published wholly in the original version.

The Commission refrains from commenting, only stating that the responsibility for the data and opinions appearing in the reports, rests solely with the Institute or the expert who is the author.

Other reports on the sectoral programme will be published by the Commission as soon as they are received.

The Commission will also publish a series of documents and tables of syntheses, allowing for international comparisons on the evolution of concentration in the different member states of the Community.

CRANFIELD SCHOOL OF MANAGEMENT

STUDIES IN INDUSTRIAL CONCENTRATION

Director of Projects: R. B. Cornu

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No. 1: CONCENTRATION IN THE UK PAPER INDUSTRY 1968-1972

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The British Carton Association;

The Fibreboard Packing Case Manufacturers Association;

The Wallcoverings Institute;

The Paper and Paper Products Industry Training Board

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However, full responsibility for analyses and opinions expressed within the Report rests with the authors.

January 1975

INTRODUCTION

This Report describes an investigation of the industrial concentration within the UK Paper Industry, 1968-1972. The study was sponsored by the European Economic Commission and was of approximately nine months' duration.

The research constitutes one part of a series of studies of the development of concentration in selected sectors and markets of EEC member countries.

The terms of reference for the study covered the following industrial sectors:

Manufacture of Paper & Board (NICE 271) (S.I.C. 481)

Conversion of Paper & Board (NICE 272) (S.I.C. 482-484 incl.)

The analysis of these industrial sectors covered both quantitative and qualitative aspects.

For the quantitative analysis, the Directorate of Competition of the EEC specified a number of indices which have been used in similar studies throughout the Community. These indices and the research methodology are described in Section 1 of the Report.

SUMMARY

The study has confirmed theoretical objections to the use of concentration indices to describe structure and performance in a market. The sectors investigated were defined by the nature of the raw materials rather than the purposes of the finished products. When applied to whole industrial sectors so delineated, measures of concentration do not reflect competition from substitute products made in other industries (for example, between paper and polythene bags, or paper towels and textile towelling); neither do they reflect competition from imports; finally, their use as a measure of competition implies that all products within the sector are competitive with each other (in an extreme case, cardboard boxes are competitive with paper handkerchiefs!).

Within the paper industry all three of these objections were found to be valid. Many products have close non-paper substitutes; imports account for about half of total UK paper consumption, and for significant proportions of that of certain converted products; within each of the major sectors of paper and board manufacture and conversion, there exist separate and identifiable product groupings.

It was considered that a more meaningful description of competitive forces would be achieved by individual analysis of each product group. Greater emphasis was therefore given to analysis of product groups than to statistical information relating to the complete sectors. Sections 3 and 4 of the report describe for each of the eight product groups the relative sizes of the major companies, the pattern of overseas trade, and the forms of competition (pricing, distribution and other marketing aspects). The diversity of the industry and of the markets which it supplies are major conclusions of this analysis.

The product groups analysed were as follows:

Paper & Board Manufacturing: Printing & Writing Paper
Packaging Paper including Tissues
Board including Corrugated Case Materials

Paper & Board Conversion: Non-Board Packaging (bags and multi-wall sacks);
Board Packaging (cartons and fibreboard
containers)
Manufactured Stationery
Miscellaneous products (cups, plates, fancy
goods, etc.)

Wallpaper

SECTION 1. RESEARCH METHODOLOGY

A. Basis of Classification

B. Industrial Concentration and its Measurement

SECTION 1

RESEARCH METHODOLOGY

The terms of reference for the study require that the analysis of concentration within the UK Paper Industry be described in terms of the following financial variables:

- turnover;
- profit (before tax);
- cash flow¹ (profits + depreciation);
- equity or own capital (paid up shares plus reserves);
- gross investment (annual additions to fixed assets
gross of disposals);
- exports;
- number of employees;
- wage bill.

British published statistics provide aggregate figures for individual industrial sectors relating to turnover, exports and, in some cases, employees and total wage bill.

In order to calculate concentration indices relating to each of the above variables, the necessary data were obtained from the published financial accounts of individual firms. The total figures so obtained were cross-checked with the published aggregate statistics to ensure that most of the firms in each sector had been identified. Although formally required to do so, except where total employment is less than one hundred, not all enterprises presented information relating to the number of employees and total wage bill, and complete analyses of these variables were not possible.

1. The authors preferred the more conventional definition of cash flow (profit + depreciation - tax) referred to here as net cash flow.

A. Basis of Classification

1. Classification of Firms within the Industry

Before the relevant financial information could be collected, the individual establishments classified to Nomenclature Industrielle de la Communauté Européenne (NICE) 271 and 272 (paper manufacture and paper conversion) had to be identified.

British firms are classified according to the Standard Industrial Classification (revised 1968), (SIC) system and not NICE. However, for both systems the classification of paper manufacturing and paper conversion were sufficiently similar in detail for this not to be a problem.

The UK Government Statistical Service publishes a directory of establishments classified to the Paper Industry (including establishments classified to other industries but producing paper and paper products):

Report on the Census of Production 1968

170. Directory of Businesses: Paper, Printing & Publishing

However, data in companies' financial accounts relate to the total enterprise, not to individual establishments.²

The identification of enterprises within the industry was achieved using:

British Paper & Board Industry Federation: List of Members;
Paper & Paper Products Industry Training Board: List of Members;
Kompass 1968 and 1972;
Phillips Paper Trade Directory;
Who Owns Whom in British Industry 1968 and 1972.

2. The Census of Production defines "establishment" and "enterprise" as follows:

"establishment": the premises under the same ownership or management at a particular address (e.g. factory or mine);

"enterprise": one or more establishments under common ownership or control; normally consisting of a single establishment, more than one establishment owned by the same firm, or a number of establishments owned by a parent company and its subsidiary companies.

Copies of the financial accounts of individual enterprises are held centrally and were examined at Companies Registration Offices, London and Edinburgh.

2. Classification on the Basis of Output

In order to ensure the comparability of the results of this co-ordinated Common Market investigation, the terms of reference required the adoption of several general assumptions.

The assumption made relating to the classification of individual firms to specific industrial sectors was as follows: where 50% or more of the turnover of a firm is accounted for by products classified to NICE 271 or 272, then that firm is considered to be entirely producing within that sector.

The published financial statistics of individual firms relate to the total activity of the firm, and data relating to specific product lines are not available. Consequently in some cases the financial data for a given firm may not relate solely to its paper interests. For instance, if a firm makes cartons using 60% paper and 40% plastic, it is not possible to obtain the financial statistics relating to paper interests only. On the other hand, the assumption implies that where a similar firm uses 40% paper and 60% plastic, this firm will be excluded from the study on the basis that less than 50% of turnover is accounted for by NICE 271 or 272.

This classification by principal activity of the company led to some problems in the definition of the industry. Where a company with multiple activities published separate accounts for subsidiaries engaged in different activities, data from these subsidiary accounts were used in the analysis. Some large companies do not structure their financial reports in this way. In a few cases statistics relating to other activities could not be excluded from the financial data of firms whose principal products fell within our terms of reference. More significant problems occurred with manufacturers whose output of paper products is significant in relation to this industry but accounts for less than 50% of their own turnover. The most significant exclusion was the Metal Box Co. Ltd., an important producer of paper packaging.

3. Classification on the Basis of Ownership

A further assumption included in the terms of reference was that an individual firm was classified as a subsidiary of another when the owning or parent company held 90% or more of the issued capital.

This assumption did not significantly distort the ownership relationships existing within the British paper industry. (For further discussion see Section 2). However, the assumption produced an anomalous result in the cases of the Bowater Corporation which has a 50% holding in the Bowater-Scott Corporation. It became apparent that the data for this subsidiary ought to be included with that of the parent company because of their common top management, and this was in fact done throughout the research.

4. Classification problems in respect of Vertical Integration

Many firms within the paper industry are vertically integrated, manufacturing paper and board and also producing converted products. Within some companies the two activities were carried out by separate subsidiaries and financial accounts were available relating to each sector. In special cases where an individual enterprise was highly vertically integrated, advice was sought from the management of these firms, enabling the necessary corrections to be made (see Sections 2, 3 and 4).

In further cases, certain arbitrary assumptions had to be made as to whether or not a process could be classified as manufacturing or conversion. The production of paper tissues and toilet tissues was considered to be a manufacturing process only; whereas the production of surgical products, babies nappies, etc. was considered an entirely converting process.

5. Classification according to Product Groups

As a result of both the theoretical analysis of industrial concentration and discussions with individual firms and trade associations, it became apparent that in both the manufacturing and converting sectors of the industry, not all products were competitive with each other: specialty papers do not compete directly with the bulk grades of paper: fibreboard packing cases have certain characteristics which do not make them substitutes for

board cartons or paper bags: cardboard cartons, stationery and disposable babies' napkins cannot be described as competitive products. Within each of the major sectors of paper and board manufacture and conversion, there exist separate and identifiable product groupings. It was considered that in order to present a more meaningful description of concentration in terms of market shares, each product group should be individually analysed.

Ample justification for this approach can be found in the relevant literature. Ideally, product group analysis should be expanded to include all competing products. For instance, in the case of paper bags, competing products include plastic and cellulose wrapping bags. In the case of fibreboard containers, competing substitutes include wooden cases and heavy duty polythene containers. The product group analysis within the paper manufacturing sector is somewhat simpler as direct substitutes from outside the industry are fewer.

The product groups analysed were as follows:

| | |
|------------------------------|--|
| Paper & Board Manufacturing: | Printing & Writing Paper; Packaging Paper including Tissues; Board including Corrugated Case Materials. |
| Paper & Board Conversion: | Non-Board Packaging (bags and multi-wall sacks); Board Packaging (cartons and fibreboard containers); Manufactured Stationery Miscellaneous products (cups, plates, fancy goods etc.); Wallpaper |

B. Industrial Concentration and its Measurement

Concentration is but a single facet of the structure and organisation of an industry: among other important factors are the degree of vertical integration, the extent of diversification, and the barriers to new entrants.

The structure of an industry is of great interest to the economist; different patterns of industrial organisation imply varying behaviour among the respective buyers and sellers. From the buyer's point of view - different conditions exist if he is buying from a monopolist rather than from one of a large number of equally sized firms.

However, any conclusions as to market forces existing within an industry cannot be deduced until the "market" has been clearly defined. Competition can only exist between sellers of "competing" products: a manufacturer of paper bags does not necessarily compete with only other paper bag manufacturers, but is also aware that plastic, polythene and cellulose packaging exists, and can be used for equally acceptable forms of packaging. In other words, an industry cannot necessarily be delineated by the nature of raw materials or a method of production.

The facet of industrial structure which has attracted most attention is concentration, being perhaps the only aspect of structure which can be easily and meaningfully quantified. Concentration describes the number and size distribution of the firms in a given industry. Several different measures of concentration have been suggested in the literature and are used in all of the series of the Commission's concentration studies.

The value of using a series of indices to measure concentration lies in an understanding of what exactly each index is measuring. Concentration has been defined as "the number and size distribution of the firms" - thus both fewness and dispersion are being measured.

The remainder of this section defines the various measures of concentration and analyses the extent to which the indices which have been suggested measure the fewness of firms, or the variability of the sizes of firms.

1. Definitions and Basic Properties of Concentration Indices

It is assumed that some variables, such as turnover, are being used to measure the sizes of firms in the market. (The same mathematical forms apply whatever the variable selected). The following notation will be used in this section:

- N total number of firms in the industry;
- x_i the value of a variable for Firm i , when firms are ranked in descending order with respect to that variable;
- X the aggregate of the variable for the whole industry, that is,

$$\sum_{i=1}^N x_i$$

- P_i the proportion of the aggregate accounted for by Firm i , that is,

$$\frac{x_i}{X}$$

- μ the arithmetic mean value of the variable, that is, $\frac{X}{N}$

a) Concentration Ratios

The Concentration Ratio for an industry is defined as:

$$\frac{1}{X} \sum_{i=1}^R x_i$$

that is, it is the fraction of the total variable accounted for by the R largest firms ranked in descending order of that variable. The value of R is a parameter chosen by the user.

For any one value of R this measure gives only a limited picture of the whole industry. For this reason the concentration ratios for several

different values of R are usually quoted. It should be noted that when comparing two industries A and B it is possible for industry A to have a larger concentration ratio than industry B for small values of R , but a smaller one for large values of R . (i.e. it is possible on this measure for industry A to appear to be more concentrated than industry B for small values of R , but less concentrated for large values of R). This is illustrated in Fig. 1.

The Concentration Ratio has the advantage in a large industry that only the size of the whole industry and that of the top few firms are necessary for its calculation.

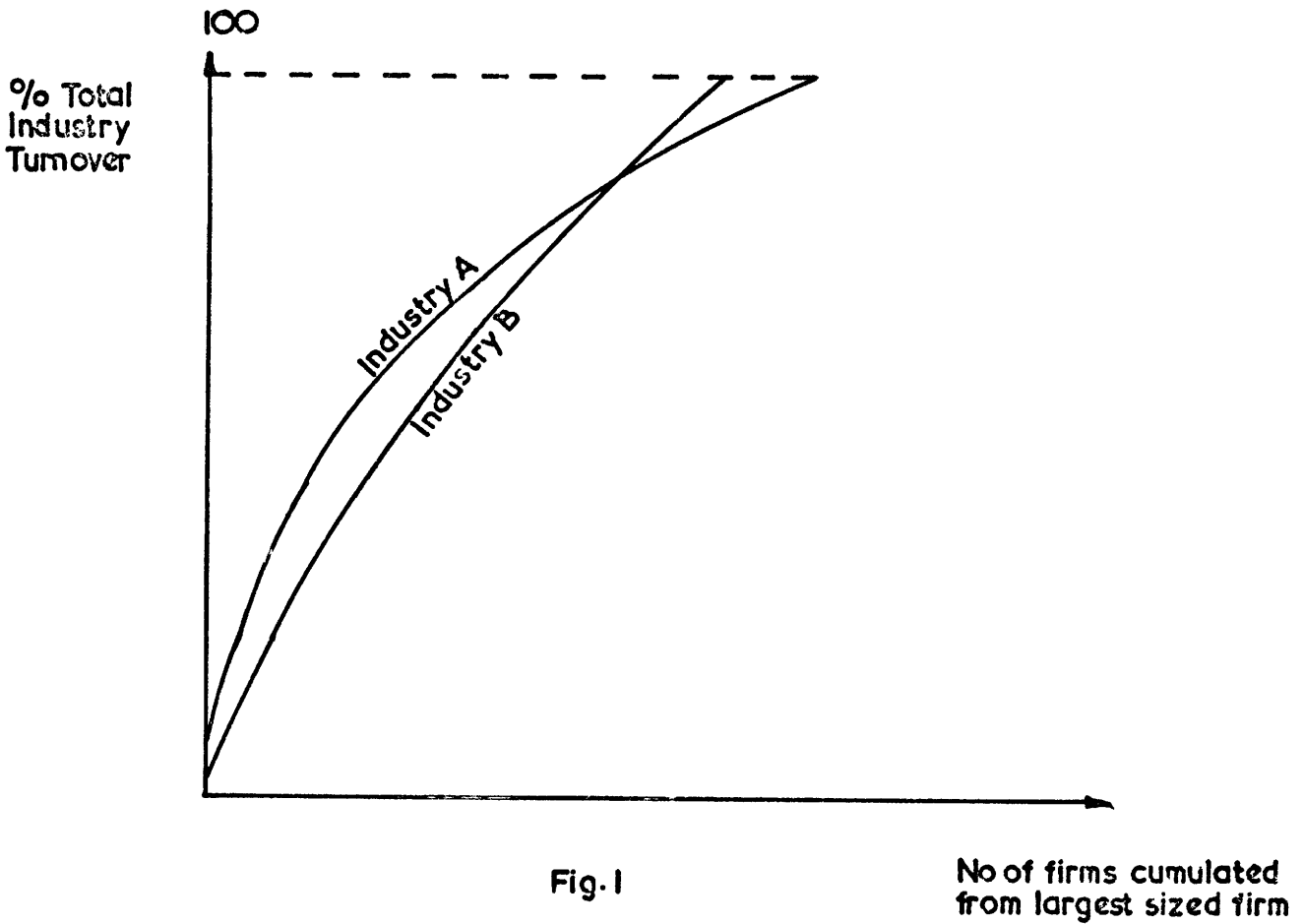


Fig. 1

No of firms cumulated
from largest sized firm

b) Measures based on Variance

These include variance, standard deviation and coefficient of variation.

$$\text{Variance, } V = \frac{\sum_{i=1}^N (x_i - \mu)^2}{N}$$

$$\text{Standard Deviation, } \sigma = \sqrt{V}$$

$$\text{Coefficient of Variation, } c = \frac{\sigma}{\mu}$$

These are prima facie examples of measures which are concerned with the dispersion of the sizes of firms in the industry and not with the total number of firms in the industry. From the calculation point of view they have the advantage that they can be estimated from data on a random sample of firms in the industry. It is not even necessary to know the aggregate value of the variable.

c) Gini Coefficient

This measure is based on the Lorenz curve.³ The Lorenz curve plots the percentage of total industry turnover on the vertical axis against percentage of firms cumulated from the smallest on the horizontal axis. Thus the curve is concave (degenerating into a straight line when all firms are of equal size). Where a variable other than turnover is used, the percentage of firms is cumulated from the firm with the smallest value of the variable under consideration.

The Gini Coefficient is defined (see Fig. 2) as:

$$\frac{\text{Shaded Area}}{\text{Area } OXY}$$

3. For a complete list of references see Bibliography on Page 4.38

It ranges from 0 (all firms equal in size) to 1 (all output in the hands of a single firm). The following formula provides a method of calculation when the values of the variable are ranked in ascending order (x_j ; $j+1$ to N)

$$\frac{1}{NX} \sum_{j=1}^N (j-1)F_j - jF_j - 1$$

$$F_j = \frac{N}{\sum_{k=N-j+1}^N x_k}$$

Generally, complete data on the aggregate of the variable for the industry is necessary for the calculation of the Gini Coefficient.

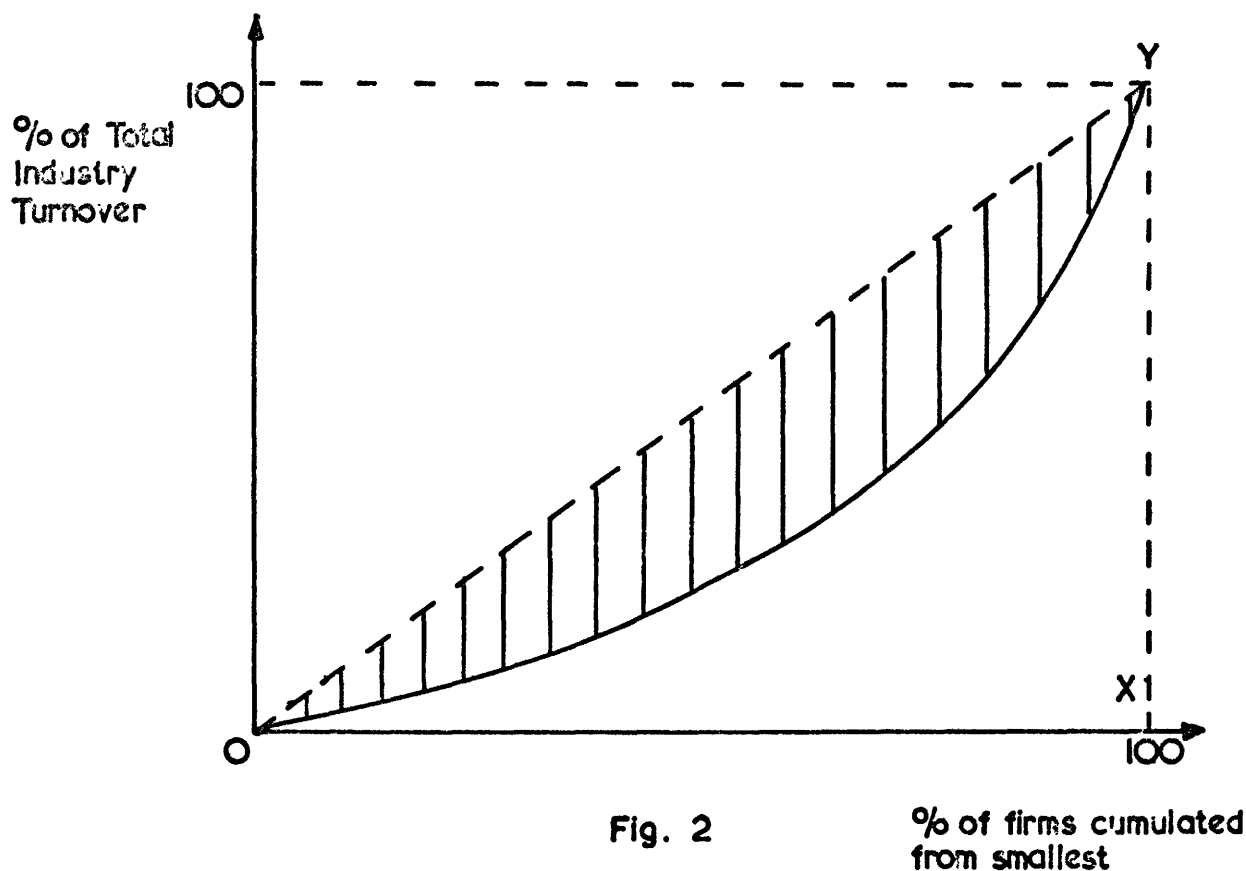


Fig. 2

% of firms cumulated from smallest

d) Herfindahl-Hirschmann Index

This was suggested by Herfindahl and is defined as the sum of the squares of the market shares, i.e.

$$\text{Herfindahl-Hirschmann Index} = \sum_{i=1}^N p_i^2$$

It has the interesting interpretation that it is equal to the probability of two items of output of the industry chosen at random both originating from the same firm. Thus, if the index were calculated for the paper industry, it would equal the probability that two pieces of paper chosen at random were manufactured by the same firm (for: p_1^2 is the probability of both pieces coming from the first firm, p_2^2 is the probability of both pieces coming from the second firm, etc.).

An alternative formula for the index can easily be shown to be:

$$\frac{c^2 + 1}{N}$$

where c is the coefficient of variation. Thus the index can be estimated from data on a random sample of firms in the industry providing N is known.

The index lies between $\frac{1}{N}$ and 1. Some authors prefer to define it as:

$$\text{H-H} = 1000 \sum_{i=1}^N p_i^2$$

i.e. to inflate its value by a multiple of 1000. This convention has been adopted by the Commission and is followed in this report.

e) Entropy

The entropy concept has its roots in information theory and its use to measure concentration is suggested by Theil et al.

Information theory states that the information content of a message that an event E has occurred is a decreasing function of the probability of occurrence of E . As the probability of E occurring approaches 1 the event

becomes a near certainty and a message stating that it has actually occurred provides little information; similarly the more unlikely the event before its realisation, the larger will be the information content of a message of its occurrence.

The decreasing function generally assumed is the logarithm of the reciprocal of the probability q , i.e.

$$h(E) = \log \frac{1}{q} = - \log q$$

where $h(E)$ is the information content of event E . (The reason for this choice is the requirement that $h(E_1 \text{ and } E_2) = h(E_1) + h(E_2)$ where E_1 and E_2 are independent events.)

Prior to the receipt of a message, the expected information content of that message can be computed. The expected information content of a message on which event has occurred from a range of events E_1, \dots, E_n , whose probabilities, q_1, \dots, q_n sum to 1, is:

$$\sum_{i=1}^n q_i H(E_i) = - \sum_{i=1}^n q_i \log q_i$$

and this is referred to as the entropy of this distribution.

The entropy is a measure of 'disorder'. The closer the n probabilities q_i are to $\frac{1}{n}$, and the larger n is, the less order there is in the system; disorder being maximum when all the probabilities are equal. Hence the application of the entropy concept to industrial concentration is apparent. Entropy provides a negative measure of the inequality of the shares in the total output etc. of the firms in a given industry.

In the notation introduced at the beginning of this section,

$$\text{Entropy Index, } E = - \sum_{i=1}^N p_i \log p_i$$

If one share is 1 and all others are 0, then $E = 0$ and the degree of concentration is maximum. If all shares are equal ($=\frac{1}{N}$) then $E = - \log N$ and the degree of concentration is minimum for that value of N .

Returning to the paper industry example, if the manufacture of paper is nearly all concentrated in the hands of one firm, then the information content of a message on where an individual piece of paper was manufactured would be low. On the other hand, if concentration is low, information as to the place of manufacture of a given piece of paper has a greater information content.

f) Linda Index

Another measure of industrial concentration is given by Linda.

$$Q_i = \frac{K - i}{i} \cdot \frac{A_i}{1 - A_i}$$

where $A_i = \frac{1}{X} \sum_{j=1}^i x_j$ and values of x are in descending order.

K may be any number of firms from 2 to N . (Thus Q_i is the average share of the market held by the top i firms divided by the average share of the market held by the other $(K-i)$ firms included in the sample).

The Linda Index is defined as:

$$\frac{1}{K(K-1)} = \frac{K-1}{\sum_1 Q_i}$$

(i.e. the Linda Index is $\frac{1}{K}$ x the average of the Q_i 's).

The Linda index is designed to measure the degree of inequality between the values of the variable included in a sub-sample of K units.

It is also intended to define the boundary between the oligopolists within an industry and the other firms. This boundary occurs at the first major discontinuity between values of the variable ranked in descending order. This concept implies that oligopolists can be defined in terms of the variable concerned.

Linda indices are calculated for the first two firms ($K=2$), then the first three ($K=3$) and so on, until a minimum value is produced (that is the index for $K+1$ is greater than that for K firms). At this point the "oligopolistic arena" is defined.

2. The Measurement of Fewness

The variance, standard deviation and coefficient of variation measure the degree of inequality within a distribution and, provided relative sizes are unchanged, will not be affected by the number of firms.

Also, the Lorenz curve can easily be seen to be the same whatever the number of firms, N and it follows from this that the Gini Coefficient remains constant as N increases.

It can be demonstrated that the Herfindahl-Hirschmann Index varies inversely with the number of firms, N . In the case of the Linda Index, it can be shown that if K is large, the Linda Index will show approximately - but not exactly - the same pattern as the Herfindahl-Hirschmann Index.

The Entropy Index depends linearly on the logarithm of N , the number of firms decreasing as the latter increases.

No similar generalisations can be made in the case of the Concentration Ratio as this is in essence a partial measure. However, if instead of being defined as the proportion of the industry which is in the hands of the top R firms, the Concentration Ratio were defined as the proportion of the industry in the hands of the top $P\%$ of all firms, then it would remain constant as R increased.

These results are summarised in Fig. 3 (where a linear transformation has been applied to each index to make scales correspond).

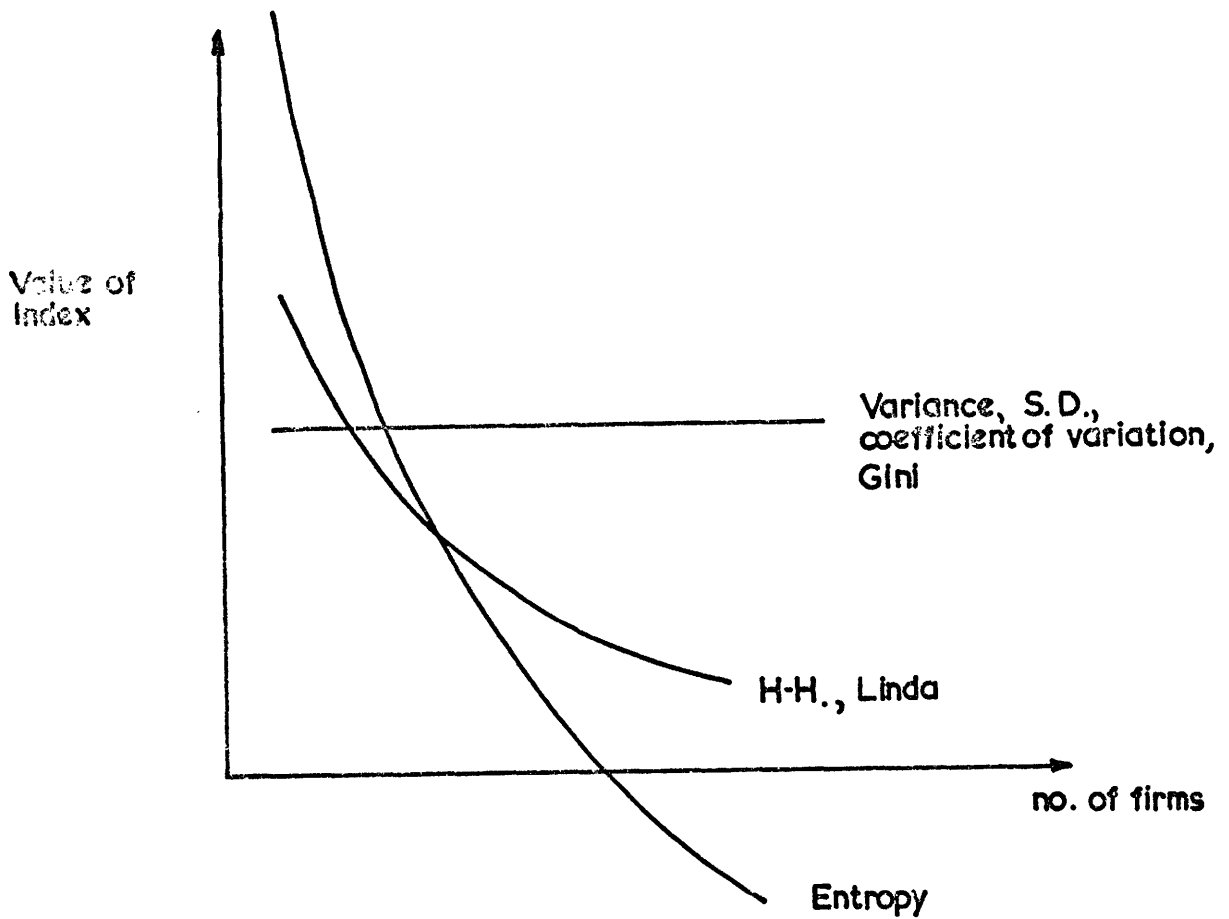


Fig. 3

When a number of industries are being compared, the entropy measure is more likely to accentuate the fewness of the firms within the industry than either the Linda or the Herfindahl-Hirschmann Index. The variance, standard deviation, coefficient of variation and Gini Coefficient cannot be considered to be measures of fewness at all.

3. The Measurement of Dispersion

The relationship between each index and the dispersion of the variable for which it is calculated is most obvious when the values of the variable are lognormally distributed (that is the logarithms of these values are normally distributed with a mean m and a standard deviation s).⁴

Some authors have suggested that distributions of sizes of firms within an industry may be lognormal, though this was not found to be the case in the paper industry (see Section 2.6 below).

The extent to which the different concentration indices measure dispersion can be mathematically deduced from the theory of lognormal distribution. Analysis shows that when the firms in the industry are lognormally distributed, each of the concentration indices is mathematically related to s . The nature of the individual relationships is presented in Fig. 4. The variance and standard deviation are not shown as these depend on m as well as s . This dependence on m is in fact a highly undesirable property for a concentration index to have. It means that if the sizes of all firms in an industry are increased by the same factor, the value of the index will change. Thus the index will depend on the unit in which sizes are measured. Also, when two industries are being compared, an index which depends on m will, in part, be merely reflecting the differences in the total sizes of the two industries.

Consequently, where the sizes of the firms within a given industry are known to be lognormally distributed, it is not necessary to calculate each of the measures of dispersion. Once s is determined each of the indices can be calculated from the formulae which have been illustrated graphically in Fig. 4 and given below for completeness:

$$\begin{aligned} \text{Mean size} &= e^m + 0.5s^2 \\ \text{Variance} &= e^{2m} + s^2 (e^{s^2} - 1) \\ &\quad \text{(where } e = 2.718) \\ \text{Coefficient of} & \\ \text{Variation, } c &= (e^{s^2} - 1)^{\frac{1}{2}} \end{aligned}$$

4. not to be confused with μ and σ defined on page (1.7, 1.9) above.

$$\text{Gini Coefficient} = 2\phi \frac{s}{\sqrt{2}} - 1$$

(where $\phi(z)$ is the probability that $t \leq z$ when t is $N(0,1)$)

$$\text{Herfindahl Hirschmann Index} = \frac{e^{s^2}}{N}$$

$$\text{Entropy Index} = \frac{s^2}{2} - \log_e N$$

(this assumes that natural logarithms are used to calculate the index).

It should be noted that these formulae can hold only when N is large enough to provide an adequate description of the lognormal distribution. The required size for N increases as s increases. When s and N are large, the Linda Index will approximate to the formula:

$$L = \frac{e^{0.5s^2}}{\sqrt{N}}$$

(The Linda is not, however, normally calculated for the entire group of N firms.) Thus, each of the concentration indices examined measure fewness and dispersion in different ways and to different extents. When using a series of indices to describe the concentration in a given industry, the following particular properties of the indices should be borne in mind:

(i) the variance, standard deviation, coefficient of variation and Gini Coefficient do not take any account of fewness of firms in the industry;

(ii) when two industries are being compared, the Entropy measure will reflect fewness to a greater extent than either the Herfindahl or the Linda indices;

(iii) when the distribution of sizes is lognormal (m,s) then the Gini Coefficient and the coefficient of variation are approximately linearly related to s for $0 < s < 1$. The Herfindahl index is a very poor measure of s in this range and the Entropy index is related to s^2 ;

(iv) "absolute" measures of variability such as variance and standard deviation are undesirable as they depend on the size of the total industry as well as on the proportion of it held by the individual firms;

(v) the Linda index is only appropriate for reflecting relative sizes of large and small firms in an industry and has particular application to those markets which characteristically have at their head a few large manufacturers.

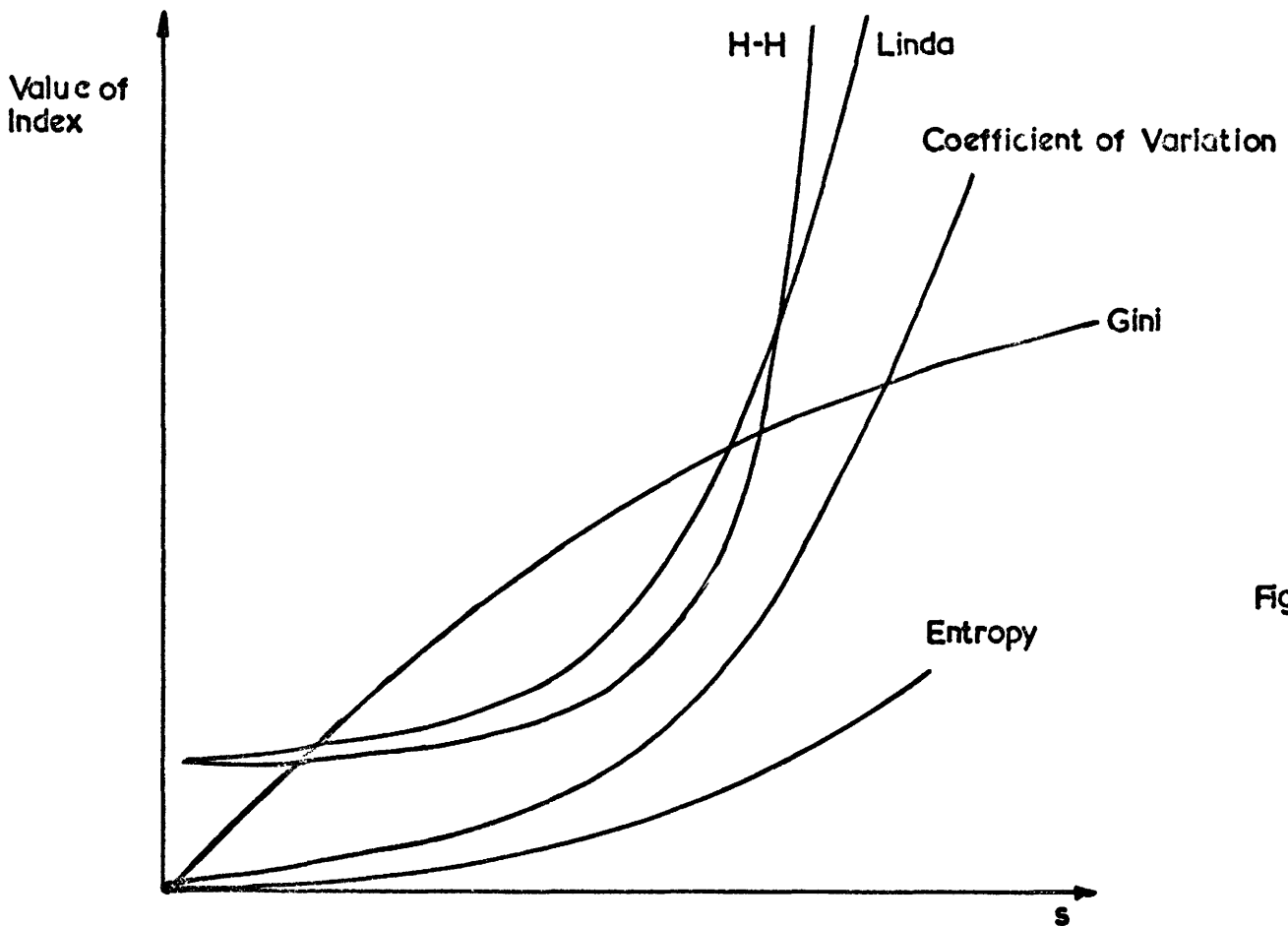


Fig. 4

SECTION 2. MANUFACTURE & CONVERSION OF PAPER & BOARD

1. Vertical integration within the industry
2. Diversification by enterprises
3. Size distribution of enterprises
4. Employment within the industry
5. The analysis of concentration
6. The test for lognormality
7. The pattern of ownership

SECTION 2

MANUFACTURE AND CONVERSION OF PAPER AND BOARD

The manufacture and conversion of paper and board are distinct and separate industrial activities. The manufacture of paper and board involves the conversion of raw materials (mainly wood pulp) into base grades of paper and board. The distinction between paper and board is a technicality based on the relative weights of the two products. The process of conversion is the transformation in any way of the basic paper and board into the final product.

Following convention within the industry, the coating of paper was considered to be part of the manufacturing process.

The UK paper industry depends heavily on imported pulp and is thus at a cost disadvantage to Scandinavia and North America which have local supplies. This cost disadvantage arises from the fact that users of imported pulp require an additional process to reverse the dehydration of the wood pulp needed prior to transportation.

The industry was greatly assisted in the past by the fact that, whereas wood pulp entered the UK duty free, paper and board imports were subject to tariffs of up to 20%. These tariffs were removed by 1967 following the formation of the EFTA in 1960.

More recently⁵, the government has taken a more positive role in encouraging the process of recovery and recycling of waste paper, which can also be used for the manufacture of certain grades of paper and board.

Since 1960 the demand for paper and board has been increasing by approximately 4% per annum by weight. Factors contributing to this increasing demand include the growth in demand for packaging items (of which paper is by far the more important, see Table 39, page 4.16; the general growth in communications and the fast growth in demand for tissue paper (particularly soft tissue); and papers and boards for specialised industrial uses.

5. 1974 UK Government Green Paper on Recycling Waste.

The British paper industry exports comparatively little of its total output: since 1968 exports of manufactured and converted paper and board have consistently represented approximately 5% of total production, by weight. Tables 1 and 2 summarise the production and trade of each sector of the industry. Exports to the EEC have been increasing over the last ten years, while traditional Commonwealth markets have remained relatively stable.

As the tables suggest, imports of paper and board continue to account for an increasing proportion of total consumption. In 1960, imports of manufactured paper and board represented 27% of total consumption by weight, 34% in 1968, and 43% in 1972; thus by 1972, almost as much paper and board was imported as was produced domestically. The principal factor behind the rapid growth in imports was the reduction in tariff barriers, mentioned above, on paper imports from Scandinavia.

The Scandinavian countries compete very strongly in the lower grades of paper and board and in semi-finished paper products, and since 1954 the proportion of UK paper consumption supplied by them has risen from a quarter to over a third. The cost advantages that the Scandinavians have over UK producers in pulp costs and in respect of fuel costs (through natural advantages such as hydroelectric power or by the use of tax-free fuel oil) are most important for the low-grade, mass-tonnage grades of paper (news-print and kraft paper).

The response of British firms to this situation has been to switch production away from lower grades towards higher quality grades, where it is advantageous for the producer to be near the point of sale, and cost disadvantages are less noticeable.

Proximity to the point of sale is probably an important factor in determining the quantity of converted products imported into the UK. As indicated in Table 2, imports of converted products represent less than 10% of total production in value terms. It is interesting to note that almost all imports are of packaging products.

Recent trends in production and trade of individual products are discussed more fully in Sections 3 and 4.

TABLE 1(a) TOTAL PRODUCTION AND TRADE - MANUFACTURE

| Year | '000 m tonnes | | | | | | | | | | |
|---------------------------------------|---------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--|
| | 1954 | 1956 | 1958 | 1960 | 1962 | 1964 | 1966 | 1968 | 1970 | 1972 | |
| Newsprint | 622.1 | 652.8 | 636.0 | 752.7 | 665.8 | 762.2 | 748.6 | 735.3 | 756.9 | 467.5 | |
| Other printing and writing papers | 779.9 | 845.6 | 850.0 | 973.9 | 899.7 | 1013.0 | 1060.6 | 1030.8 | 1060.4 | 930.9 | |
| Packaging papers | 599.6 | 624.3 | 686.1 | 813.2 | 825.2 | 875.3 | 908.3 | 909.8 | 1095.3 | 1040.8 | |
| Tissues | 46.1 | 55.7 | 88.4 | 120.0 | 160.3 | 191.5 | 247.7 | 285.7 | 319.6 | 347.0 | |
| Industrial and special purpose papers | 187.1 | 213.7 | 229.9 | 267.8 | 283.6 | 318.8 | 321.8 | 335.6 | 359.3 | 379.4 | |
| Packaging board | 660.8 | 713.1 | 810.6 | 919.7 | 902.1 | 1001.9 | 1018.3 | 1076.8 | 1009.1 | 861.7 | |
| Other board | 182.9 | 177.2 | 189.5 | 216.4 | 216.3 | 239.2 | 235.6 | 288.7 | 302.6 | 310.5 | |
| Total | 3078.5 | 3282.4 | 3490.5 | 4063.7 | 3953.0 | 4401.9 | 4540.9 | 4662.7 | 4903.2 | 4337.8 | |

British Paper and Board Industry Federation

'000 m tonnes; indices 1954 = 100

| Year | Total Production | | Imports | | Exports | |
|------|------------------|---------------|--------------|---------------|--------------|---------------|
| | Index number | '000 m tonnes | Index number | '000 m tonnes | Index number | '000 m tonnes |
| 1954 | 100 | 3080 | 100 | 910 | 100 | 250 |
| 1956 | 107 | 3280 | 116 | 1050 | 110 | 270 |
| 1958 | 113 | 3490 | 126 | 1150 | 90 | 220 |
| 1960 | 132 | 4060 | 157 | 1430 | 73 | 180 |
| 1962 | 128 | 3950 | 168 | 1530 | 66 | 160 |
| 1964 | 143 | 4400 | 206 | 1870 | 69 | 170 |
| 1966 | 148 | 4540 | 208 | 1890 | 61 | 150 |
| 1968 | 151 | 4660 | 250 | 2270 | 73 | 180 |
| 1970 | 159 | 4900 | 276 | 2510 | 93 | 230 |
| 1972 | 141 | 4340 | 337 | 3050 | 100 | 250 |

B.P.B.I.F.

TABLE 1(b): VALUE OF TOTAL PRODUCTION - MANUFACTURE

£'000

| Year | 1963 | 1968 | 1972 | 1973 |
|---------------------------------------|---------|---------|---------|---------|
| Newsprint | 39,141 | 47,336 | 36,435 | 38,490 |
| Other printing and writing papers | 121,138 | 149,375 | 186,864 | 238,389 |
| Packaging papers | 53,108 | 61,444 | 82,144 | 102,697 |
| Tissues | 9,274 | 12,947 | 16,111 | 21,370 |
| Industrial and special purpose papers | 39,167 | 41,237 | 65,080 | 93,398 |
| Packaging board | 40,833 | 66,724 | 71,058 | 86,648 |
| Other board | 16,145 | 26,054 | 28,728 | 31,918 |
| TOTAL | 318,806 | 405,117 | 486,420 | 612,910 |

1963, 1968 Census of Production
1972, 1973 Business Monitor

TABLE 1(c): VALUE OF EXTERNAL TRADE - MANUFACTURE

£'000

| EXPORTS / IMPORTS | 1971 | 1972 |
|--------------------------------------|-----------------|-----------------|
| Newsprint | 12 / 60,060 | 20 / 83,759 |
| Other printing and writing papers | 18,116 / 48,732 | 19,775 / 41,169 |
| Packaging Papers | 5,668 / 75,676 | 5,532 / 82,418 |
| Tissues | 4,536 / 5,532 | 4,773 / 6,392 |
| Industrial and special purpose paper | 12,616 / 28,224 | 12,072 / 35,210 |
| Packaging Board | 836 / 12,452 | 885 / 12,926 |
| Other board | 3,372 / 1,348 | 3,713 / 1,475 |

Business Monitor

TABLE 2 (a): VALUE OF TOTAL PRODUCTION - CONVERSION

| Year | 1963 | 1968 | 1971 | 1972 | 1973 |
|-----------------------------|---------|---------|---------|-----------|-----------|
| Wallcoverings | 18,715* | 36,509 | 50,173 | 63,535 | 71,800 |
| Stationery | 62,308 | 108,107 | 181,847 | 203,938 | 239,741 |
| Miscellaneous | 65,059 | 110,403 | n/a | 157,972 | 192,622 |
| Packaging - not incl. board | 61,719 | 93,593 | n/a | 289,205 | 348,144 |
| Board Packaging | 162,946 | 233,608 | 312,148 | 350,452 | 419,075 |
| TOTAL | 370,747 | 582,220 | n/a | 1,065,102 | 1,271,382 |

* vinyl wallcoverings n/a

1963, 1968 Census of Production
1971, 1972, 1973 Business Monitor

TABLE 2(b): VALUE OF EXTERNAL TRADE - CONVERSION

| Year | 1971 | 1972 | 1973 |
|-----------------------|--------|--------|---------|
| EXPORTS | 11,435 | 16,702 | 21,767 |
| IMPORTS | 640 | 1,275 | 1,589 |
| Wallcoverings | 3,736 | 3,462 | 2,791 |
| Stationery | 514 | 743 | 960 |
| Miscellaneous | n/a | 8,865 | 12,745 |
| Packaging - not Board | n/a | 4,088 | 4,635 |
| Board Packaging | n/a | 4,563 | 6,415 |
| TOTAL | n/a | 15,387 | 23,841 |
| | n/a | 6,459 | 8,537 |
| | n/a | 58,103 | 72,647 |
| | n/a | 40,051 | 52,255 |
| | n/a | 79,596 | 103,672 |

Business Monitor

Further details of external trade in manufactures and converted products in terms of major origins and destinations is given in Appendix C.

1. Vertical Integration within the Industry

Although distinct, the two industrial sectors of manufacturing and conversion are closely related; the converting sector is largely dependent on the products of the manufacturers. For this reason, the extent of vertical integration through the two sectors is of importance.

Individual firms within the industry have two ways of increasing vertical integration:

- (a) expanding their own manufacturing capacity backwards or forwards (as appropriate) to cover more stages of the production of the final product;
- (b) acquiring a subsidiary company which undertakes a further stage in the production process.

TABLE 3: VERTICAL INTEGRATION WITHIN PAPER & BOARD MANUFACTURING AND CONVERSION SECTORS IN 1968

| | Total no. of companies | Total no. of enterprises |
|--|---------------------------|-----------------------------|
| No. of "single-company" organisations identified engaged in: | | |
| manufacture only | 40 | 40 |
| conversion only | 152 | 152 |
| both | 0 | 0 |
| No. of "multi-company" organisations (groups) identified engaged in: | | |
| manufacture only | 10 | 56 |
| conversion only | 9 | 33 |
| both | 18 | 99 |

The term "company" refers here to an undertaking producing its own financial accounting reports. The term "organisation" refers here to the ultimate controlling board of a grouping of subsidiaries with the same ownership.

As Table 3 indicates, the "single-company" organisations (i.e. independent organisations with no subsidiary companies) identified in the industry are either producing entirely within the converting sector or entirely within the manufacturing sector. None of these organisations integrates vertically.

An examination of the "multi-company" organisations (i.e. ultimate controlling organisations with one or more subsidiary trading companies) shows the opposite picture. Half of the "groups" have subsidiaries engaged in both industrial sectors, and are thus described as vertically integrated. It is interesting to note that among the subsidiary companies of such vertically integrated groups, in the majority of cases each subsidiary tends to be either exclusively manufacturing or converting - as was the pattern among the "single-company" organisations. One major exception to this rule is the largest stationery manufacturer, which both manufactures the paper and converts it to its final products.

2. Diversification by enterprises

As previously stated, individual companies were classified to paper and board manufacture and conversion if these products accounted for more than 50% of their activity.

Consequently, where diversification has been undertaken by the "single-company" organisations, this by definition cannot account for a greater proportion of activity than paper and board products. In fact, product diversification is not a significant characteristic of such companies.

Those subsidiary companies which are part of "multi-company" groupings will again by definition comprise the paper and board interests of such groups. However, in several instances, these groupings of companies will be significantly diversified.

TABLE 4: DIVERSIFICATION WITHIN "MULTI-COMPANY" GROUPS

| | |
|---|----|
| Number of multi-company groups identified in 1968 (Table 3) | |
| of which, | 37 |
| exclusive to paper and board industry | 21 |
| having interests in other industries | 16 |
| Industrial areas of diversification: | |
| engineering/building products | 8 |
| food/tobacco/consumer goods | 5 |
| printing/publishing/office equipment | 3 |

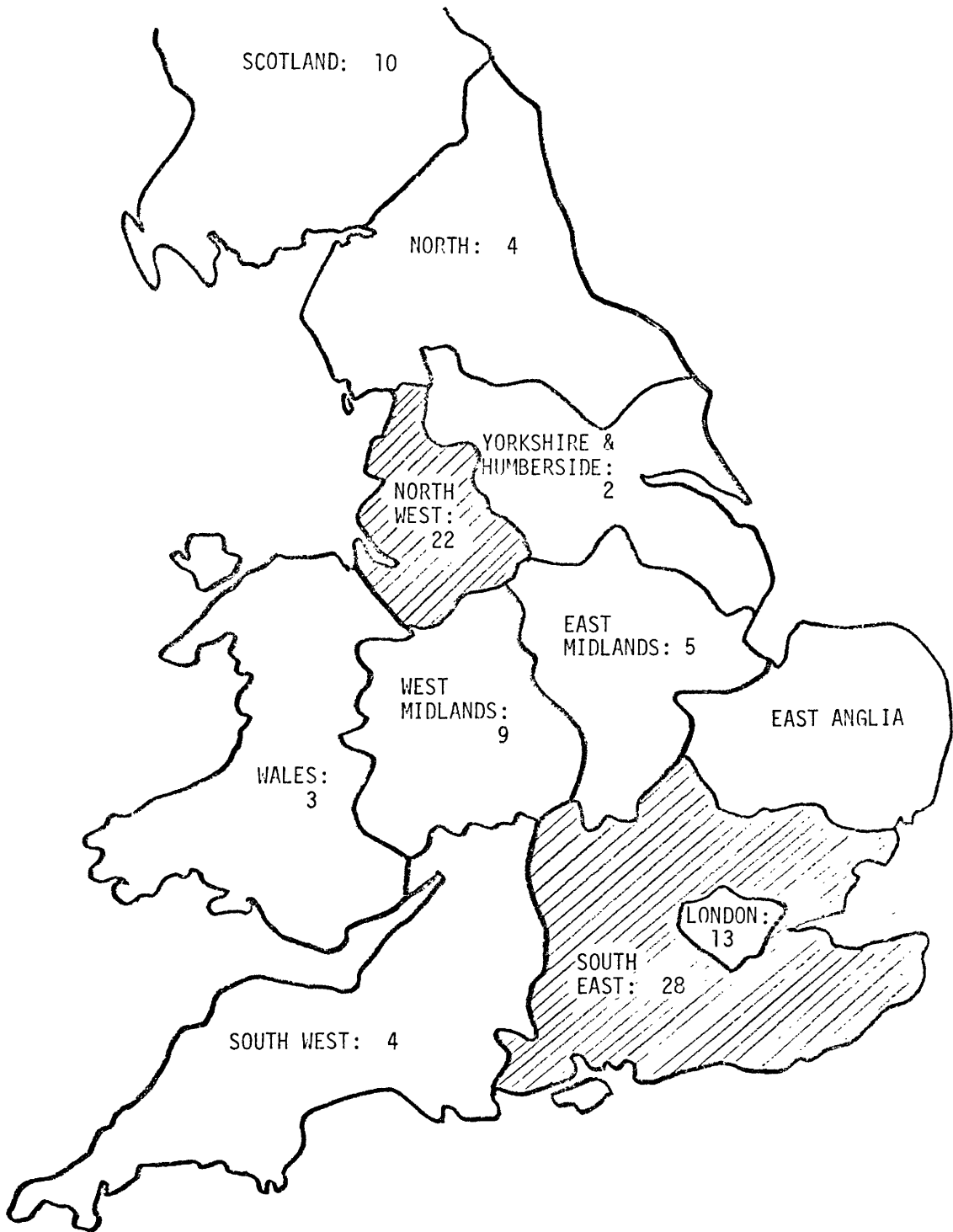
The following points of interest arose from this analysis: of the ten organisations engaged in paper manufacture but not in conversion, only one was part of a diversified "group". Diversified conglomerates have interests either in both manufacturing and conversion together, or in conversion only.

3. Summary of industry structure

To summarise, the UK paper and board industry is dominated by several large "groups" whose subsidiaries undertake both manufacturing and converting processes. In addition, several of these groupings are themselves part of highly diversified conglomerates.

These factors give the vertically integrated groups significant economic advantages over rivals as is characteristic of any oligopolistic market structure. In this case, the oligopolists' strength lies in the fact that being both manufacturers and converters, they have not only an assured market for their manufactured products, but, conversely, they have guaranteed raw materials for their converting subsidiaries.

MAP TO SHOW REGIONAL DISTRIBUTION OF THE LARGEST 100 COMPANIES IN THE PAPER & BOARD INDUSTRY



4. Employment within the Industry

Statistics of persons employed in the industry are published in aggregate form only, and these are shown in the table below.

TABLE 5: TOTAL EMPLOYEES CLASSIFIED ACCORDING TO MAIN ACTIVITY OF ESTABLISHMENT OF EMPLOYMENT

| | 1968 | 1969 | 1970 | 1971 | 1972 |
|---|----------------|----------------|----------------|----------------|----------------|
| Paper, board and pulp manufacture and coating | 83,687 | 80,353 | 73,965 | 69,015 | 66,763 |
| Converters: | | | | | |
| Bag | 6,419 | 6,570 | 6,097 | 5,424 | 5,768 |
| Box | 17,237 | 15,211 | 14,851 | 14,257 | 14,765 |
| Flexible packaging | 9,942 | 11,090 | 9,717 | 9,438 | 9,800 |
| Fibreboard packing case | 24,870 | 21,960 | 22,366 | 22,030 | 22,498 |
| Carton | 23,128 | 23,094 | 21,741 | 21,227 | 22,050 |
| Other converting | 13,573 | 22,583 | 20,014 | 20,851 | 21,656 |
| Stationery and envelopes | 19,074 | 19,168 | 19,028 | 18,806 | 18,790 |
| Miscellaneous | 9,727 | 8,652 | 7,637 | 6,952 | 8,212 |
| Wallpaper | 7,504 | 9,894 | 6,817 | 7,068 | 6,058 |
| TOTAL | 215,161 | 218,575 | 202,233 | 195,068 | 196,360 |

Paper and Paper Products Industry Training Board

The aggregate level of employment within the UK paper and board industry reflects the prevailing economic conditions within the industry, which have been discussed in the preceding sections of Part 2.

Despite an increasing import percentage, due to the competitive disadvantage of UK producers already described, the paper industry maintained employment in 1967/68, through an unexpected boom in consumer spending.

In 1969 the supply of pulp began to fall, resulting in higher prices. However, Scandinavian paper prices were also allowed to rise, and thus any dramatic increase in the import share of consumption was avoided, and employment was generally maintained throughout the industry.

In contrast to 1969, 1970 saw an almost 10% fall in employment, which was particularly marked among paper and board manufacturers. Pulp prices were increased by around 10% on average from 1.1.70, when the industry had to combat other rising costs, particularly those of wages and transport. The magnitude of price increases was checked by the need to match the prices of competing imported papers.

Although pulp prices rose again in 1971, a world slackening of demand for pulp limited the amount of the increase. However, the UK paper industry was also faced with other substantial cost increases, particularly in fuel oil and wages. This situation precipitated a contraction in the industry and the decision by many of the large groups to reduce their involvement in low grade papers. Employment within the industry fell by a further 7,000.

The figures for 1972 suggest that the industry was beginning to emerge from the downturn in trade. However, the over-capacity situation in the light of falling world demand suggests further rationalisation to come.

The performance of the industry since 1968 is further analysed in terms of profitability in the sections dealing with individual product groups.

5. The Analysis of Concentration

Sections 1 - 4 have outlined the salient economic features of the UK paper and board industry over the past decade. Against this background, the evolving pattern of concentration within the industry can be now examined.

The pattern of concentration between 1968 - 1972 inclusive within the two industrial sectors of paper and board manufacture and conversion was measured by a series of indices applied to the following variables:

turnover;
exports;
pre-tax profits;
cash flow (profits + depreciation);
net cash flow (profits + depreciation - tax);
own capital or equity;
gross annual investment.

Three methodological problems arose from this analysis. First, as previously stated, concentration indices cannot theoretically be calculated for zero or negative values of a variable. Thus, in any given year, zero and negative values of variables were omitted. This convention, adopted by the Commission, leads to some problems of interpretation, in respect of those variables which had negative or zero values even though the company was trading. These variables include profits, cash flow, exports and (in a few cases) gross investment. The following implications should be noted:

- (a) the size of the sample of companies is different for different variables in the same year;
- (b) the mean values of these variables represent the means of positive values only. For this reason, these arithmetic means cannot be used to calculate ratios such as average return on equity, average margin on sales and similar standard ratios;
- (c) those indices which measure the dispersion of the variable (e.g. the coefficient of variation) tend to understate that dispersion when zero and negative values are excluded.

Secondly, the development of concentration is studied over a five year period only. Discussions with representatives of the industry pointed out the cyclical nature of the trade based on an approximate ten year cycle period. Consequently, the period chosen is not felt to be adequate to permit firm conclusions as to the trends in concentration.

Thirdly, concentration indices as described and used within this study measure the size and dispersion of UK producers relative to the total UK production. However, as has been previously stated, the UK paper and board industry represents approximately 60% of total UK consumption of all paper and board and converted products. This fact is particularly important when conclusions as to market dominance of individual firms are being considered.

The following tables contain an analysis of sales turnover of the firms which were identified within the manufacturing (Table 6) and converting (Table 7) sectors.

It will be noted that the estimates of total turnover for each sector differ from the corresponding published figure in Tables 1(a) and 2, page 2.4, 5. This discrepancy occurs mainly because the Census of Production, the source of the published aggregate data, is based on individual establishments. Paper manufacture and conversion activities of the same firm can be more easily distinguished by this method, both from each other and, in the case of diversified enterprises, from activities outside the paper industry.

Table 8 compares the published aggregate turnover figures for 1968 and 1972 with the sums of individual company data analysed by the authors. This comparison shows that most of the discrepancies are due to incomplete distinction between manufacturing and converting interests of vertically integrated enterprises within the paper industry.

When these two sectors are combined, the sums of the individual company data used in this analysis are fairly close to the published statistics. Since data for individual firms for turnover and for other variables, are available only from their published accounts, complete reconciliation with published statistics was not possible.

TABLE 6: ANALYSIS OF TURNOVER OF MANUFACTURING ORGANISATIONS

| Year | 1968 | 1969 | 1970 | 1971 | 1972 |
|--|---------------|---------------|---------------|---------------|---------------|
| Number of Organisations ⁷ . | 64 | 65 | 67 | 66 | 66 |
| Total Turnover (£'000) | 469,656 | 521,486 | 569,687 | 567,403 | 622,911 |
| Mean (£'000) | 7,338 | 8,023 | 8,503 | 8,597 | 9,438 |
| Coefficient of Variation | 2.03 | 2.08 | 2.10 | 2.04 | 2.05 |
| Gini | 0.728 | 0.736 | 0.731 | 0.720 | 0.715 |
| Herfindahl-Hirschmann | 80.2 | 82.0 | 80.8 | 78.3 | 78.9 |
| Entropy | -133.4 | -132.8 | -134.5 | -135.9 | -136.3 |
| Linda Index for N* | | | | | |
| Concentration Ratios % | | | | | |
| = 2 | 0.562 29.2 | 0.543 31.6 | 0.642 31.8 | 0.721 30.8 | 0.742 31.5 |
| = 4 | 0.411 50.6 | 0.460 50.6 | 0.501 49.7 | 0.483 48.9 | 0.500 49.0 |
| = 8 | 0.361 67.5 | 0.359 67.3 | 0.370 65.8 | 0.369 64.5 | 0.388 64.0 |
| = 10 | 0.327 72.6 | 0.311 73.0 | 0.318 71.5 | 0.312 70.3 | 0.320 69.8 |
| = 12 | 0.313 76.4 | 0.300 77.1 | 0.299 75.8 | 0.294 74.5 | 0.296 74.0 |
| = 20 | 0.245 87.1 | 0.264 87.2 | 0.255 86.3 | 0.241 85.5 | 0.240 85.0 |
| = 30 | 0.237 93.1 | 0.240 93.3 | 0.233 92.4 | 0.220 92.1 | 0.215 92.0 |
| = 40 | 0.221 96.7 | 0.225 96.8 | 0.212 96.2 | 0.200 96.2 | 0.199 95.9 |

7. Each "multi-enterprise" organisation (group) was counted as one organisation - total no. of enterprises is not recorded.

TABLE 7: ANALYSIS OF TURNOVER OF CONVERTING ORGANISATIONS, EXCLUDING WALLCOVERINGS⁸.

| Year | 1968 | 1969 | 1970 | 1971 | 1972 |
|--|---------------|---------------|---------------|---------------|---------------|
| Number of Organisations ⁷ . | 179 | 174 | 171 | 161 | 145 |
| Total Turnover (£'000) | 510,557 | 577,050 | 645,618 | 669,197 | 738,686 |
| Mean (£'000) | 2,852 | 3,316 | 3,776 | 4,157 | 5,094 |
| Coefficient of Variation | 4.09 | 3.97 | 3.84 | 3.70 | 3.50 |
| Gini | 0.829 | 0.829 | 0.831 | 0.823 | 0.824 |
| Herfindahl-Hirschmann | 98.96 | 96.46 | 91.97 | 91.12 | 91.16 |
| Entropy | -140.4 | -140.7 | -141.8 | -142.1 | -140.1 |
| Linda Index for N* | | | | | |
| Concentration Ratios % | | | | | |
| = 2 | 0.553 40.2 | 0.559 39.4 | 0.589 38.3 | 0.603 38.0 | 0.613 37.8 |
| = 4 | 0.598 54.9 | 0.549 54.6 | 0.547 53.1 | 0.552 52.8 | 0.539 53.1 |
| = 8 | 0.543 67.3 | 0.541 66.7 | 0.535 65.3 | 0.529 64.9 | 0.526 65.1 |
| = 10 | 0.475 71.1 | 0.480 70.3 | 0.480 68.8 | 0.464 68.6 | 0.468 68.7 |
| = 12 | 0.415 74.5 | 0.415 73.7 | 0.409 72.3 | 0.395 72.2 | 0.399 72.2 |
| = 20 | 0.337 82.8 | 0.308 83.0 | 0.271 82.6 | 0.267 82.7 | 0.259 83.3 |
| = 30 | 0.316 87.2 | 0.305 87.6 | 0.268 88.0 | 0.268 87.7 | 0.254 88.9 |
| = 40 | 0.295 89.8 | 0.291 90.1 | 0.268 90.6 | 0.261 90.5 | 0.251 91.7 |

8. See Section 4.5, Page 4.36

TABLE 8: RECONCILIATIONS OF PUBLISHED STATISTICS WITH ACCOUNTING DATA OF FIRMS IDENTIFIED IN THE INDUSTRY

| | <u>1968</u> | £'000 <u>1972</u> |
|---|-------------|----------------------|
| <u>Published statistics</u> | | |
| Converting | 582,220 | 1,065,102 |
| less Wallcoverings | 36,509 | 63,535 |
| | <hr/> | <hr/> |
| | 545,711 | 1,001,567 |
| Manufacturing | 405,117 | 486,420 |
| | <hr/> | <hr/> |
| | 950,828 | 1,487,987 |
| | <hr/> | <hr/> |
| <u>Aggregation of individual firms identified</u> | | |
| Converting | 510,526 | 738,703 |
| Manufacturing | 469,651 | 622,908 |
| | <hr/> | <hr/> |
| | 980,177 | 1,361,611 |
| | <hr/> | <hr/> |

Tables 6 and 7 allow an immediate comparison of the two sectors of the UK paper industry. The converting sector is characterised by a large number of small organisations, as has been demonstrated in the bar charts, pages 2.9 and 2.10. This fact is reflected in both the relative numbers of organisations and in the mean turnover values.

The extent of the variation of the actual turnover of individual companies from the mean turnover of the sector is reflected in the coefficient of variation. The value of this index for converting organisations is almost twice the value for manufacturing organisations. This reflects the relative nature of production within each sector; the more capital-intensive manufacturing sector means greater standardisation of the possible ranges of output. Converting organisations, on the other hand, can feasibly produce a far wider range of output. Between 1968-1972 the value of the

coefficient of variation for the conversion sector has fallen 14%, compared with the almost static value for the manufacturing sector.

The relative values of the Gini coefficient indicate that the converting sector is more concentrated than the manufacturing sector. The explanation of this is found by examining Graph 1 overleaf, which shows the percentage share of total turnover held by individual companies in 1972.

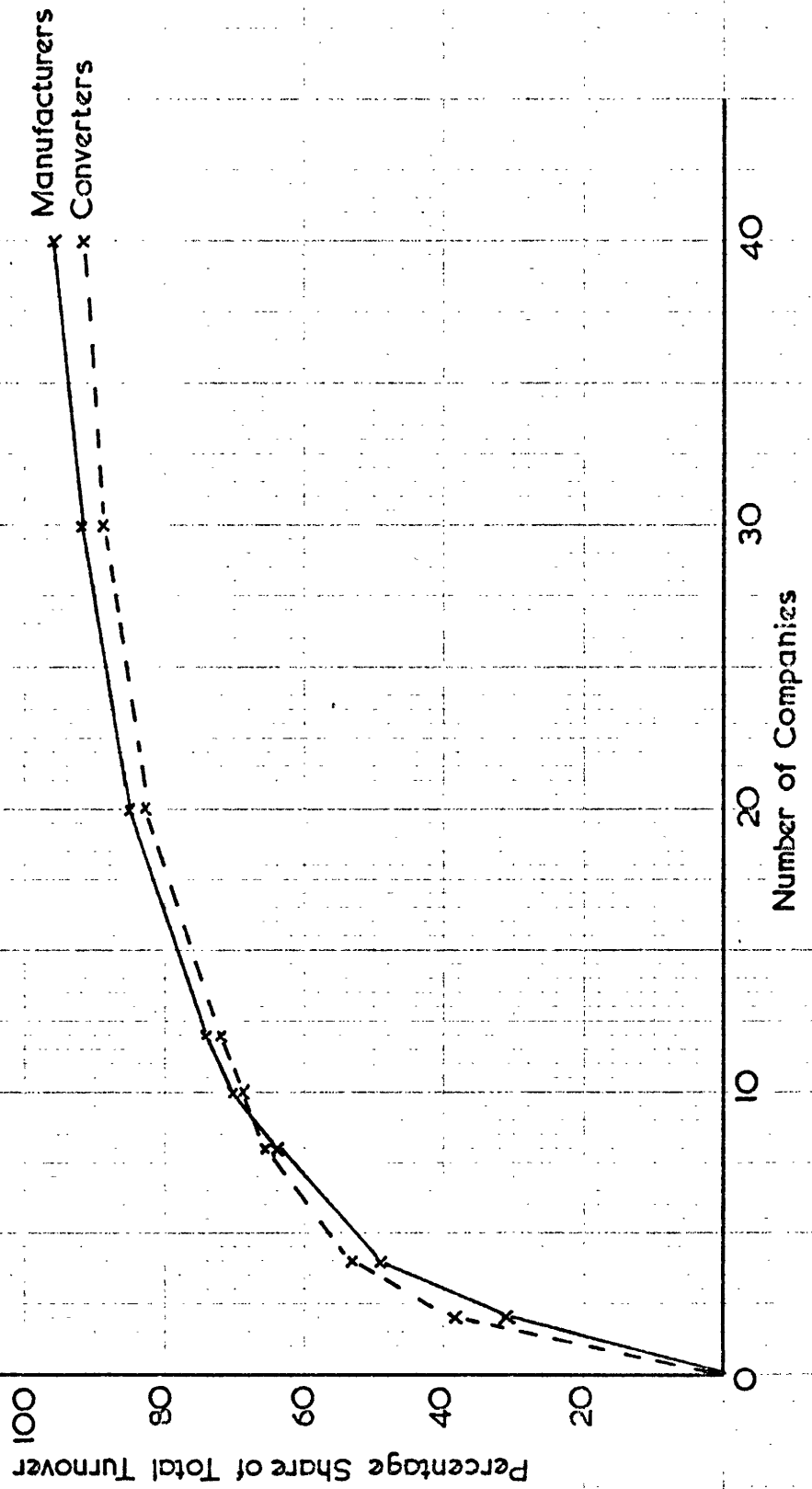
In manufacturing, the concentration ratio corresponding to the first quartile (approximately the 17 largest firms) was 82%; in converting, the corresponding ratio (for the 36 largest firms) was 96%.

It will be noted that whereas the other indices all show a greater degree of concentration in conversion than in manufacture, the Entropy index shows the opposite result. This is a reflection of the greater sensitivity of the Entropy index to the number of firms included in the calculation.

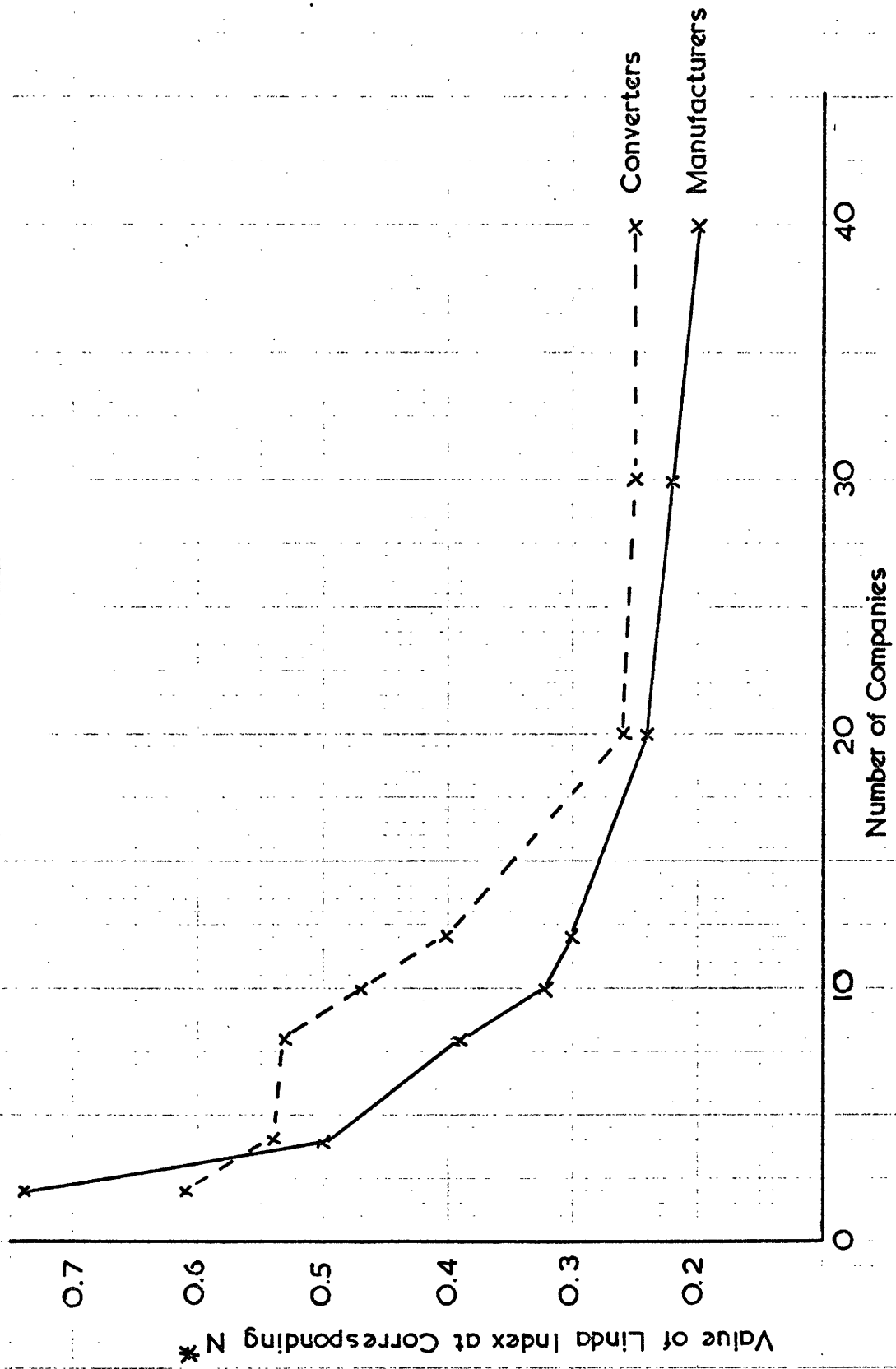
The values of the Linda index calculated for the variable turnover are plotted on Graph 2. Both the manufacturing and converting sectors of the industry exhibit the same pattern of a falling Linda curve, in all years 1968-1972, with no minimum point of inflection before the fortieth company is reached. This would suggest that no oligopoly existed in either sector of the industry - or, in other words, when the firms were ranked in descending order of turnover, no distinct "threshold" or discontinuity of size was observed, implying no "oligopolistic arena".

The examination of the separate product groups within each sector of the industry contained in Sections 3 and 4 of this Report refutes this conclusion. The explanation lies in the fact that each sector of the industry has specialised into several distinct non-competing product groups. Each product group exhibits the characteristics of an oligopoly having at its head a small number of large firms. The sizes of these individual oligopolists will vary from one product group to another according to nature of production. Thus, the summing together of a series of "individual oligopolies" does not produce a single "all industry" oligopoly, but rather the varying size of the oligopolists produces no point of discontinuity in sizes and hence no "oligopolistic arena" can be identified.

GRAPH I. CONCENTRATION RATIOS OF THE TWO INDUSTRY SECTORS IN 1972



GRAPH 2. LINDA INDICES FOR THE TWO INDUSTRY SECTORS IN 1972



This is the situation in both the manufacturing and converting sectors of the paper industry. Further analyses of each product group are contained in Sections 3 and 4.

For both the manufacturing and converting sectors, analyses were undertaken of the other data variables (exports, profits, cash flow, equity and investment) relating to the individual organisations within the industry. The full series of concentration indices calculated for each of the financial variables examined are contained in Appendix A.

As stated at the beginning of the Section, concentration indices cannot be applied to variables with negative or zero values. This problem did not arise in the analysis of turnover, as any firm with zero turnover in any year is considered to be non-trading in that year and is omitted. Data most affected by this criterion are those relating to exports and profits: only a proportion of the firms identified in each sector are exporters; and within each sector a few firms will make losses in any given year. Consequently the number of data items for these variables will be less than the total number of companies in any year.

Tables 9 and 10 show the numbers of organisations in each sector having data relating to each variable in each year 1968-1972. In the case of profits, both the amount of profits and losses made in each year are shown.

Having examined the extent of concentration in sales turnover within each sector of the industry, further analysis was undertaken to assess the concentration of the other financial variables in Tables 9 and 10. As stated, the concentration indices calculated for all variables are contained in Appendix A. These indices describe the concentration of each

TABLE 9: NUMBERS OF FINANCIAL STATISTICS RELATING TO MANUFACTURING ORGANISATIONS

| Year | No. of organisations with positive values of variable | | | | | | |
|------|---|-------------------------------|------------|-------------------------------|------------|--------|---------|
| | Turnover | Net profit | Losses | Net cash flow | Investment | Equity | Exports |
| | No. | £'000 total of variable | No. | £'000 total of variable | | | |
| 1968 | 64 | 59 33,800 | 5 1,500 | 62 | 64 | 64 | 54 |
| 1969 | 65 | 63 33,400 | 2 900 | 64 | 65 | 65 | 57 |
| 1970 | 67 | 59 25,300 | 8 900 | 63 | 67 | 67 | 61 |
| 1971 | 66 | 57 18,900 | 9 2,000 | 60 | 66 | 65 | 59 |
| 1972 | 66 | 58 26,600 | 8 1,300 | 63 | 66 | 66 | 60 |

TABLE 10: NUMBERS OF FINANCIAL STATISTICS RELATING TO CONVERTING ORGANISATIONS

| Year | No. of organisations with positive values of variable | | | | | | |
|------|---|-------------------------------|-----------|-------------------------------|------------|--------|---------|
| | Turnover | Net profit | Losses | Net cash flow | Investment | Equity | Exports |
| | No. | £'000 total of variable | No. | £'000 total of variable | | | |
| 1968 | 179 | 177 38400 | 2 700 | 177 | 178 | 179 | 154 |
| 1969 | 174 | 172 42000 | 2 500 | 172 | 172 | 174 | 150 |
| 1970 | 171 | 168 39400 | 3 500 | 170 | 171 | 171 | 147 |
| 1971 | 161 | 154 43000 | 7 800 | 158 | 161 | 161 | 137 |
| 1972 | 145 | 140 53200 | 5 1700 | 142 | 145 | 144 | 124 |

variable in isolation. For example the table relating to manufacture on page 128 shows that in 1970 the ten largest manufacturing companies in terms of turnover accounted for 71.5% of total turnover and that the ten manufacturing companies with the greatest profits accounted for 70.3% of profits. However, only six firms were common to both these groups and the order of firms differed according to which variable was used for ranking.

Appendix B sets out more comprehensive statistical evidence on differences in ranking in both manufacturing and conversion. Because of the wide variations, it was decided to omit from this report certain tabulated comparisons of the financial variables, which have appeared in reports produced in other member countries of the EEC and which are valid only when differences in ranking are small. This decision is explained more fully in the Appendix.

Of all the variables included in the analysis, turnover presented the fewest problems of definition and interpretation. For this reason, it was decided to rank firms according to turnover and study the distribution of other financial variables in relation to this ranking.

In other words, having determined that the top 4 manufacturers (in terms of turnover) account for 50% of total turnover of the sector, it was of interest to see whether these same 4 firms also accounted for 50% of profits, exports, cash flow, equity and investment.

For each sector of the industry, the percentage share of the total of each financial variable held by the largest 2, 4 and 10 companies in turnover terms was calculated. The results are shown for the manufacturing sector in Table 11 and for the converting sector in Table 12.

From Appendix A, it may be noted that, in the converting sector, exports were more concentrated than any other financial variable, according to most of the alternative indices. This greater degree of concentration occurred in each of the five years; in 1972 ten of the 145 companies accounted for 87% of exports. From data in Table 2 above, it can be calculated that exports were equal to only 3.7% of the converting sector's output.

The results revealed by this analysis were particularly interesting in respect of profits. (In the event of one of the top ten companies in either section making a loss, this was included as a negative figure). Considering Table 11 first, in 1968 the percentage of pre-tax profits held by the ten manufacturers with the largest turnover was similar to the percentage shares of turnover (i.e. the largest two companies held 29% of turnover and 32% of profits; the largest four, 50% of turnover and 54% of profits, and so on). But in the following years, 1969-1972, the percentage share of total profits fell quite dramatically, the fall being particularly marked for the top two firms. This pattern is reflected in the net cash flow percentages, this being defined as (profit - tax + depreciation).

The results in Table 12 relating to converters do not show such a dramatic slump in the percentage share of profits as was the case for the manufacturers. The pattern of profit shares is more variable, but even so the figures suggest that at least among the top four firms there was some loss in the percentage share of profits relative to turnover.

In both sectors of the industry, the percentage shares of exports and gross annual investments consistently fell below the equivalent shares of total turnover. Again, this pattern was less marked among the converting organisations than among the manufacturers. The only variable for which the percentage share was greater than for the corresponding turnover share was equity, and this was the case in both sectors of the industry.

TABLE 11: PERCENTAGE OF TOTAL FINANCIAL VARIABLES HELD BY TOP 2, 4 & 10 ORGANISATIONS RANKED IN DESCENDING ORDER OF TURNOVER

| n = | Turnover | Exports | Pre-Tax Profits | Net Cash Flow | Equity | Annual Investment |
|--------------------|----------|---------|-----------------|---------------|--------|-------------------|
| MANUFACTURERS 1968 | | | | | | |
| 2 | 29.2 | 34.3 | 32.2 | 33.8 | 35.2 | 30.1 |
| 4 | 50.6 | 44.2 | 45.1 | 49.6 | 52.1 | 43.5 |
| 10 | 72.6 | 60.5 | 72.0 | 73.8 | 72.1 | 58.9 |
| MANUFACTURERS 1969 | | | | | | |
| 2 | 31.6 | 25.5 | 26.1 | 28.3 | 35.9 | 33.2 |
| 4 | 50.6 | 33.6 | 39.8 | 43.0 | 51.9 | 45.0 |
| 10 | 73.0 | 56.0 | 67.6 | 65.7 | 73.0 | 62.3 |
| MANUFACTURERS 1970 | | | | | | |
| 2 | 31.8 | 34.7 | 19.5 | 25.2 | 35.5 | 31.7 |
| 4 | 49.7 | 43.1 | 45.6 | 45.5 | 51.5 | 41.8 |
| 10 | 71.5 | 61.0 | 63.7 | 66.4 | 71.7 | 67.3 |
| MANUFACTURERS 1971 | | | | | | |
| 2 | 30.8 | 30.3 | 12.9 | 22.4 | 35.0 | 28.9 |
| 4 | 48.9 | 38.2 | 45.2 | 44.4 | 49.6 | 40.9 |
| 10 | 70.6 | 54.3 | 59.7 | 69.4 | 74.1 | 58.7 |
| MANUFACTURERS 1972 | | | | | | |
| 2 | 31.5 | 34.4 | 8.3 | 25.0 | 36.7 | 37.6 |
| 4 | 49.0 | 40.6 | 39.7 | 43.8 | 50.7 | 48.7 |
| 10 | 69.8 | 58.3 | 59.5 | 64.1 | 75.0 | 67.9 |

TABLE 12: PERCENTAGE OF TOTAL FINANCIAL VARIABLES HELD BY TOP 2, 4 & 10 ORGANISATIONS RANKED IN DESCENDING ORDER OF TURNOVER

| n= | Turnover | Exports | Pre-Tax Profits | Net Cash Flow | Equity | Annual Investment |
|-----------------|----------|---------|-----------------|---------------|--------|-------------------|
| CONVERTERS 1968 | | | | | | |
| 2 | 40.2 | 36.4 | 36.7 | 33.4 | 46.6 | 28.0 |
| 4 | 54.9 | 39.2 | 50.8 | 50.4 | 58.8 | 43.4 |
| 10 | 70.1 | 78.9 | 72.8 | 70.9 | 69.9 | 56.9 |
| CONVERTERS 1969 | | | | | | |
| 2 | 39.4 | 35.9 | 34.4 | 33.5 | 45.0 | 24.6 |
| 4 | 54.6 | 40.5 | 48.1 | 49.1 | 57.1 | 42.0 |
| 10 | 70.3 | 76.9 | 71.6 | 69.4 | 67.1 | 55.5 |
| CONVERTERS 1970 | | | | | | |
| 2 | 38.3 | 39.2 | 37.7 | 32.7 | 44.4 | 23.1 |
| 4 | 53.1 | 45.1 | 50.5 | 48.2 | 56.3 | 44.5 |
| 10 | 68.8 | 72.5 | 68.5 | 66.6 | 63.2 | 56.2 |
| CONVERTERS 1971 | | | | | | |
| 2 | 38.0 | 32.2 | 35.8 | 31.5 | 42.7 | 30.8 |
| 4 | 52.8 | 36.7 | 48.8 | 46.7 | 55.1 | 48.4 |
| 10 | 68.6 | 65.0 | 68.2 | 64.8 | 61.0 | 65.8 |
| CONVERTERS 1972 | | | | | | |
| 2 | 37.8 | 31.6 | 35.9 | 32.1 | 44.6 | n/a |
| 4 | 53.1 | 35.6 | 49.4 | 47.8 | 57.1 | |
| 10 | 68.7 | 61.4 | 68.3 | 67.7 | 67.5 | |

TABLE 13:
INTERNATIONAL COMPARISON OF CONCENTRATION OF SALES -- TURNOVER IN 1969 ONLY

| | Number | Coefficient of Variation | Gini | Herfindahl Hirschmann | Entropy | CR at 4 Linda n* = 4 | CR at 10 Linda n* = 10 |
|---------------------------------|--------|--------------------------|------|-----------------------|---------|----------------------------|------------------------------|
| MANUFACTURING (NICE 271) | | | | | | | |
| Germany | 189 | 3.43 | 0.83 | 67.6 | -154.4 | 40.4 0.67 | 59.1 0.32 |
| Italy | 532 | 3.47 | 0.75 | 24.5 | -205.9 | 23.2 0.46 | 42.0 0.19 |
| Holland | 19 | 1.60 | 0.62 | 186.7 | -93.6 | 71.8 0.83 | 88.6 0.73 |
| UK | 65 | 2.08 | 0.74 | 82.0 | -132.8 | 50.6 0.46 | 73.0 0.31 |
| CONVERSION (NICE 272) | | | | | | | |
| Germany | 1121 | 5.59 | 0.73 | 28.8 | -230.6 | 27.6 0.72 | 36.4 0.41 |
| Italy | 704 | 1.68 | 0.44 | 5.42 | -260.6 | 8.9 0.34 | 18.3 0.15 |
| Holland | 98 | 1.36 | 0.58 | 29.2 | -172.6 | 25.3 | 46.2(at-12) |
| UK | 174 | 3.97 | 0.83 | 96.5 | -140.7 | 54.6 0.55 | 70.3 0.48 |

C.E.E. Direction Generale de la Concurrence
IV/A - 3 Tableaux de Concentration IV/45/74 - F

6. Test for Lognormality

An investigation was undertaken to determine how closely the distribution of the turnover of the converting companies approximated to the lognormal distribution. The number of manufacturing firms identified in the industry was too small to permit conventional tests of significance.

The mean (m) and standard deviation (s) of the logarithms of turnover were calculated and a frequency distribution with seven classes was generated on the basis of the ordinates of the normal distribution. A theoretical distribution of this kind was generated for 1968, 1970 and 1972. By this technique the actual distributions were found to differ appreciably in lognormality. Fig. 5 below compares the frequency observed from the data with the expected frequency for each size range.

The difference between the actual and theoretical distributions was found by the χ^2 test to be significant at the 2% level in 1968 and at the 1% level in 1970 and 1972.

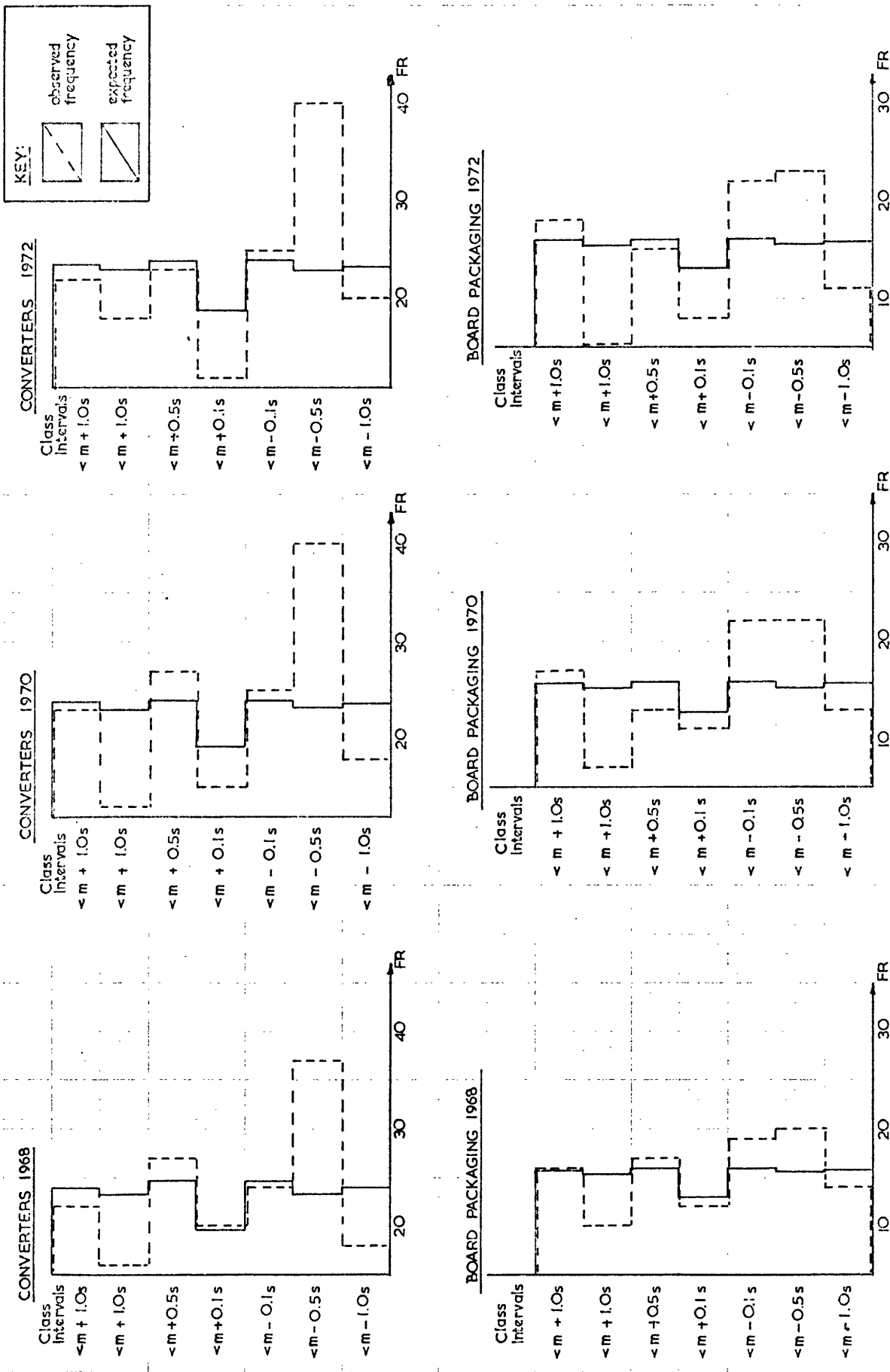


FIG. 5

7. The Pattern of Ownership

An analysis was undertaken to determine the relative numbers of public companies and private companies in the industry in the most recent year, 1972. Those organisations which form part of larger diversified conglomerates were classified as public companies if the parent company was publicly owned; and vice versa when the parent company was privately owned.

To avoid problems of vertical integration, the manufacturing and converting sectors were considered together.

41 of the 211 organisations in the industry are public companies. Of the 37 "multi-enterprise" companies referred to earlier, only 5 are privately owned. Although they represented only about 20% of the total number of organisations, public companies accounted for 85% of the total "own capital" of the industry in 1972.

For data relating to the same year, 1972, a further analysis of the incidence of interlocking directorates within the companies classified to the paper industry was undertaken. In the first instance the analysis was confined to the larger companies. No common directorates were revealed. This was assumed to be indicative of the pattern throughout the industry and the analysis was discontinued.

Changes of ownership of firms in the industry during the period 1968-1972 are recorded in the table below.

TAKEOVERS 1968-1972: MANUFACTURERS

| <u>Company</u> | <u>Equity</u> £'000 | <u>First Owner</u> | <u>Year</u> <u>of</u> <u>Change</u> | <u>Second Owner</u> |
|----------------------------------|------------------------|--|---|------------------------|
| Allan B. Carlisle & Sons Ltd. | 8 | Independent | 1969 | Brittains Ltd. |
| Leonard Stace Ltd. | 169 | Independent | 1969 | Associated Paper Mills |
| Sterling Stubbins | 328 | Chartered co., USA | 1970 | S.I.L. Co., London |
| Bathford Paper Mills Co. Ltd. | 94 | Bathford & Ryburndale (Holdings) Ltd. | 1971 | Portals Holdings Ltd. |
| Ryburndale Paper Mills | 67 | Bathford & Ryburndale (Holdings) Ltd. | 1971 | Portals Holdings Ltd. |

TAKEOVERS 1968-1972: CONVERTERS

| <u>Company</u> | <u>Equity</u> | <u>First Owner</u> | <u>Year of Change</u> | <u>Second Owner</u> |
|----------------------------|---------------|--|-----------------------|-----------------------------------|
| C.P. Corrugated Cases Ltd. | 580 | Independent | 1968 | Tremlett Ltd. |
| Standard Box & Carton Co. | 9 | Independent | 1969 | Delyn Ltd. |
| Grove Mill Paper Co. Ltd. | 1293 | Lloyds Packing & Warehouses (Holdings) | 1969 | Capseals Ltd. |
| Browne & Day Ltd. | 106 | Independent | 1970 | Cundell Packaging (Holdings) Ltd. |
| Decoflex Ltd. | 60 | Independent | 1970 | Lamson Industries Ltd. |
| Brand Packaging | - | Melbray Print & Packaging | 1971 | Tremlett Ltd. |
| C. A. Coutts Ltd. | 131 | Bryant & May | 1971 | Cundell Packaging (Holdings) Ltd. |
| F. Morrell & Co. | 45 | G.U.S. | 1972 | McCleod Russell |

ENTRANTS INTO THE INDUSTRY

| <u>Company</u> | <u>Equity</u> £'000 | <u>Date</u> | <u>Sector</u> |
|--------------------------------------|------------------------|-------------|-----------------------------------|
| Integrated Packaging Ltd. | 1 | 1968 | Packaging |
| Sterling Stubbins Ltd. | 75 | 1968 | Tissue manufacturing |
| Brittains Arborfield Ltd. | 405 | 1969 | Paper manufacturing |
| Cundell Corrugated (Barnstable) Ltd. | - | 1969 | Packaging |
| Capseals Liners Ltd. | 397 | 1969/70 | Packaging |
| Fay International Ltd. | - | 1970 | Merchanting of paper goods |
| Dolan Corrugated Containers Ltd. | 374 | 1970/71 | Corrugated fibreboard containers |
| Brittains Paper Ltd. | 1048 | 1971 | Paper manufacturing |
| N & S Export Packers Ltd. | - | 1971 | Packaging materials manufacturing |
| Alf Cooke Bag Co. Ltd. | 32 | 1972 | Non-board packaging |
| Ruberoid Paper Co. Ltd. | 625 | 1972 | Paper manufacturing |
| Joseph Batchelor Ltd. | - | 1972 | Paper manufacturing |

EXITS FROM THE INDUSTRY

| | | | |
|----------------------------|-----|---------|---------------------|
| W. R. Annan Ltd. | 52 | 1969 | Packaging |
| Chiltern Hunt | 350 | 1969/70 | Packaging |
| Chas. Sprenger & Sons Ltd. | 36 | 1971 | Packaging |
| Clyde Paper Co. Ltd. | - | 1971 | Paper manufacturing |

Note: the tables record those companies for which evidence was found of incorporation or cessation of trading during the period 1968-1972. Where accounts were not filed for 1972 and for other years, this was assumed to be due to the time lag involved in making the accounts available to the public.

SECTION 3. ANALYSIS OF MANUFACTURING PRODUCT GROUPS

1. Manufacture of printing + writing paper product group
2. Manufacture of packaging papers product group
3. Manufacture of board product group

SECTION 3

THE ANALYSIS OF MANUFACTURING PRODUCT GROUPS

Firms comprising the manufacturing sector of the paper and board industry (NICE 271) were considered to fall into three distinct non-competing groups:

printing and writing papers, incl. newsprint;
packaging papers, incl. tissues;
board making, incl. corrugated case materials.

The allocation of the individual firms into the relevant product groups was made with the help of information from trade associations; and with information from the firms themselves on the nature of the competition they experienced. Where the different subsidiaries of the same parent company manufacture for different product groups, then each subsidiary has been classified according to its own individual activity.

TABLE 14: NUMBERS OF COMPANIES CLASSIFIED TO EACH PRODUCT GROUP

| Year | Printing & Writing Papers | Packaging Papers | Board Making |
|------|---------------------------|------------------|--------------|
| 1968 | 27 | 19 | 20 |
| 1969 | 28 | 19 | 20 |
| 1970 | 29 | 20 | 20 |
| 1971 | 29 | 19 | 19 |
| 1972 | 29 | 19 | 20 |

An analysis of seller concentration in each of the separate product groups was undertaken. It was felt that an investigation of concentration amongst competing manufacturers provides a better description of the market conditions within that product group. The various concentration ratios used were calculated on the variable of turnover only. The use of this variable avoided the methodological difficulties outlined in Section 2.5 above.

The concentration indices calculated for each of the three product groups are summarised in the following tables, 15 and 16.

The following sub-sections, 3.1, 3.2 and 3.3 consider in greater detail the economic features and performance of each product group. This introductory section is intended to present some preliminary comparative conclusions relating to all of the manufacturing product groups.

Board manufacture requires different machinery from that used in paper manufacture. Manufacturers producing paper can feasibly switch production between print and writing papers and packaging papers, or produce a combination of the two. The manufacture of newsprint and soft tissue paper are further specialisations. Domestic newsprint production is effectively a duopoly, but does in fact represent less than half of total UK consumption. Tissue manufacture is a relatively new and compact industry, with at present only seven members registered with The British Paper and Board Industry Federation.

Tables 15 and 16 indicate that the level of concentration within each of the product groups as measured by the Gini Coefficient is similar. Between 1968-1972 the value of the Gini coefficient for packaging paper has remained constant, compared with the declining values over the same period within the printing and writing and board manufacturing product groups. This apparent fall in the level of concentration is most marked among the board manufacturers.

According to the Gini, Herfindahl-Hirschmann and Entropy indices, in each year, the degree of concentration was greatest in the packaging paper and least in the printing and writing product groups. For the printing and writing group, these indices changed little over the five year period, but for the other two groups it tended to decline. This decrease reflected reduced dispersion of turnover. The lower concentration indicated in the printing and writing group reflects the presence of about 50% more firms than in either of the other two groups.

Graphs showing the full series of concentration ratios and Linda indices can be found in the relevant sub-sections. Within the board manufacturing and packaging paper product groups, the concentration ratios at the beginning of the period at both 5 and 10 are similar. Again, the pattern of declining concentration among the board manufacturers over the period 1968-1972 is reflected in the value of the concentration ratio at 5 for this.

TABLE 15: ANALYSIS OF TURNOVER OF THE DIFFERENT MANUFACTURING PRODUCT GROUPS

COEFFICIENT OF VARIATION

| Product Group | 1968 | 1969 | 1970 | 1971 | 1972 |
|--------------------|------|------|------|------|------|
| Printing & Writing | 1.79 | 1.86 | 1.90 | 1.87 | 1.89 |
| Board Manufacture | 2.00 | 1.88 | 1.80 | 1.70 | 1.72 |
| Packaging Paper | 2.09 | 2.05 | 2.00 | 1.96 | 1.93 |

GINI COEFFICIENT

| Product Group | 1968 | 1969 | 1970 | 1971 | 1972 |
|--------------------|------|------|------|------|------|
| Printing & Writing | 0.68 | 0.70 | 0.69 | 0.67 | 0.66 |
| Board Manufacture | 0.73 | 0.71 | 0.70 | 0.68 | 0.67 |
| Packaging Paper | 0.72 | 0.73 | 0.72 | 0.72 | 0.72 |

HERFINDAHL-HIRSCHMANN INDEX

| Product Group | 1968 | 1969 | 1970 | 1971 | 1972 |
|--------------------|--------|--------|--------|--------|--------|
| Printing & Writing | 155.10 | 158.90 | 159.58 | 155.53 | 157.06 |
| Board Manufacture | 249.30 | 226.87 | 211.75 | 203.83 | 198.33 |
| Packaging Paper | 282.79 | 273.24 | 249.75 | 253.75 | 248.38 |

ENTROPY INDEX

| Product Group | 1968 | 1969 | 1970 | 1971 | 1972 |
|--------------------|---------|---------|---------|---------|---------|
| Printing & Writing | -102.92 | -102.17 | -103.74 | -106.21 | -106.76 |
| Board Manufacture | - 82.13 | - 85.43 | - 87.28 | - 88.64 | - 90.20 |
| Packaging Paper | - 79.93 | - 79.81 | - 83.49 | - 81.83 | - 82.63 |

TABLE 16: ANALYSIS OF TURNOVER OF THE MANUFACTURING PRODUCT GROUPS

CONCENTRATION RATIO AT N* = 5

LINDA INDEX AT N* = 5

| Year | 1968 | 1969 | 1970 | 1971 | 1972 |
|--------------------|--------------|--------------|--------------|--------------|--------------|
| Printing & Writing | 73.1 0.73 | 73.1 0.76 | 71.6 0.81 | 68.7 0.82 | 68.2 0.82 |
| Board Manufacture | 83.6 1.03 | 81.4 1.00 | 80.1 0.98 | 79.0 0.96 | 78.3 1.02 |
| Packaging Paper | 83.0 0.85 | 85.8 0.79 | 84.6 0.73 | 85.9 0.74 | 85.3 0.73 |

CONCENTRATION RATIO AT N* = 10

LINDA INDEX AT N* = 10

| Year | 1968 | 1969 | 1970 | 1971 | 1972 |
|--------------------|--------------|--------------|--------------|--------------|--------------|
| Printing & Writing | 85.9 0.52 | 86.0 0.54 | 85.0 0.51 | 82.6 0.50 | 81.7 0.51 |
| Board Manufacture | 94.0 0.77 | 93.7 0.64 | 93.7 0.58 | 92.6 0.58 | 91.0 0.59 |
| Packaging Paper | 94.4 0.80 | 94.7 0.85 | 93.4 0.81 | 94.2 0.82 | 94.1 0.79 |

group. The comparatively lower level of concentration within the printing and writing product group is reflected in lower values of the concentration ratio at both the level of the first 5 and first 10 companies.

The Analysis of Performance

In Section 2, the performance of the UK paper and board industry was analysed in terms of the level of employment in each sector between 1968-1972. It was stated then that the more conventional performance measures of profit margin and return on equity could not be calculated for large sectors of an industry containing many companies not competing in similar product markets. At this stage of examining those individual product markets, performance can be more meaningfully analysed in terms of profitability and return on equity.

Tables 17 and 18 below show the mean and standard deviation of respectively profit margin and return on equity for each of the product groups identified. The ratios used were defined as follows:

$$\text{profit margin} = \frac{\text{profit before tax}}{\text{turnover}}$$

$$\text{return on equity} = \frac{\text{profit before tax}}{\text{shares} + \text{reserves}}$$

(Throughout the analysis, companies making losses in any year are included and the value of the loss computed as a negative profit. This allows a more satisfactory analysis of the variability in performance).

Tables 17 and 18 show a wide variation in the value of both the profit margin and return on equity, both from product group to product group, and for any product group, from year to year. This pattern of variability is especially marked in the analysis of profit margin. The measurement of standard deviation further reflects the enormous variability in the performance of each of the product groups.

TABLE 17: ANALYSIS OF PROFIT MARGIN

| Mean profit margin Standard deviation of profit margin | 1968 | 1969 | 1970 | 1971 | 1972 |
|--|--------------------------|----------------|----------------|----------------|----------------|
| | Printing & Writing Paper | 0.065 0.111 | 0.067 0.085 | 0.045 0.075 | 0.032 0.073 |
| Board Manufacture | 0.043 0.066 | 0.071 0.073 | 0.063 0.075 | 0.047 0.071 | 0.066 0.080 |
| Packaging Paper | 0.074 0.054 | 0.079 0.046 | 0.046 0.071 | 0.040 0.044 | 0.056 0.049 |

TABLE 18: ANALYSIS OF RETURN ON EQUITY

| Mean return on equity Standard deviation on return on equity | 1968 | 1969 | 1970 | 1971 | 1972 |
|--|--------------------------|--------------|--------------|--------------|--------------|
| | Printing & Writing Paper | 0.42 1.38 | 0.47 1.69 | 0.34 1.34 | 0.34 1.53 |
| Board Manufacture | 0.31 0.57 | 0.29 0.51 | 0.20 0.36 | 0.15 0.30 | 0.29 0.52 |
| Packaging Paper | 0.30 0.46 | 0.36 0.46 | 0.26 0.52 | 0.28 0.49 | 0.55 0.97 |

It was decided to examine further the wide dispersion in profit margins and returns on equity. To what degree did differences between companies occur consistently over the five year period?

In order to answer this question, five-year averages of profit margins and returns on equity were calculated for each firm. The coefficients of variation

(Standard deviation)

mean

of the five-year averages may be compared with those derived from the distribution containing individual figures for all of the five years:⁹.

Coefficients of Variation

(a) 5-year averages (b) Individual figures for all 5 yrs.

PROFIT MARGINS

| | | |
|----------------------|------|------|
| Printing and writing | 1.38 | 1.62 |
| Board manufacturing | 0.84 | 1.26 |
| Packaging paper | 0.55 | 0.91 |

RETURNS ON EQUITY

| | | |
|----------------------|------|------|
| Printing and writing | 3.17 | 3.78 |
| Board manufacturing | 1.41 | 1.88 |
| Packaging paper | 1.24 | 1.75 |

These results show that consistent differences between firms in these two performance indicators account for most of the dispersion observed over the five-year period. Because of possible anomalies in the original figures (e.g. the valuation of capital) and certain assumptions made for the purposes of this report (e.g. in allocation of group figures between subsidiaries), firm conclusions cannot be drawn from these findings. Further research would be necessary to verify this apparent divergence in profitability between firms before any attempt at explanation.

9. see next page.

One hypothesis which was investigated at some length was the relationship between profitability (measured by gross margins or by return on equity) and size. No significant regression results were derived from these investigations. No relationship was established either between gross margin on turnover and level of turnover or between return on equity and value of equity. This result is consistent with the nature of competition and specialisation within the industry, discussed at greater length in the following subsections. The results are presented in the table below.

REGRESSION ANALYSIS - VALUE OF R² COEFFICIENT

| Product Group | <u>Profit Margin</u> Turnover | <u>Return on Equity</u> Equity |
|--------------------|----------------------------------|-----------------------------------|
| Printing & Writing | 0.00062 | 0.01134 |
| Board Manufacture | 0.00647 | 0.03924 |
| Packaging Papers | 0.02796 | 0.04576 |

9.

(a) If the profit margin or return on equity in the year j is shown as r_j then the five-year average R is $(r_{68} + r_{69} + r_{70} + r_{71} + r_{72}) \div 5$

The coefficient of variation is $\frac{1}{\bar{R}} \sqrt{\frac{\Sigma (R - \bar{R})^2}{n - 1}}$ where n is the number of firms

(b) The coefficient of variation based on individual figures is given by the following equation:

$$V = \frac{S_c}{M_c}$$

$$S_c = \frac{n_{68} s_{68}^2 + n_{69} s_{69}^2 + n_{70} s_{70}^2 + n_{71} s_{71}^2 + n_{72} s_{72}^2}{n_{68} + n_{69} + n_{70} + n_{71} + n_{72}}$$

$$M_c = \frac{n_{68} m_{68} + n_{69} m_{69} + n_{70} m_{70} + n_{71} m_{71} + n_{72} m_{72}}{n_{68} + n_{69} + n_{70} + n_{71} + n_{72}}$$

and for each year $S = \sqrt{\frac{\Sigma (r - \bar{r})^2}{n - 1}}$

$$m = \bar{r} = \frac{\Sigma r}{n}$$

SECTION 3: SUB-SECTION 1

MANUFACTURE OF PRINTING & WRITING PAPER PRODUCT GROUP

Included within this product grouping are those firms manufacturing printing and writing paper (incl. coated) and newsprint.

In terms of domestic consumption, newsprint represents the greater usage by weight. However, domestic production of printing and writing paper has in recent years almost doubled that of newsprint. The shortfall is covered by imports. Production of both types of paper has been falling since about 1969/70 and in both cases imports represent an increasing proportion of consumption. However, as Table 19 below indicates, imports of newsprint account for over 50% of consumption, but less than 30% of printing and writing paper consumption.

Financial statistics relating to those firms identified in the product group are shown in Table 20. The values shown are at prices prevailing at the time of recording, but even without correcting for inflation it is possible to identify the fall in total net cash flow of the firms in the product group during the period.

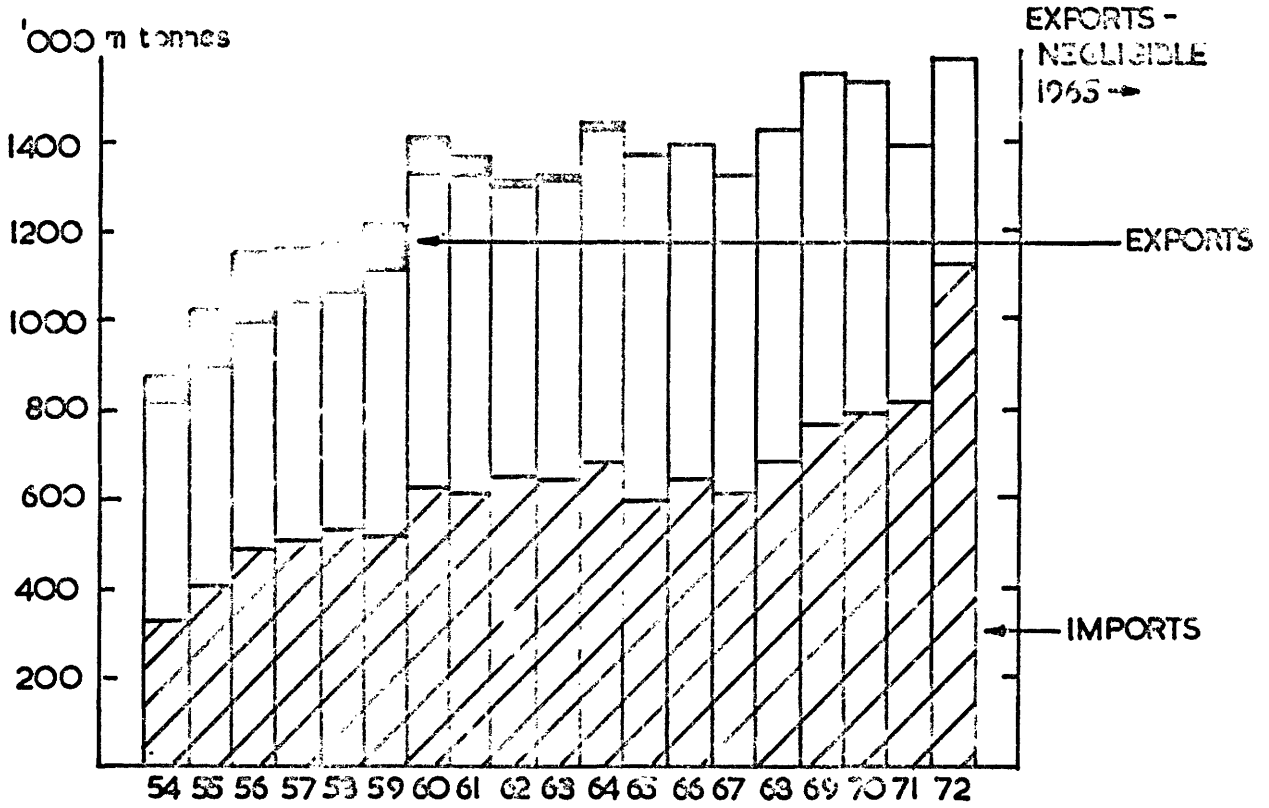
The large firms in this section of the paper industry during the period 1968-1972 were Bowaters, Reed International, Wiggins Teape and Inveresk Paper Company.

Of these companies, Bowater and Reeds have an effective duopoly of newsprint manufacture. However, UK manufacturers supply less than 50% of newsprint usage, the remainder being imported from Canada and Scandinavia.

Printing papers are used by printers for book publishing and production of periodicals, brochures, etc. Writing papers are used for personal stationery and office stationery. Paper mills traditionally sell to their customers through merchants or directly to printers and wholesalers: few manufacturing mills have their own merchanting companies.

Characteristically, paper mills rely on regular customers, producing often on contract and to specification for large orders. The major part of orders is supplied from stock. However, as previously stated, the

TABLE : 19 APPARENT CONSUMPTION — NEWSPRINT



APPARENT CONSUMPTION — PRINTING AND WRITING PAPERS Incl.coated.

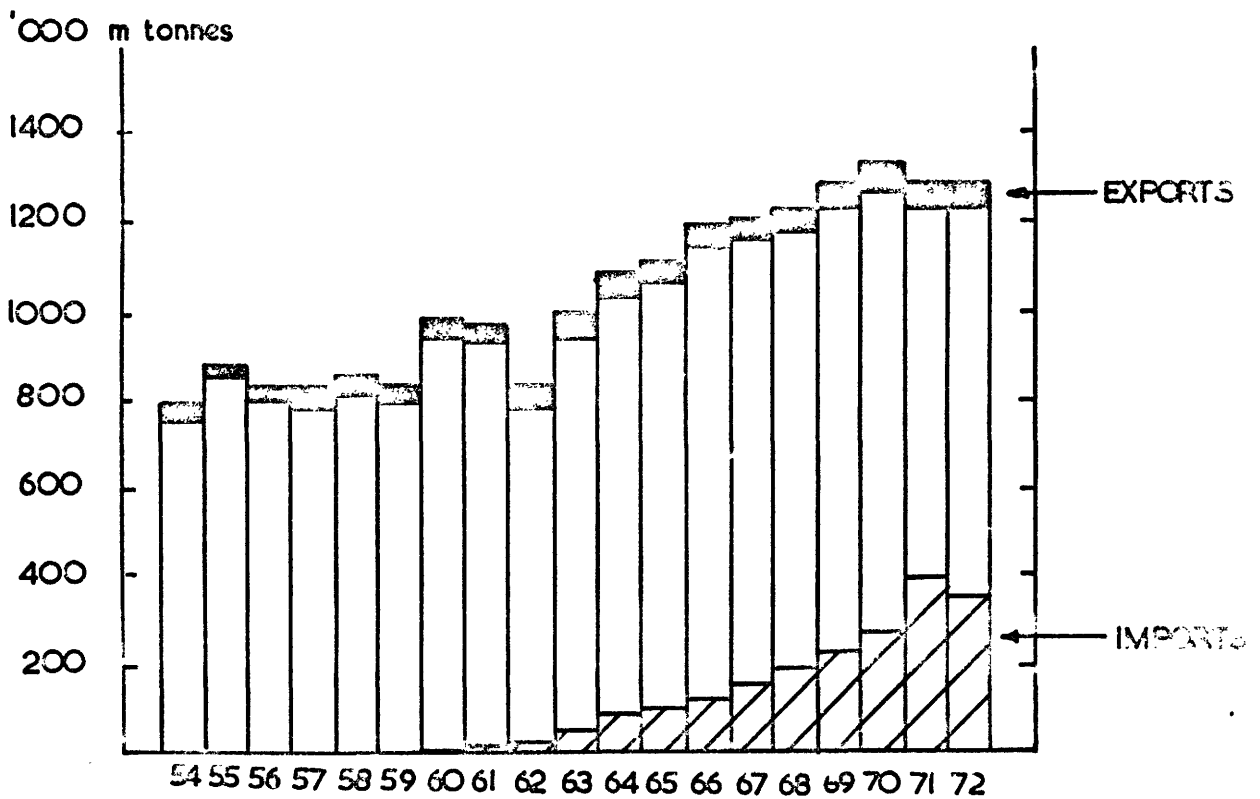


TABLE 20: FINANCIAL STATISTICS OF COMPANIES IDENTIFIED IN PRINTING & WRITING PRODUCT GROUPS

| Year | Number of Companies | Total Turnover | Total Exports | Pre-Tax Profits | Total Net Cash Flow | Total Equity | Total Annual Investment |
|------|---------------------|----------------|---------------|-----------------|---------------------|--------------|-------------------------|
| 1968 | 27 | 254,549 | 15,277 | 18,356 | 20,160 | 159,172 | 14,546 |
| 1969 | 28 | 286,353 | 15,850 | 16,920 | 20,300 | 171,522 | 19,426 |
| 1970 | 29 | 317,942 | 20,988 | 12,783 | 17,904 | 172,478 | 17,473 |
| 1971 | 29 | 311,203 | 22,719 | 11,333 | 18,125 | 166,025 | 26,017 |
| 1972 | 29 | 347,966 | 24,848 | 10,095 | 18,048 | 174,956 | 17,107 |

largest firms within the product group are part of larger vertically integrated companies and fluctuations on the demand side have a lesser influence. These large firms appear to be price leaders in the ordinary, bulk grades where other smaller mills are making the same grades. However, smaller mills can be equally profitable if they produce specialty papers in smaller runs tailor-made to the customers' exact requirements. In fact, the long-run future of the industry is seen to be in those products with a high "value added", since it is anticipated that it will become increasingly difficult for UK mills to compete on ordinary bulk grades with lower cost producers such as Sweden and Finland, as was discussed earlier in Section 2.

Structure

Table 21 shows the asset structure of the product group. Paper manufacturing is a capital intensive industry. In recent years the low rate of return (see Tables 17 and 18) has provided little incentive for new entrants into the industry, or for significant takeovers and mergers in the period under consideration: one major exception was the takeover in 1970/71 of Wiggins Teape Ltd. by the large diversified conglomerate, British American Tobacco.

TABLE 21: ASSET STRUCTURE OF FIRMS IDENTIFIED IN PRINTING AND WRITING
PRODUCT GROUP

| <u>Own Capital (£'000)</u> | <u>No. of firms</u> | |
|----------------------------|---------------------|----------|
| | 1968 | 1972 |
| 0 - 50 | 1 | 1 |
| 51 - 500 | 6 | 5 |
| 501 - 1,000 | 5 | 4 |
| 1,001 - 10,000 | 11 | 14 |
| 10,001 - 20,000 | 2 | 2 |
| 20,001 - 50,000 | 1 | 1 |
| 50,001 - 100,000 | 1 | 1 |
| | <hr/> 27 | <hr/> 28 |

Between 1968-1972 the product group has been fairly static, with most firms surviving, but with reduced profits in later years. Declining liquidity and failure to produce new investment in real terms may be an indication of future rationalisation.

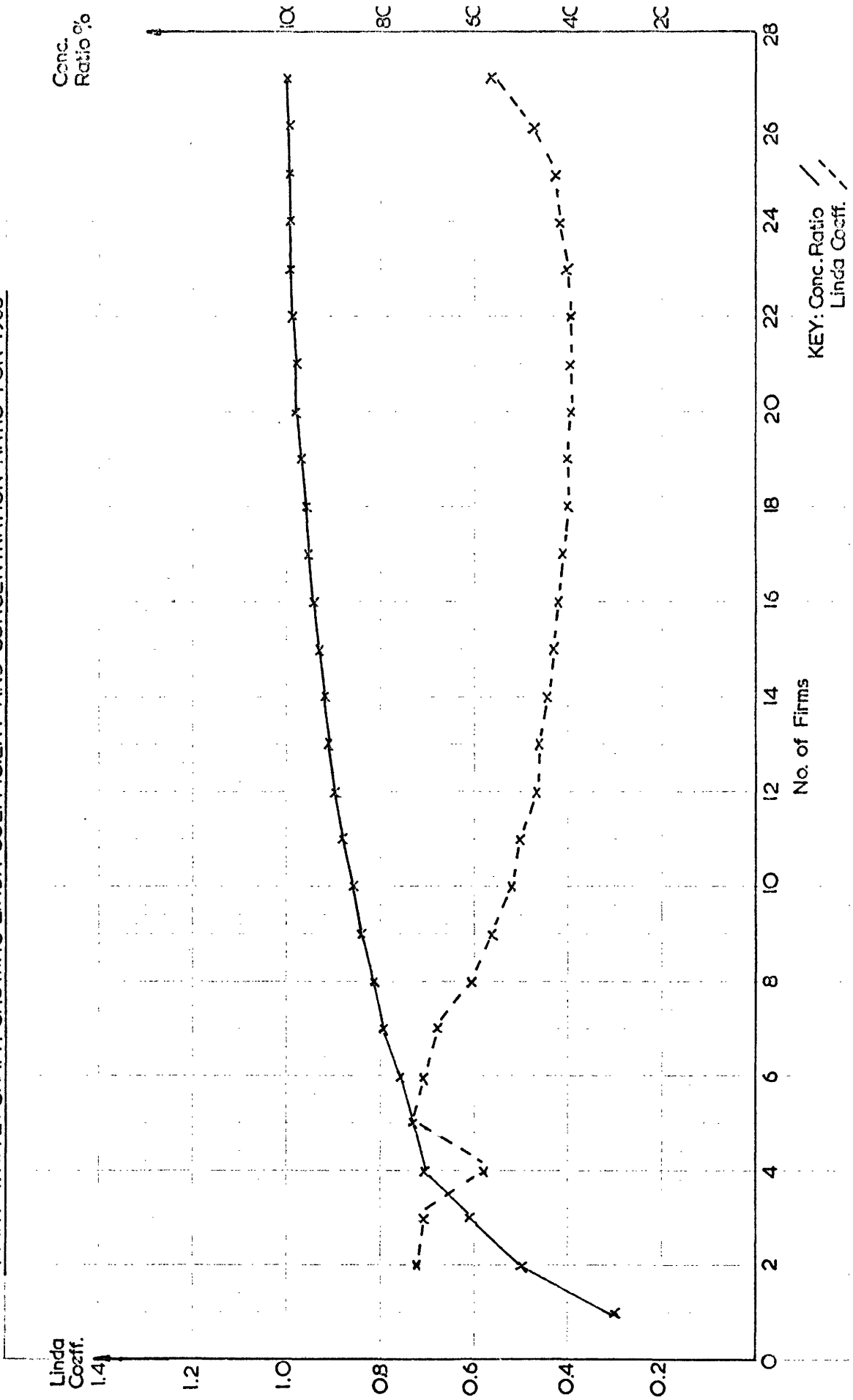
The analysis of concentration in terms of turnover shown in Table 22 reflects the situation within the product group. Each of the indices has remained fairly static between 1968-1972. The importance of the largest producers is reflected in the concentration ratios and Gini coefficient. A high variability of size of turnover would not be expected in such a capital intensive sector of the industry.

The graphical representation of the concentration and Linda indices shows the four largest firms forming a distinct oligopolistic group. In 1972 their respective shares of all sales by UK producers were 30%, 20%, 11% and 9%; the sales of the fifth largest company represented only 3% of total sales. Once again, this oligopoly situation must be considered against the background of competition from imported papers; the four firms' combined share of the UK market is of the order of 40-50%.

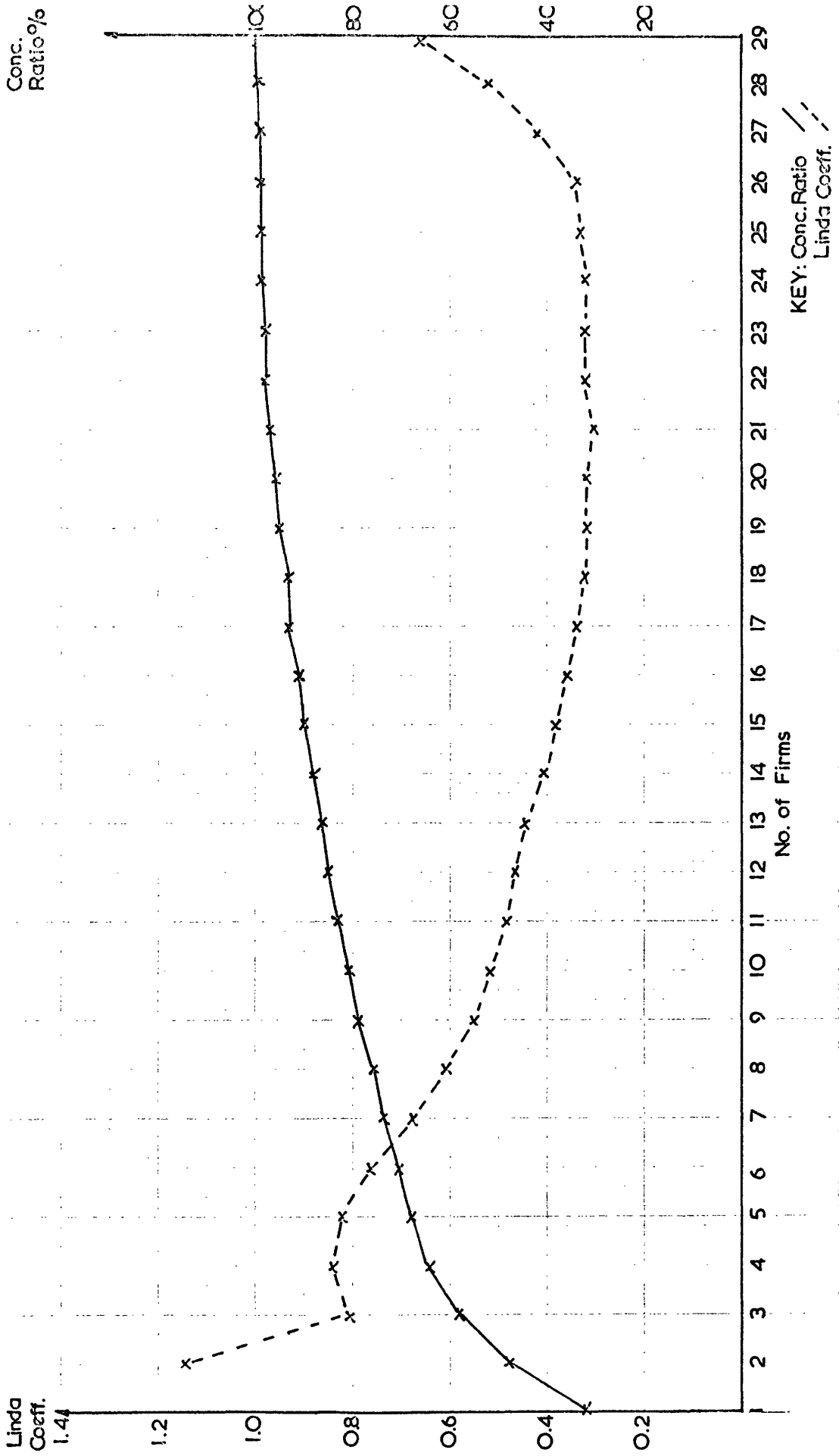
TABLE 22: PRINTING & WRITING PAPER, ANALYSIS OF TURNOVER

| | 1968 | 1969 | 1970 | 1971 | 1972 |
|--------------------------|----------------|----------------|---------------|--------------|--------------|
| No. of Companies | 27 | 28 | 29 | 29 | 29 |
| Total Turnover ('000) | 254,549 | 286,440 | 318,037 | 311,377 | 348,096 |
| Mean | 9427.741 | 10230.00 | 10966.793 | 10737.138 | 12003.310 |
| Coefficient of Variation | 1.785 | 1.857 | 1.904 | 1.873 | 1.885 |
| Gini | 0.679 | 0.695 | 0.690 | 0.668 | 0.658 |
| Herfindahl-Hirschmann | 155.099 | 158.898 | 159.580 | 155.526 | 157.059 |
| Entropy | -102.918 | -102.166 | -103.736 | -106.211 | -106.763 |
| Linda Index for N* | | | | | |
| Concentration Ratios % | | | | | |
| = 2 | 0.724 50.00 | 0.699 51.36 | 0.869 50.4 | 1.09 48.1 | 1.14 48.3 |
| = 5 | 0.727 73.1 | 0.757 73.1 | 0.810 71.6 | 0.81 68.7 | 0.82 68.1 |
| = 10 | 0.523 85.8 | 0.536 86.0 | 0.507 84.9 | 0.49 82.6 | 0.50 81.6 |
| = 15 | 0.429 93.2 | 0.433 93.3 | 0.424 92.1 | 0.38 90.8 | 0.37 90.0 |
| = 20 | 0.394 97.5 | 0.400 97.9 | 0.364 97.3 | 0.31 96.9 | 0.30 96.5 |
| = 27 | 0.568 100.0 | 0.623 99.9 | 0.478 99.9 | 0.48 99.8 | 0.41 99.9 |
| | | | | | |
| | | | | | |

PRINT WRITE: GRAPH SHOWING LINDA COEFFICIENT AND CONCENTRATION RATIO FOR 1968



PRINT WRITE: GRAPH SHOWING LINDA COEFFICIENT AND CONCENTRATION RATIO FOR 1972



SECTION 3: SUB-SECTION 2

MANUFACTURE OF PACKAGING PAPERS PRODUCT GROUP

Included within this product grouping are those firms manufacturing packaging papers and tissue paper. Packaging papers are used extensively in the wrapping of food and other products. Tissue manufacture includes both hard and soft tissue varieties.

Until 1963 the UK market for tissues was shared by Kimberly-Clark and Scott Paper of the USA., the latter being linked with the British company, Bowater. In 1963 their position was challenged by Peter Dixon, Inveresk, Wiggins Teape and Satinex. At the beginning of 1966, a Swedish pulp producer acquired a controlling interest in Satinex and its name was subsequently changed to Mado Consumer Products. In 1967 the tissue interests of Peter Dixon, Inveresk and Associated Tissues were merged to form British Tissues.

During the period under consideration tissue manufacture remained a compact industry. In 1973 the British Paper and Board Industry Federation had seven members registered as tissue manufacturers. Four of these members can be considered to be completely vertically integrated, both manufacturing and converting the tissue to its final form.

Tissue firms, being in a relatively newer sector of the paper industry, possess comparatively newer machinery and hence the need for replacement investment is less critical.

In many ways, mills producing packaging papers exhibit similar economic characteristics to those discussed in relation to manufacturers of printing and writing papers. Table 23 shows the financial statistics relating to companies identified in the group. The asset structures of the two sectors shown in Table 24 are similar, reflecting the common technology and production methods.

TABLE 23: FINANCIAL STATISTICS OF FIRMS IDENTIFIED WITHIN THE MANUFACTURE OF PACKAGING PAPER PRODUCT GROUP

£'000

| YEAR | NUMBER OF COMPANIES | TOTAL TURNOVER | TOTAL EXPORTS | PRE-TAX PROFITS | TOTAL NET CASH FLOW | TOTAL EQUITY | TOTAL ANNUAL INVESTMENT |
|------|---------------------|----------------|---------------|-----------------|---------------------|--------------|-------------------------|
| 1968 | 19 | 123,220 | 2,408 | 8,103 | 8,148 | 56,193 | 7,553 |
| 1969 | 19 | 138,621 | 3,195 | 9,626 | 9,455 | 56,484 | 9,276 |
| 1970 | 20 | 151,489 | 3,706 | 6,177 | 8,002 | 56,316 | 13,971 |
| 1971 | 19 | 150,469 | 3,893 | 3,498 | 5,948 | 52,521 | 9,650 |
| 1972 | 19 | 158,458 | 4,211 | 7,254 | 10,068 | 50,713 | 4,230 |

TABLE 24: COMPARATIVE ASSET STRUCTURES OF PACKAGING PAPER AND PRINTING AND WRITING PRODUCT GROUPS

| Own Capital (£'000) | Packaging Paper No. of firms | | Printing & Writing No. of firms | |
|---------------------|---------------------------------|------|------------------------------------|------|
| | 1968 | 1972 | 1968 | 1972 |
| 0 - 50 | 2 | 1 | 1 | 1 |
| 51 - 500 | 7 | 9 | 6 | 5 |
| 501 - 1,000 | 2 | 2 | 5 | 4 |
| 1,001 - 10,000 | 7 | 6 | 11 | 14 |
| 10,001 - 20,000 | 0 | 0 | 2 | 2 |
| 20,001 - 50,000 | 1 | 1 | 1 | 1 |
| over 50,000 | | | 1 | 1 |
| | 19 | 19 | 27 | 28 |

Production and trade statistics relating to packaging paper manufacture are shown in Table 25. Domestic production of packaging papers represents approximately 30% of consumption; imports accounted for the bulk of consumption. During the five-year period imports of kraft wrapping paper increased by almost 20%. Imports of other wrapping papers have remained more static.

This large volume of imports reduces the significance of concentration indices as indicators of market structure. Table 26 shows the concentration indices calculated for the product group on the basis of turnover. The size distribution of the sales by UK firms of packaging papers is fairly similar to that of sales of printing and writing papers. Apart from the entropy index, each of the measures suggests a slightly higher degree of concentration (the entropy index is affected more than the other measures by the greater number of companies). The graphical representation of the concentration ratios and Linda indices shows an "oligopoly" group of six firms with 88% of all UK sales, in 1968. In 1972 the minimum value of the Linda occurs at the fifth firm indicating a loss in its share of the market by the sixth firm.

TABLE 25

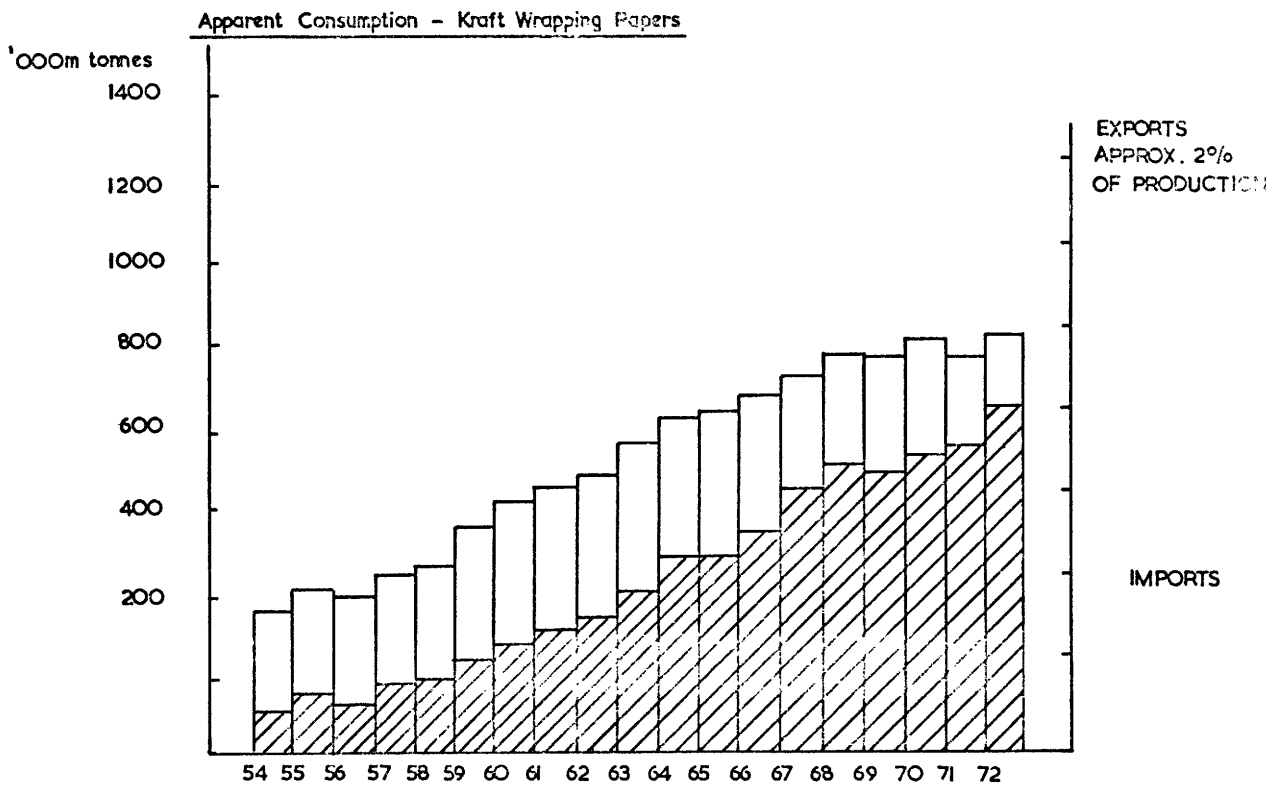
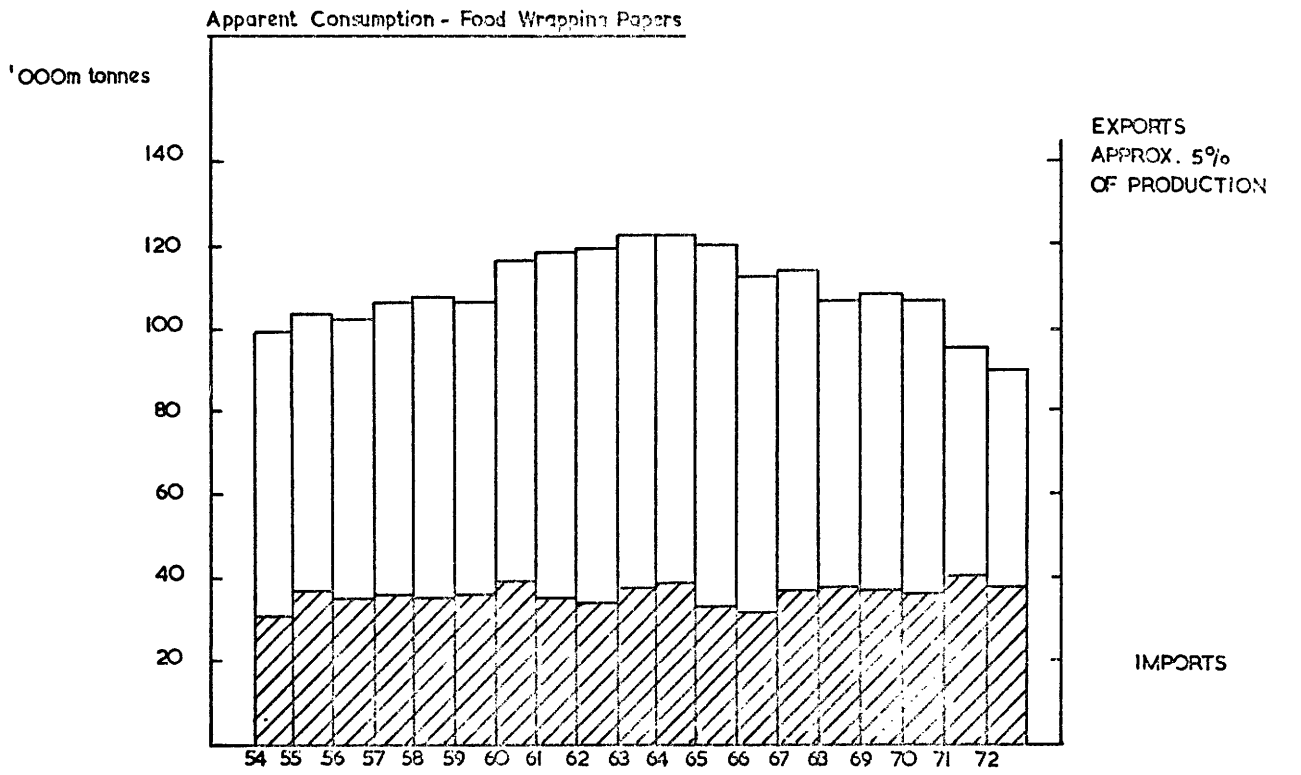
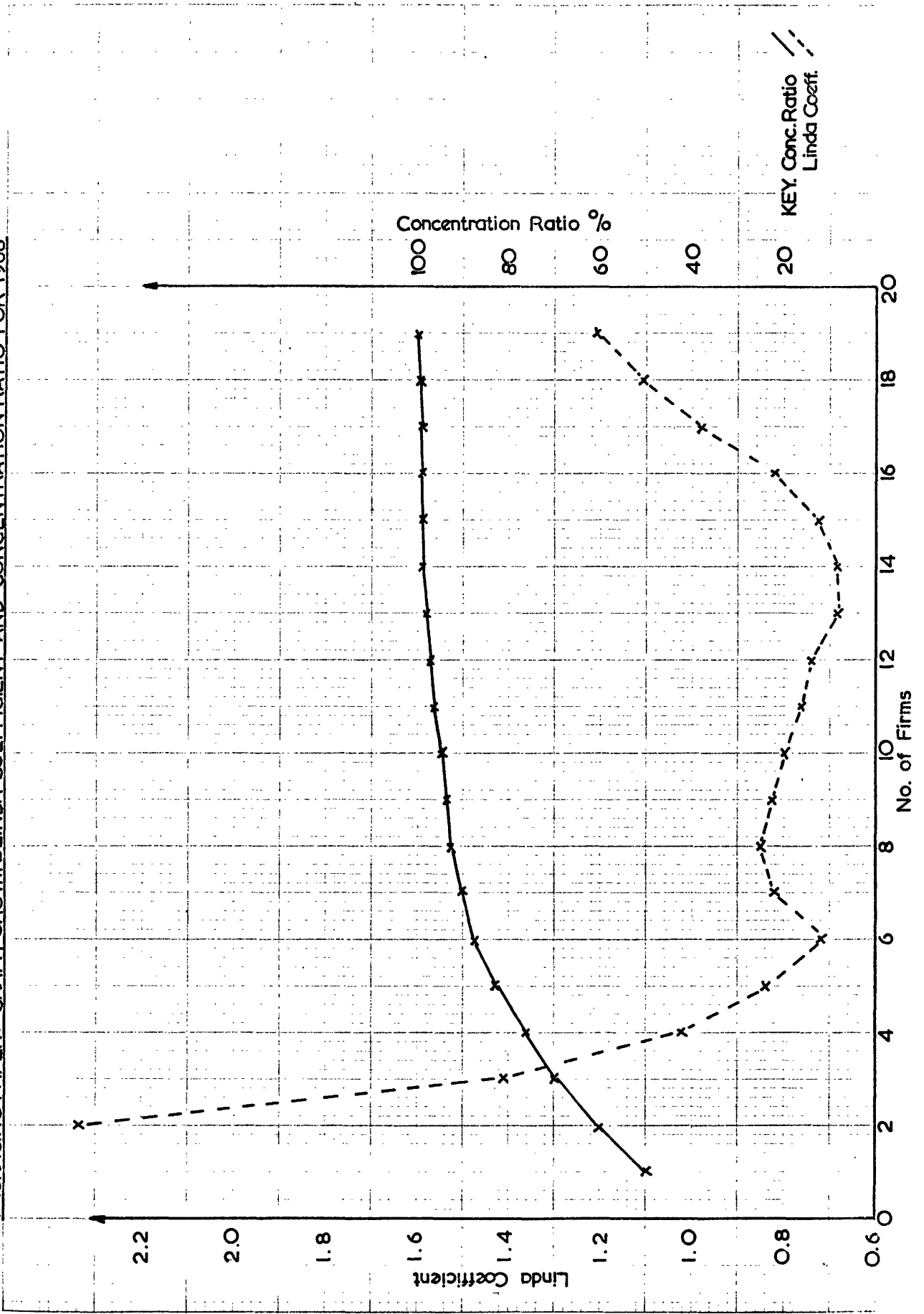


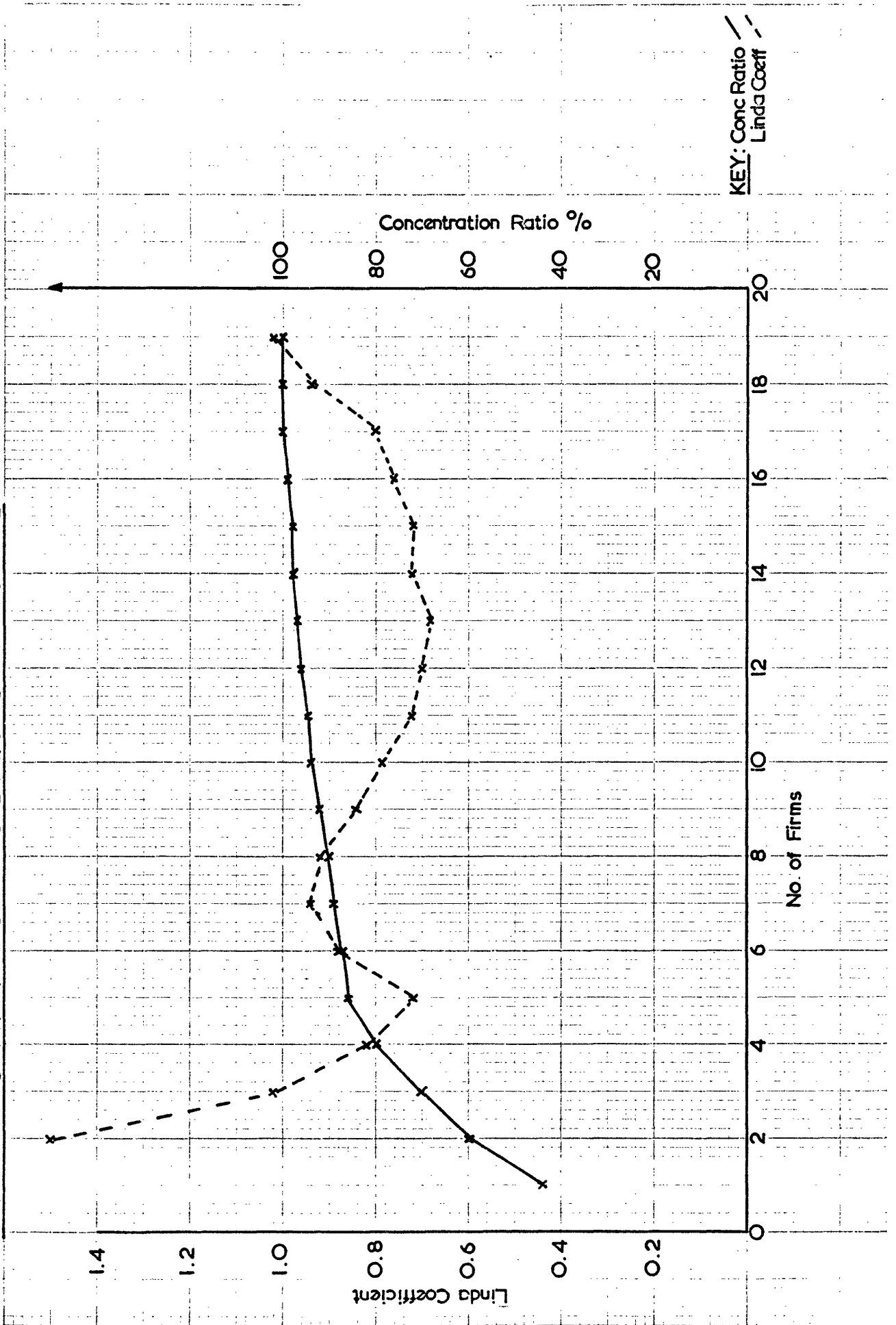
TABLE 26: PACKAGING PAPER, ANALYSIS OF TURNOVER

| | 1968 | 1969 | 1970 | 1971 | 1972 |
|--------------------------|--------------|--------------|--------------|--------------|--------------|
| No. of Companies | 19 | 19 | 20 | 19 | 19 |
| Total Turnover ('000) | 123,220 | 138,621 | 151,489 | 150,469 | 158,458 |
| Mean | 6485.26 | 7295.84 | 7574.45 | 7919.421 | 8339.89 |
| Coefficient of Variation | 2.091 | 2.04 | 1.998 | 1.954 | 1.928 |
| Gini | 0.722 | 0.729 | 0.720 | 0.720 | 0.716 |
| Herfindahl-Hirschmann | 282.789 | 273.24 | 249.751 | 253.751 | 248.375 |
| Entropy | -79.930 | -79.815 | -83.492 | -81.825 | -82.628 |
| Linda Index for N* | | | | | |
| Concentration Ratios % | | | | | |
| = 2 | 2.33 60.7 | 1.96 60.5 | 1.80 58.0 | 1.62 59.5 | 1.50 59.7 |
| = 5 | 0.84 82.9 | 0.79 85.8 | 0.72 84.6 | 0.73 85.8 | 0.72 85.3 |
| = 10 | 0.80 94.4 | 0.85 94.6 | 0.81 93.4 | 0.82 94.2 | 0.79 94.0 |
| = 15 | 0.71 99.3 | 0.75 99.2 | 0.66 98.6 | 0.72 98.9 | 0.71 98.9 |
| | | | | | |
| | | | | | |
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PACKAGING PAPER: GRAPH SHOWING LINDA COEFFICIENT AND CONCENTRATION RATIO FOR 1968



PACK PAPER - GRAPH SHOWING LINDA COEFF & CONC RATIO FOR 1972



KEY: Conc Ratio / Linda Coeff

SECTION 3: SUB-SECTION 3

MANUFACTURE OF BOARD PRODUCT GROUP

Board manufacture may be considered in two sectors:

- (i) packaging board;
- (ii) specialty and other board (excl. building board).

Domestic production of board has been fairly static, but since 1967/68 has begun to decline. Imports represent approximately 25% of consumption of packaging boards and approximately 15% of consumption of other boards. Production and trade statistics are shown in Table 27.

The manufacture of packaging boards is characterised by a small number of large units, usually all having converting interests. Specialty board makers tend to be fewer in number and often produce for specialised converted products, e.g. plaster board, boards for the motor industry, shoe industry, etc. Table 28 presents the financial statistics relating to the firms in the industry. Table 29 below shows the asset distribution of the firms in the industry.

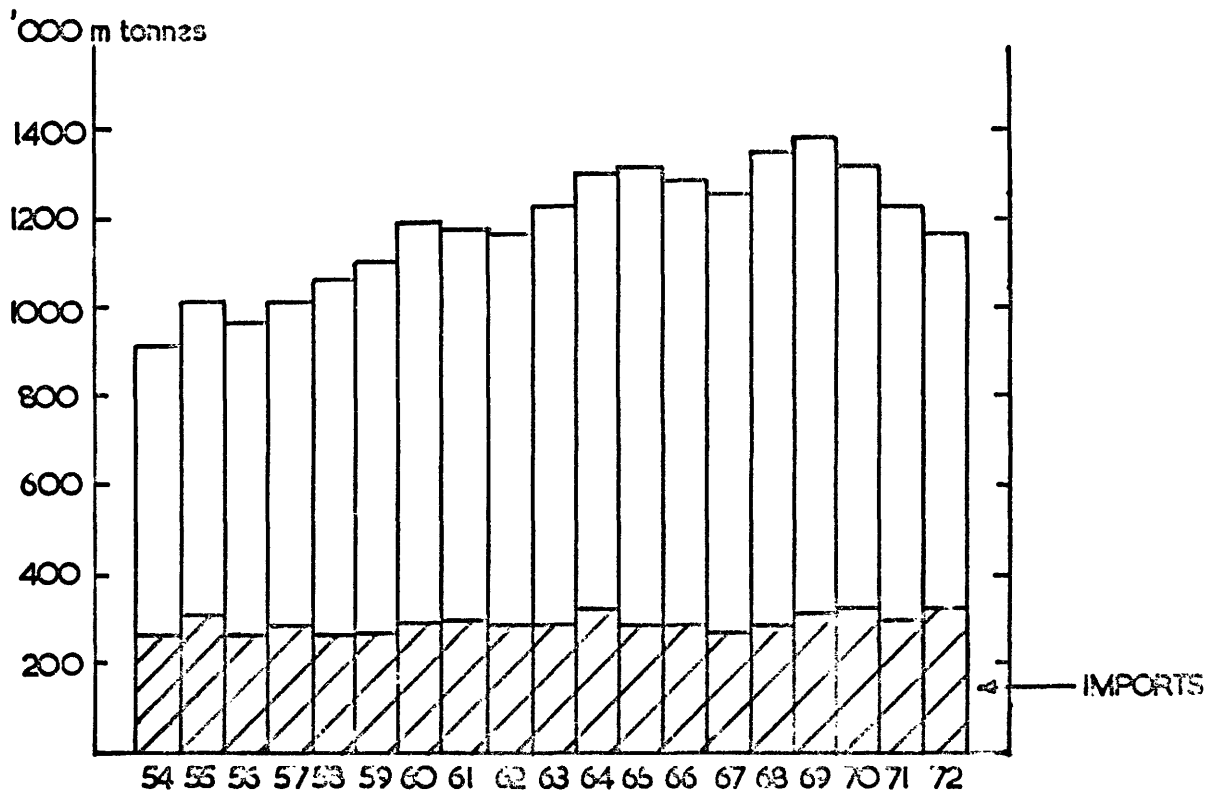
TABLE 29: ASSET STRUCTURE OF FIRMS IDENTIFIED IN BOARD MANUFACTURING PRODUCT GROUP

| <u>Own Capital</u> (£'000) | <u>No. of Firms</u> 1968 | <u>No. of Firms</u> 1972 |
|----------------------------|-----------------------------|-----------------------------|
| 0-50 | 3 | 0 |
| 5-500 | 7 | 9 |
| 50-1,000 | 3 | 3 |
| 100-10,000 | 6 | 6 |
| 1,000-20,000 | 1 | 1 |
| over 20,000 | 0 | 1 |

Table 29 illustrates the capital intensive nature of the product group compared with other sectors of the paper industry: in 1972 there were no firms with own capital less than 50,000.

TABLE 27

APPARENT CONSUMPTION — PACKAGING BOARDS



APPARENT CONSUMPTION — OTHER BOARDS

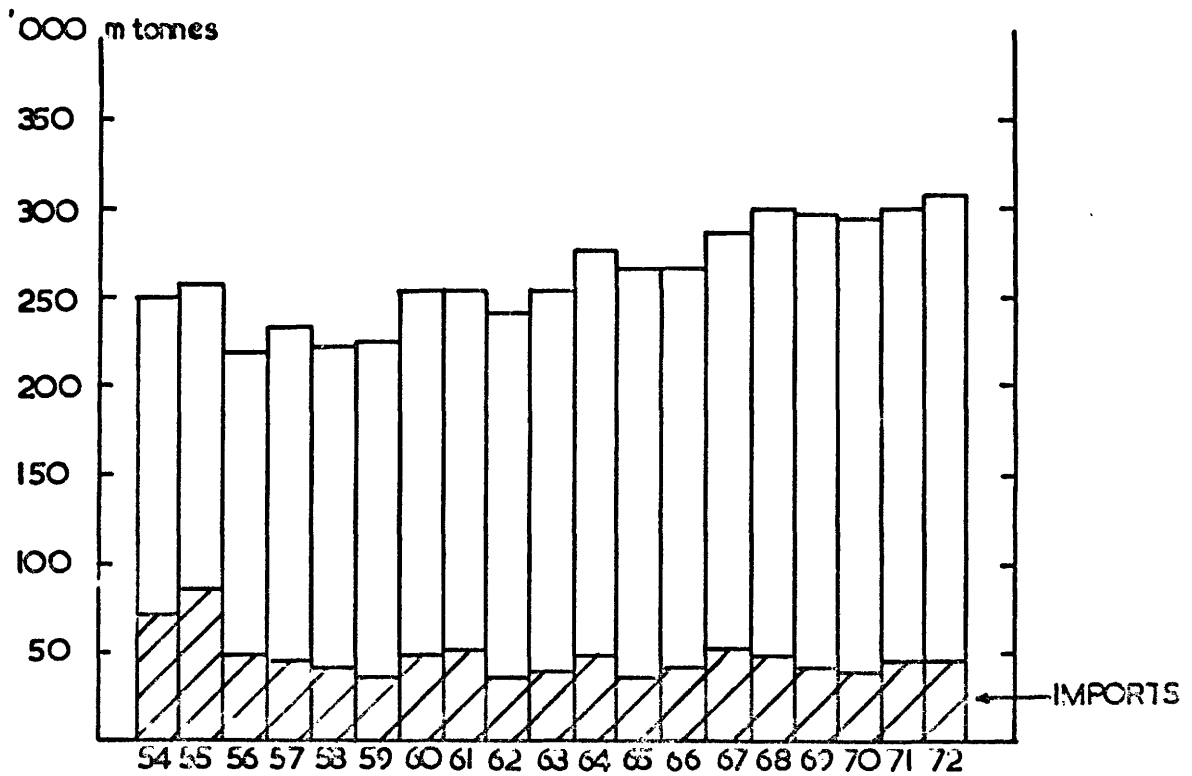


TABLE 28: FINANCIAL STATISTICS OF COMPANIES IDENTIFIED IN
BOARD MANUFACTURING PRODUCT GROUP

£ '000

| YEAR | NUMBER OF COMPANIES | TOTAL TURNOVER | TOTAL EXPORTS | PRE-TAX PROFITS | TOTAL NET CASH FLOW | TOTAL EQUITY | TOTAL ANNUAL INVESTMENT |
|------|---------------------|----------------|---------------|-----------------|---------------------|--------------|-------------------------|
| 1968 | 20 | 76,274 | 3,776 | 4,191 | 5,852 | 41,396 | 6,302 |
| 1969 | 20 | 78,917 | 3,717 | 4,590 | 6,379 | 41,648 | 4,557 |
| 1970 | 20 | 79,620 | 3,674 | 3,809 | 5,754 | 40,096 | 5,726 |
| 1971 | 19 | 81,410 | 3,753 | 3,292 | 5,639 | 54,475 | 6,054 |
| 1972 | 20 | 89,051 | 5,097 | 5,068 | 7,296 | 57,573 | 4,739 |

Within the board manufacturing sector there has been a trend towards vertical integration over the past decade or so. In almost all cases this has been through mills buying up converting interests. Where mills have been bought up this has tended to be by larger conglomerates typically with strength in other industries. The three largest firms in the product group, Thames Board Mills, Wiggins Teape and Mardon Packaging are owned by diversified conglomerates, Unilever, British American Tobacco and Imperial Tobacco respectively.

Most producers of board confine their manufacturing activities to this product (different machines are required for paper and board manufacture) but one mill may produce a wide range of qualities of board. Board is sold almost entirely to industrial buyers. Many manufacturers sell a substantial proportion of their output to regular customers. Board is made entirely to order and not for stock, each batch being made to the customer's specifications. This results in a fairly competitive industry with a tendency for the larger firms to be price leaders. Whereas paper manufacturers distribute much of their output via merchants, competition among board manufacturers expresses itself through the use of salesmen for direct selling to customers.

Not all board manufacturers are in competition with one another. Within this sector there are distinct product sub-groups: coated and uncoated boards, base board for fibreboard packing cases, folding box grades, roofing felt base. In other words, manufacturers have specialised to fit in with segmentation within the converting industries. The lower penetration of imports indicates that board manufacturers experience less competition from overseas than other paper-making/converting companies. This reflects the bulky nature of the product and also the methods of selling and distribution (direct contact with customers and "tailor-made" production); competition has recently been increasing, especially from Scandinavia. The Scandinavians are achieving this by concentration on standard ranges of board; certain British customers are finding it more economical to purchase from these standard ranges than to order board which more precisely fits their particular requirements.

The principal raw material used for board production is wastepaper, and the industry is less vulnerable to changes in the supply and prices of pulp.

One major need is the establishment of an effective and reliable supply of wastepaper. Fluctuations in mill requirements have hindered the growth of regular collection. Because it is based on an indigenous raw material and because only a proportion of the potential amount of wastepaper is presently collected, the manufacture of board is regarded by the trade association as the sector of the paper industry most likely to withstand foreign competition.

Structure

Within the product group there has been a long-term tendency towards the takeover of smaller by larger firms. The present decline in liquidity and low profitability suggests that this will continue to be the pattern.

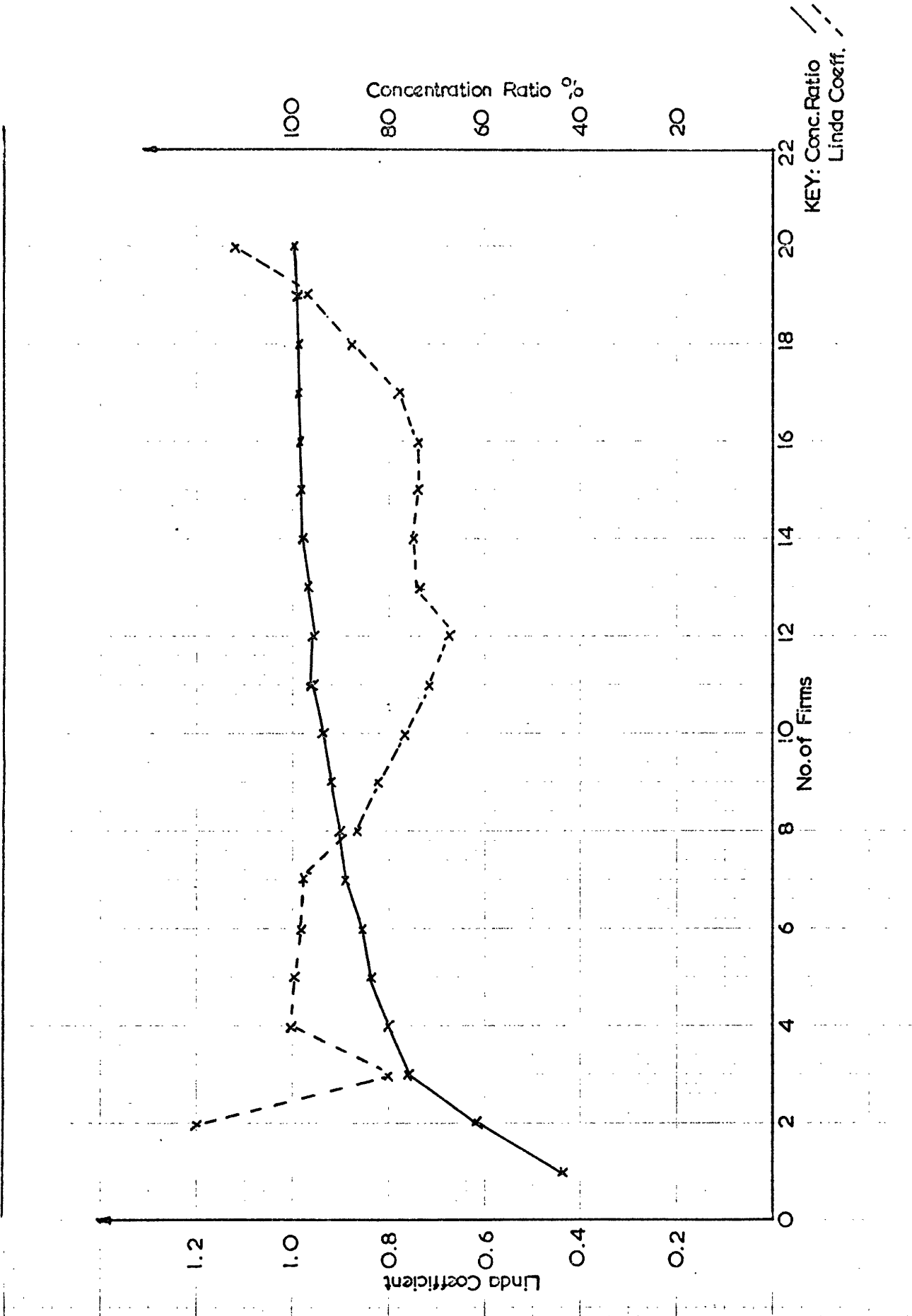
The effect of this long-run trend in the period analysed, 1968-1972 inclusive, Table 3D, has been to decrease the variability in the sizes of the firms in the sector. This is reflected in the Gini coefficient and Herfindahl index which indicate a fall in concentration as the firms become more equal in size. The analysis of concentration ratios suggests that it is the largest 10-12 firms which are tending to become less dispersed in size. This is also clearly shown by the pronounced fall in the Linda indices for the 15 largest companies.

Diagrammatic representation of the concentration ratios and Linda indices shows a distinct "oligopolistic arena" consisting of the three largest firms. Their shares of total UK sales in 1972 were 35%, 23% and 13% respectively; the fourth largest firm accounted for only 4%.

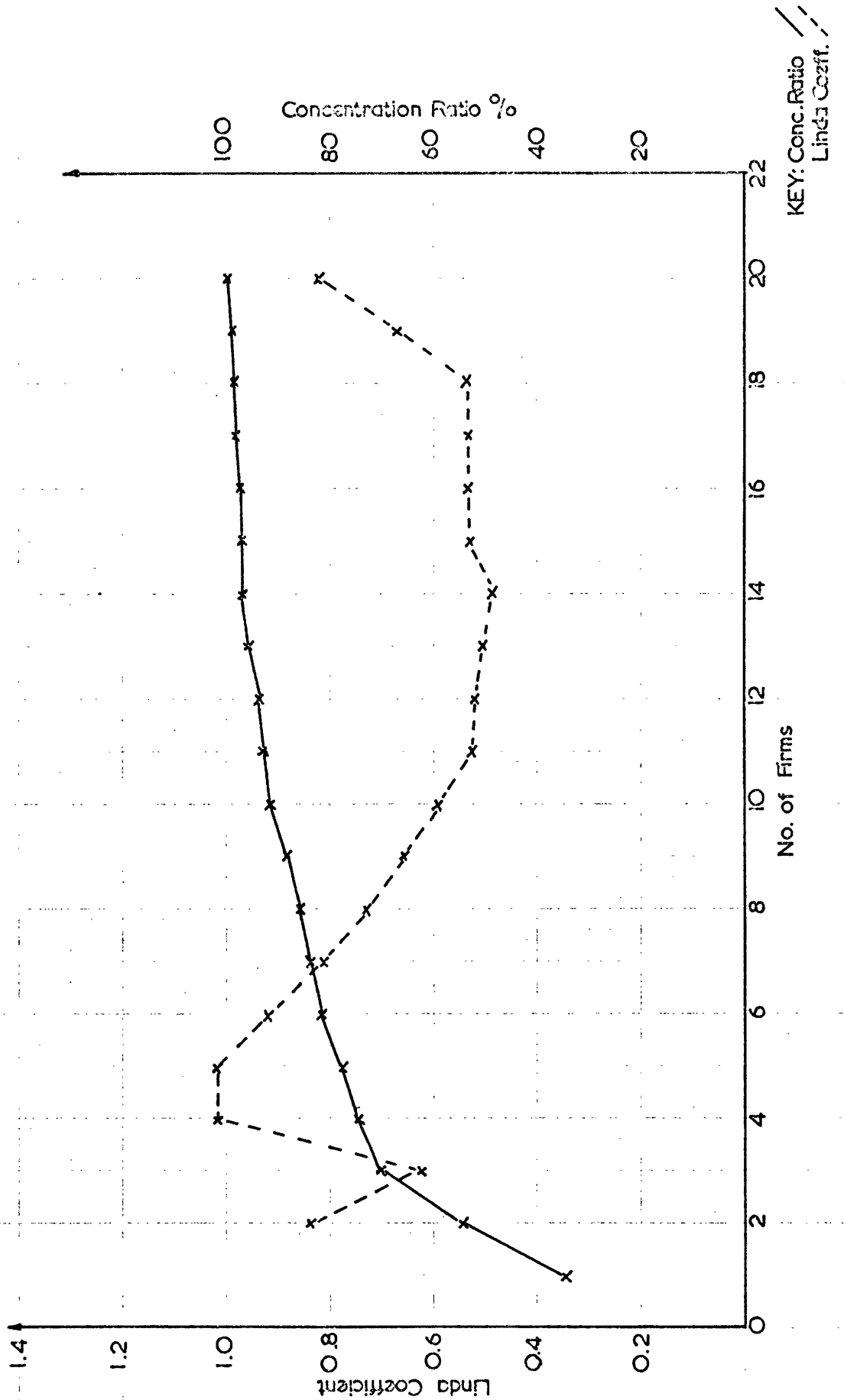
TABLE 30: BOARD MANUFACTURE, ANALYSIS OF TURNOVER

| | 1968 | 1969 | 1970 | 1971 | 1972 |
|--------------------------|--------------|--------------|--------------|---------------|--------------|
| No. of Companies | 20 | 20 | 20 | 19 | 20 |
| Total Turnover ('000) | 76,274 | 78,917 | 79,620 | 81,410 | 89,051 |
| Mean | 3813.70 | 3945.85 | 3981.00 | 4284.73 | 4452.55 |
| Coefficient of Variation | 1.99 | 1.88 | 1.79 | 1.69 | 1.72 |
| Gini | 0.731 | 0.712 | 0.701 | 0.674 | 0.674 |
| Herfindahl-Hirschmann | 249.291 | 226.873 | 211.750 | 203.831 | 198.336 |
| Entropy | - 82.126 | - 85.430 | - 87.277 | - 88.640 | - 90.200 |
| Linda Index for N* | | | | | |
| Concentration Ratios % | | | | | |
| = 2 | 1.24 61.3 | 1.10 58.9 | 0.97 56.9 | 0.95 55.8 | 0.84 56.0 |
| = 5 | 1.02 83.5 | 0.99 81.3 | 0.98 80.1 | 0.95 78.9 | 1.01 78.3 |
| = 10 | 0.76 93.9 | 0.64 93.6 | 0.58 93.6 | 0.57 92.5 | 0.59 91.0 |
| = 15 | 0.74 98.6 | 0.66 98.6 | 0.63 98.5 | 0.57 98.6 | 0.53 97.9 |
| = 19 | 0.98 99.9 | 0.91 99.8 | 0.84 99.8 | 0.90 100.0 | 0.67 99.8 |
| | | | | | |
| | | | | | |
| | | | | | |

BOARD MANUFACTURE: GRAPH SHOWING LINDA COEFFICIENT AND CONCENTRATION RATIO FOR 1968



BOARD MANUFACTURE: GRAPH SHOWING LINDA COEFFICIENT AND CONCENTRATION RATIO FOR 1972



SECTION 4. ANALYSIS OF CONVERTING PRODUCT GROUPS

1. Manufactured Stationery product group
2. Non-board packaging product group
3. Board packaging product group
4. Miscellaneous converted products group
5. Wallcoverings product group

SECTION 4

ANALYSIS OF CONVERTING PRODUCT GROUPS

Firms comprising the converting sector of the paper and board industry (NICE 272) were considered to fall into five distinct non-competing product groups:

- stationery;
- packaging - not board (paper bags, sacks);
- board packaging (boxes, cartons, fibreboard cases);
- miscellaneous (fancy goods, cups, plates);
- wallcoverings.

The allocation of the individual firms into relevant product groups was undertaken as described in the case of manufacturing product groups (Section 3).

The analysis of the wallcovering product group is considered separately from general analysis of the converting product groups. The reasons for this are explained in Section 4.5.

TABLE 31: NUMBERS OF COMPANIES CLASSIFIED TO EACH PRODUCT GROUP

| Year | Stationery | Packaging - not Board | Board Packaging | Misc. |
|------|------------|-----------------------|-----------------|-------|
| 1968 | 14 | 27 | 108 | 21 |
| 1969 | 14 | 27 | 107 | 21 |
| 1970 | 14 | 27 | 105 | 21 |
| 1971 | 14 | 27 | 102 | 21 |
| 1972 | 14 | 27 | 102 | 21 |

The analysis of seller concentration in each of the separate product groups was undertaken as described in the previous section relating to the manufacturing product groups analysis.

The concentration indices calculated for the four product groups, stationery, board packaging, non-board packaging and miscellaneous, are summarised in Tables 32 and 33.

The following sub-sections 4.1, 4.2, 4.3, and 4.4. consider in greater detail the economic features and performance of each product group. This introductory section is intended to present some preliminary conclusions relating to all of the converting product groups.

The various product groups identified within the converting sector of the UK paper industry represent very distinct and non-competing product markets. Although largely dependent on the manufacturing sector of the industry for its raw materials, the converting sector is concerned with the transformation of the paper and board into its final useable form.

A clear distinction can be made between board and non-board packaging. Although both may be considered as alternative forms of packaging, the products of the two groups exhibit physical properties which tend to make them non-competitive: board packaging usually represents the outer form of packaging, boxes, cartons and the stronger fibreboard packing cases. Non-board packaging includes paper bags, carrier bags and other paper wrappings. Such products experience more competition from plastic, polythene and cellulose packing than from board packaging.

Miscellaneous converted products include other packaging items such as tapes, gummed tape, labels, etc., as well as a plethora of items such as novelties, crackers, dress patterns and cigarette filters.

Stationery forms a further distinct product group involving the conversion of fine papers into their final product form: envelopes, school and office stationery, and so on.

With such a diverse range of product markets within the converting sector of the industry, the economic structure and performance of any product group will not necessarily bear any resemblance to any other product group. - The very wide difference in the number of companies in each product group is an indication of this fact.

TABLE 32: ANALYSIS OF TURNOVER OF DIFFERENT CONVERTING PRODUCT GROUPS

COEFFICIENT OF VARIATION

| Product Group | 1968 | 1969 | 1970 | 1971 | 1972 |
|-----------------------|------|------|------|------|------|
| Stationery | 2.22 | 2.28 | 2.25 | 2.26 | 2.20 |
| Packaging - Not Board | 2.01 | 2.12 | 2.08 | 2.04 | 2.02 |
| Miscellaneous | 1.71 | 1.71 | 1.73 | 1.79 | 1.79 |
| Board Packaging | 3.27 | 3.20 | 2.97 | 2.98 | 2.95 |

GINI COEFFICIENT

| Product Group | 1968 | 1969 | 1970 | 1971 | 1972 |
|----------------------|------|------|------|------|------|
| Stationery | 0.82 | 0.81 | 0.81 | 0.81 | 0.81 |
| Packaging -Not Board | 0.66 | 0.67 | 0.67 | 0.66 | 0.67 |
| Miscellaneous | 0.68 | 0.68 | 0.69 | 0.69 | 0.68 |
| Board Packaging | 0.83 | 0.83 | 0.82 | 0.82 | 0.82 |

HERFINDAHL-HIRSCHMANN INDEX

| Product Group | 1968 | 1969 | 1970 | 1971 | 1972 |
|-----------------------|-------|-------|-------|-------|-------|
| Stationery | 423.5 | 444.3 | 432.0 | 437.9 | 416.8 |
| Packaging - Not Board | 187.0 | 203.1 | 196.8 | 190.6 | 187.8 |
| Miscellaneous | 187.1 | 186.4 | 190.9 | 200.3 | 200.1 |
| Board Packaging | 108.4 | 104.1 | 93.6 | 96.9 | 95.0 |

ENTROPY INDEX

| Product Group | 1968 | 1969 | 1970 | 1971 | 1972 |
|-----------------------|---------|---------|---------|---------|---------|
| Stationery | -51.05 | -51.89 | -53.88 | -53.59 | -52.46 |
| Packaging - Not Board | -100.89 | -98.64 | -99.57 | -101.25 | -100.54 |
| Miscellaneous | -93.31 | -93.19 | -92.44 | -91.42 | -91.86 |
| Board Packaging | -128.42 | -129.19 | -131.95 | -131.12 | -131.11 |

TABLE 33: ANALYSIS OF TURNOVER OF THE CONVERTING PRODUCT GROUPS

CONCENTRATION RATIO AT N* = 5

LINDA INDEX AT N* = 5

| Year | 1968 | 1969 | 1970 | 1971 | 1972 |
|-----------------------|--------------|--------------|--------------|--------------|--------------|
| Stationery | 96.7 2.30 | 97.5 2.25 | 95.7 1.94 | 95.6 1.74 | 95.5 1.77 |
| Packaging - Not Board | 69.5 1.10 | 70.1 1.19 | 69.5 1.18 | 67.8 1.12 | 68.7 1.07 |
| Miscellaneous | 76.7 0.73 | 76.8 0.71 | 78.4 0.72 | 77.9 0.82 | 77.4 0.87 |
| Board Packaging | 63.0 0.60 | 61.6 0.59 | 59.6 0.49 | 60.8 0.49 | 60.0 0.50 |

CONCENTRATION RATIO AT N* = 10

LINDA INDEX AT N* = 10

| Year | 1968 | 1969 | 1970 | 1971 | 1972 |
|-----------------------|--------------|--------------|--------------|--------------|--------------|
| Stationery | 99.5 2.94 | 99.6 4.15 | 99.5 2.64 | 99.4 2.64 | 99.4 2.63 |
| Packaging - Not Board | 82.7 0.58 | 83.2 0.60 | 83.3 0.58 | 82.7 0.53 | 84.3 0.52 |
| Miscellaneous | 91.9 0.50 | 92.5 0.49 | 92.2 0.56 | 92.0 0.56 | 91.2 0.57 |
| Board Packaging | 77.5 0.41 | 76.9 0.38 | 74.4 0.37 | 75.3 0.38 | 74.9 0.38 |

Board Packaging is the largest product group in the converting sector having over three times as many firms as in the next largest product group - Non-Board Packaging. On the other hand, stationery manufacture has relatively few firms.

The relative numbers of firms in each product group is reflected in both the Herfindahl-Hirschmann and Entropy indices: both show similar values respectively for non-board packaging and miscellaneous manufacturers, these product groups having roughly similar numbers of firms, and exhibit extreme values for the two product groups with very large and very small numbers of firms.

Having the largest number of companies, the board packaging product group shows the greatest degree of variability between sizes of firms as measured by the coefficient of variation. The stationery product group has the second highest coefficient of variation. The reason for this is that this group is dominated by a single particularly large manufacturer. This fact is further reflected in the relative values of the concentration ratio for the top 5 firms, where the stationery product group appears most concentrated. Graphs showing the full series of concentration ratios and Linda indices can be found in the relevant sub-sections.

The Analysis of Performance

In Section 2, the performance of the UK paper and board industry was analysed in terms of the level of employment in each sector between 1968-1972. It was stated then that the more conventional performance measures of profit margin and return on equity could not be calculated for large sectors of an industry containing many companies not competing in similar product markets. At this stage of examining those individual product markets, performance can be more meaningfully analysed in terms of profitability and return on equity.

Tables 34 and 35 below show the mean and standard deviation of respectively profit margin and return on equity for each of the product groups identified. The ratios used were as follows:

$$\text{profit margin} = \frac{\text{profit before tax}}{\text{turnover}}$$

$$\text{return on equity} = \frac{\text{profit before tax}}{\text{shares} + \text{reserves}}$$

(Throughout the analysis, companies making losses in any year are included and the value of the loss computed as a negative profit. This allows a more satisfactory analysis of the variability in performance.)

Tables 34 and 35 show a wide variation in the value of both the profit margin and return on equity, both from product group to product group; and from year to year for any given product group. As already pointed out, the diverse range of product markets within the converting sector partly explains the differences in the performance of each grouping.

As with the manufacturing product groups, it was decided to investigate how much of the dispersion of profitability was explained by differences between individual forms which occurred consistently in each of the five years. The methods used are explained on page 3.7 above and the results shown in the following tables.

Coefficients of variation (Standard deviation/Arithmetic mean)

- (a) of five-year averages for individual firms;
- (b) of all the individual figures for each of the five years.

PROFIT MARGIN ON TURNOVER

| | (a) | (b) |
|-----------------------|------|------|
| Stationery | 0.56 | 0.70 |
| Packaging - not board | 0.78 | 0.92 |
| Miscellaneous | 1.28 | 1.59 |
| Board packaging | | 1.26 |

RETURN ON EQUITY

| | | |
|-----------------------|------|------|
| Stationery | 1.03 | 2.63 |
| Packaging - not board | 1.91 | 2.16 |
| Miscellaneous | 3.10 | 3.55 |
| Board packaging | 1.68 | 3.25 |

TABLE 34: ANALYSIS OF PROFIT MARGIN

| Mean profit margin | 1968 | 1969 | 1970 | 1971 | 1972 |
|-------------------------------------|----------------|----------------|----------------|----------------|----------------|
| Standard deviation of profit margin | | | | | |
| Stationery | 0.045 0.061 | 0.064 0.068 | 0.005 0.168 | 0.006 0.113 | 0.032 0.081 |
| Packaging - Not Board | 0.064 0.047 | 0.054 0.055 | 0.047 0.059 | 0.048 0.050 | 0.063 0.040 |
| Miscellaneous | 0.064 0.101 | 0.064 0.093 | 0.056 0.096 | 0.059 0.090 | 0.065 0.108 |
| Board Packaging | 0.060 0.063 | 0.063 0.093 | 0.048 0.085 | 0.060 0.054 | 0.062 0.063 |

TABLE 35: ANALYSIS OF RETURN ON EQUITY

| | | | | | |
|-----------------------|----------------|----------------|----------------|----------------|----------------|
| Stationery | 0.132 0.151 | 0.376 0.986 | 0.365 0.662 | 0.029 0.642 | 0.295 0.388 |
| Packaging - Not Board | 0.393 0.951 | 0.354 1.035 | 0.260 0.348 | 0.283 0.462 | 0.402 0.598 |
| Miscellaneous | 0.788 2.719 | 0.697 2.086 | 1.035 3.802 | 0.638 1.995 | 0.325 0.591 |
| Board Packaging | 0.398 1.582 | 0.263 0.735 | 0.378 1.426 | 0.277 0.358 | 0.284 0.326 |

This analysis shows that, as in the manufacturing sectors, most of the variation in rates of profits is due to differences between firms which were consistent over the five-year period. As was pointed out on page 3.7 inconsistencies in the original data and assumptions adopted for the purposes of this report may account for part of these differences. Before definitive conclusions could be drawn from this analysis, more exhaustive research would be required.

No relationship was found to exist between profitability and size. To some extent, this may reflect deficiencies in the basic data, but the absence of any such relationship is consistent with conclusions drawn from the analysis of product groups in the following sections. The results are shown in the following table.

REGRESSION ANALYSIS - VALUE OF R² COEFFICIENT

| Product Group | <u>Profit Margin</u> Turnover | <u>Return on Equity</u> Equity |
|---------------------|----------------------------------|-----------------------------------|
| Stationery | 0.03386 | 0.00011 |
| Non-board packaging | 0.00025 | 0.00039 |
| Miscellaneous | 0.04112 | 0.01492 |
| Board Packaging | 0.00222 | 0.00268 |

SECTION 4 SUB-SECTION 1

STATIONERY PRODUCT GROUP

Classified to this product group are those firms engaged in the manufacture of stationery including writing pads, envelopes, manuscript books, account books, office and school stationery, cardboard files, index cards and tabulating machine cards.

The market for stationery is seen to fall into three segments:

- (i) the domestic market, catering for the individual who requires writing paper and envelopes, notepaper and exercise books;
- (ii) industry generally which requires supplies of plain envelopes, pay packets, account books, index cards and so on;
- (iii) "big industry" which requires printed and personalised stationery of all types in large quantities.

Stationery orders will be met from stock or will be made to order according to which of the above three markets the manufacturer is supplying: the larger buyers, requiring personalised stationery, will place bulk orders directly with the manufacturers: more standardised products will, on the other hand, be met from stock. Stock distribution is primarily through wholesalers or direct to retail stationers.

The product group is dominated by one manufacturer, John Dickinson, which is a subsidiary of one of the major groups in the industry, having other subsidiaries in both the manufacturing and converting sectors. This dominance of the product group is illustrated in the attached graphs of concentration ratios and Linda indices. It will be noticed that the minimum value of the Linda occurs at $n^* = 2$, and rises thereafter, suggesting the existence of a single oligopolist. The other large stationery manufacturers are Wiggins Teape and Spicers - which is part of Reed International.

The asset structure of the firms identified in the product group is shown in Table 36 below and statistics of other financial variables relating to the firms in the product group are shown in Table 37.

TABLE 36: ASSET STRUCTURE OF FIRMS IDENTIFIED IN STATIONERY PRODUCT GROUP

| <u>Own Capital (£'000)</u> | <u>No. of firms</u> | <u>No. of firms</u> |
|----------------------------|---------------------|---------------------|
| | 1968 | 1972 |
| 0 - 50 | 2 | 2 |
| 51 - 500 | 6 | 7 |
| 501 - 1,000 | 0 | 1 |
| 1,001 - 10,000 | 4 | 2 |
| 10,001 - 20,000 | 1 | 1 |
| 20,001 - 50,000 | 1 | 1 |
| | <u>14</u> | <u>14</u> |

The analysis of concentration within the product group is shown in Table 38. It has already been mentioned that the group is dominated by a single manufacturer and has the fewest members of all converting product groups. These facts are reflected in the various concentration indices. During the period under examination, 1968-1972, the values of the various concentration indices have remained fairly static.

TABLE 37: FINANCIAL STATISTICS OF COMPANIES IDENTIFIED IN STATIONERY PRODUCT GROUP

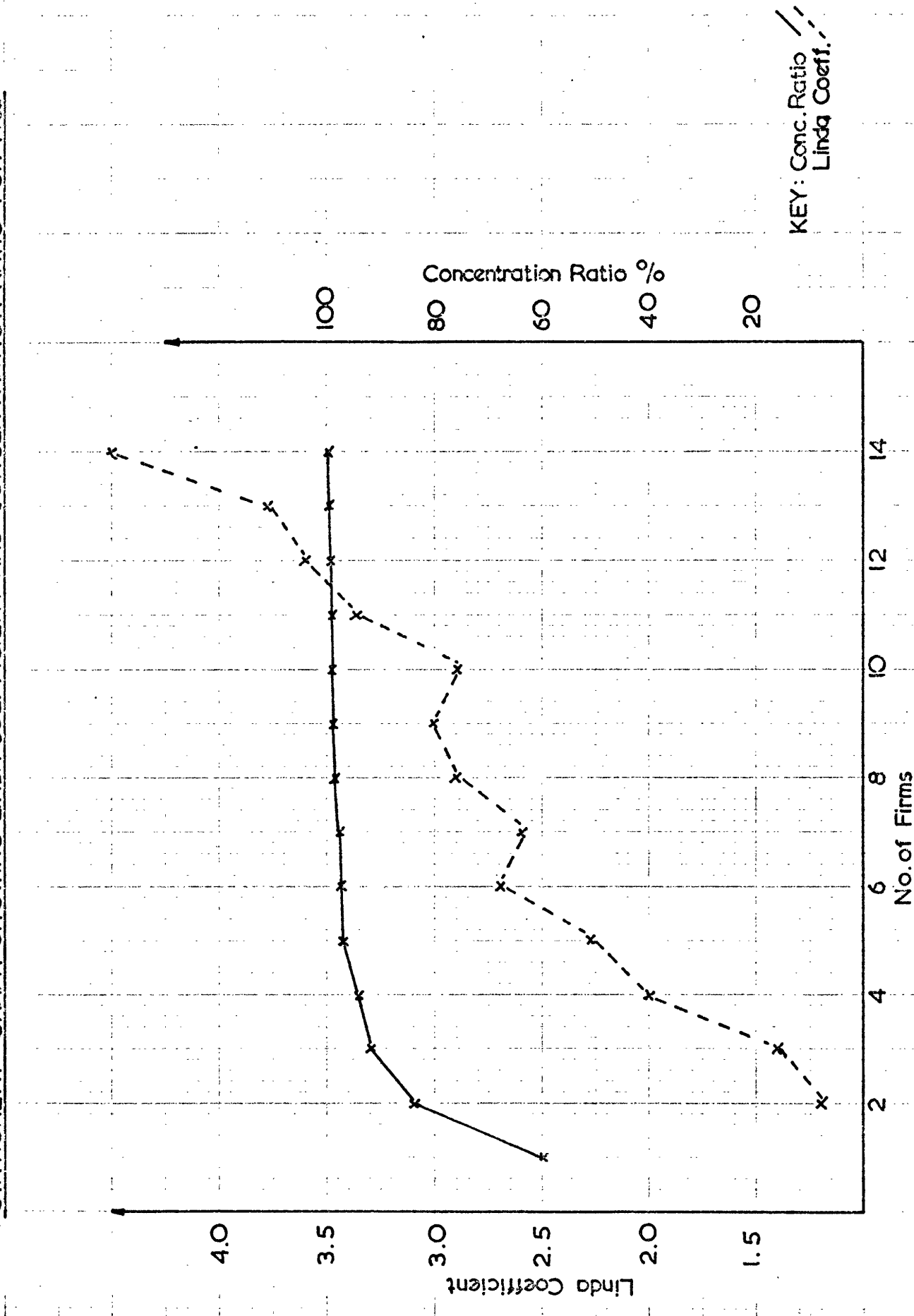
£'000

| YEAR | NUMBER OF COMPANIES | TOTAL TURNOVER | TOTAL EXPORTS | PRE-TAX PROFITS | TOTAL NET CASH FLOW | TOTAL EQUITY | TOTAL ANNUAL INVESTMENT |
|------|---------------------|----------------|---------------|-----------------|---------------------|--------------|-------------------------|
| 1968 | 14 | 153,074 | 8,228 | 11,149 | 9,754 | 46,362 | 4,479 |
| 1969 | 14 | 166,990 | 9,610 | 12,553 | 11,281 | 44,954 | 5,651 |
| 1970 | 14 | 178,239 | 11,373 | 12,048 | 11,545 | 48,262 | 6,436 |
| 1971 | 14 | 189,179 | 15,025 | 9,551 | 10,321 | 46,472 | 9,850 |
| 1972 | 14 | 207,905 | 14,604 | 11,807 | 10,645 | 57,791 | 7,589 |

TABLE 38: STATIONERY, ANALYSIS OF TURNOVER

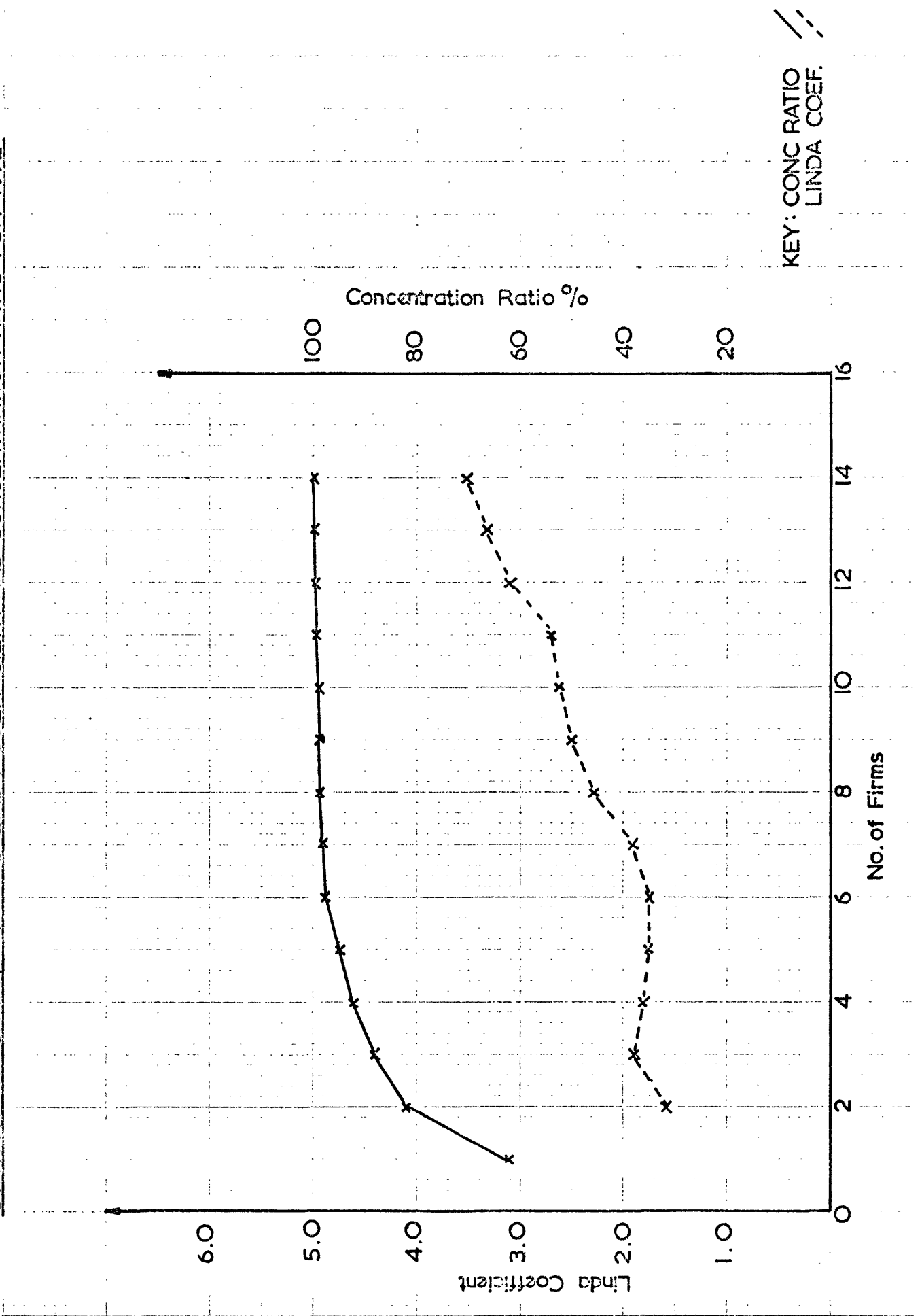
| | 1968 | 1969 | 1970 | 1971 | 1972 |
|--------------------------|---------------|---------------|---------------|---------------|---------------|
| No. of Companies | 14 | 14 | 14 | 14 | 14 |
| Total Turnover ('000) | 153,074 | 166,990 | 178,239 | 189,179 | 207,905 |
| Mean | 10933.857 | 11927.857 | 12731.357 | 13512.786 | 14850.357 |
| Coefficient of Variation | 2.198 | 2.220 | 2.284 | 2.246 | 2.264 |
| Gini | 0.813 | 0.821 | 0.812 | 0.805 | 0.805 |
| Herfindahl-Hirschmann | 416.776 | 423.483 | 444.264 | 431.984 | 437.856 |
| Entropy | - 52.463 | - 51.048 | - 51.894 | - 53.881 | - 52.463 |
| Linda Index for N* | | | | | |
| Concentration Ratios % | | | | | |
| = 2 | 1.17 83.7 | 1.19 84.1 | 1.37 84.9 | 1.49 82.5 | 1.55 82.6 |
| = 5 | 2.29 96.7 | 2.24 97.5 | 1.93 95.7 | 1.73 95.6 | 1.77 95.4 |
| = 10 | 2.93 99.5 | 4.15 99.5 | 2.64 99.4 | 2.63 99.4 | 2.62 99.3 |
| = 14 | 5.05 100.0 | 5.69 100.0 | 3.97 100.0 | 3.40 100.0 | 3.53 100.0 |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

STATIONERY : GRAPH SHOWING LINDA COEFFICIENT AND CONCENTRATION RATIO FOR 1968



KEY: Conc. Ratio /-
Linda Coeff. -

STATIONERY: GRAPH SHOWING LINDA COEFFICIENT AND CONCENTRATION RATIO FOR 1972



SECTION 4: SUB-SECTION 2

NON-BOARD PACKAGING PRODUCT GROUP

Classified as producers of non-board packaging are manufacturers of paper bags, including print bags, multi-wall paper sacks and other packaging items such as moulded pulp units, jam pot covers and bottle caps.

In terms of turnover, non-board packaging represents only approximately one quarter of all paper and board packaging. Non-board packaging items, such as paper bags and sacks, probably represent the product group with the highest cross-elasticity in respect of competing goods made from materials other than paper. Plastic and cellulose bags and sacks have, to an extent, replaced paper equivalents, these former having the advantage of greater strength and waterproofness. For this reason, the entire market for all types of bags and sacks should ideally be considered before conclusions as to firms' conduct and behaviour can be made. Paper bag manufacturers have met this competition by themselves producing bags of materials other than paper.

Paper bags require a great variety of papers for their manufacture, depending on the end use. Raw materials are bought from British or Scandinavian paper mills, and bags are made from the reel. Buying is primarily on the basis of price and quality: integrated companies do not necessarily buy from the parent company's manufacturing mill, but will go for the best price. It is however advantageous at times of shortage to have assured supplies of raw materials.

Apart from the larger bag manufacturers identified, the product group is characterised by an estimated 100 very small operators for whom data was not available. Most smaller manufacturers tend to be single-product orientated whereas the larger firms have diversified into other forms of packaging. There are an estimated six integrated manufacturers, the remainder being entirely bag manufacturers.

Given that a firm is a bag manufacturer, there is little sub-specialisation. A manufacturer can produce a wide range and variety of paper bags; only carrier bags require special plant. This results in a highly competitive atmosphere within the industry.

Specialisation within the industry is confined to whether or not the manufacturer undertakes the printing of bags. Non-printed bags are produced in large quantities and are generally distributed through merchants. Paper and other wrapping bags are such "regular use" items that total usage is not expected to increase significantly; if anything, the use of paper bags may decline as retailers try to cut costs and housewives attempt to conserve resources!

"Own name" bags and carriers are produced to the buyer's specification. Customers requiring such wrappings vary from the large retail chains down to the local grocer. In such a situation, larger buyers have a monopsonistic position.

For comparison, the following table illustrates the relative importance of the different packaging types:

TABLE 39: MANUFACTURERS' SALES OF PACKAGING PRODUCTS (£m)

| | <u>1971</u> | <u>1972</u> | <u>1973</u> |
|--|-------------|-------------|-------------|
| Paper and Board | n/a | 640 | 767 |
| Plastic | 111 | 128 | 231 |
| Laminates (foil on plastic, paper cellulose, polythene, etc.) | n/a | 27 | 48 |
| Metal | n/a | n/a | 327 |
| Wood, etc. | 44 | 43 | 56 |
| Glass | 100 | 110 | 123 |

Business Monitor PQ 480

Structure

The financial statistics relating to the firms identified in the product group are presented in Table 40.

The largest firms in the product group in the period investigated, 1968-1972, were subsidiaries of Dickinson Robinson and Reed International.

TABLE 40: FINANCIAL STATISTICS OF COMPANIES IDENTIFIED IN NON-BOARD PACKAGING PRODUCT GROUP £'000

| YEAR | NUMBER OF COMPANIES | TOTAL TURNOVER | TOTAL EXPORTS | PRE-TAX PROFITS | TOTAL NET CASH FLOW | TOTAL EQUITY | TOTAL ANNUAL INVESTMENT |
|------|---------------------|----------------|---------------|-----------------|---------------------|--------------|-------------------------|
| 1968 | 27 | 38,154 | 1,334 | 2,714 | 2,584 | 7,778 | 1,704 |
| 1969 | 27 | 42,602 | 1,495 | 2,377 | 2,160 | 7,616 | 2,331 |
| 1970 | 27 | 46,895 | 1,634 | 2,340 | 2,386 | 7,447 | 2,773 |
| 1971 | 27 | 46,674 | 1,510 | 1,819 | 2,072 | 7,721 | 1,510 |
| 1972 | 27 | 52,289 | 2,042 | 2,781 | 2,952 | 8,336 | 932 |

The importance of the two largest firms is reflected in concentration ratios which indicate that nearly 60% of the turnover of the product group is accounted for by the top two firms. The concentration ratios and Linda indices for the product group are shown graphically below.

Examination of the Linda and concentration indices shows that the two largest firms are considerably greater than their other competitors and in 1972 their sales accounted for 37% and 19% of sales by all British companies; the next largest firm accounted for only 5%. Although according to these indices these two firms, Dickinson Robinson and Reeds, forma duopoly, this position is modified by competition from products outside the definition of the industry.

An analysis of the asset structure of the firms classified to the product group is shown in Table 41. Relative to other product groups examined, the range of size of firms is not great, no firm having equity of greater than £10 million, with a distinct modal value of £51-500,000.

TABLE 41: ASSET STRUCTURE OF FIRMS IDENTIFIED IN THE NON-BOARD PACKAGING PRODUCT GROUP

| <u>Own Capital (£'000)</u> | <u>No. of firms</u> 1968 | <u>No. of firms</u> 1972 |
|----------------------------|-----------------------------|-----------------------------|
| 0 - 50 | 4 | 2 |
| 51 - 500 | 19 | 20 |
| 501 - 1,000 | 3 | 4 |
| 1,001 - 10,000 | 1 | 1 |
| More than 10,000 | 0 | 0 |
| | <u>27</u> | <u>27</u> |

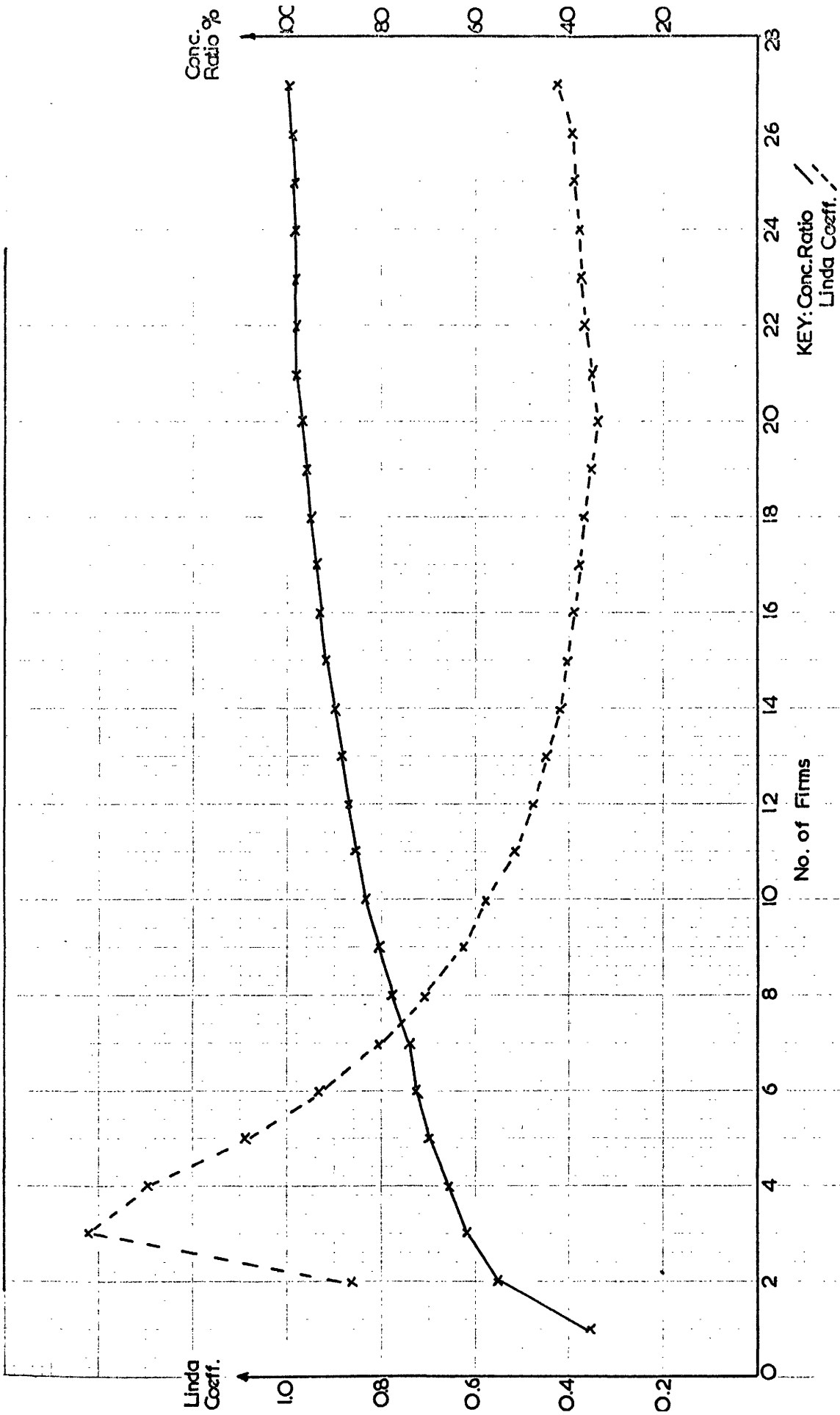
From 1968-1972 net cash flow fell in money terms implying a much greater fall in real terms of expenditure on investment.

Relative to other product groups examined in the conversion of paper and board industry, the manufacture of non-board packaging appears the least concentrated. a Gini coefficient of less than 0.7 reflects this fact. Table 42 shows the concentration indices for the product group.

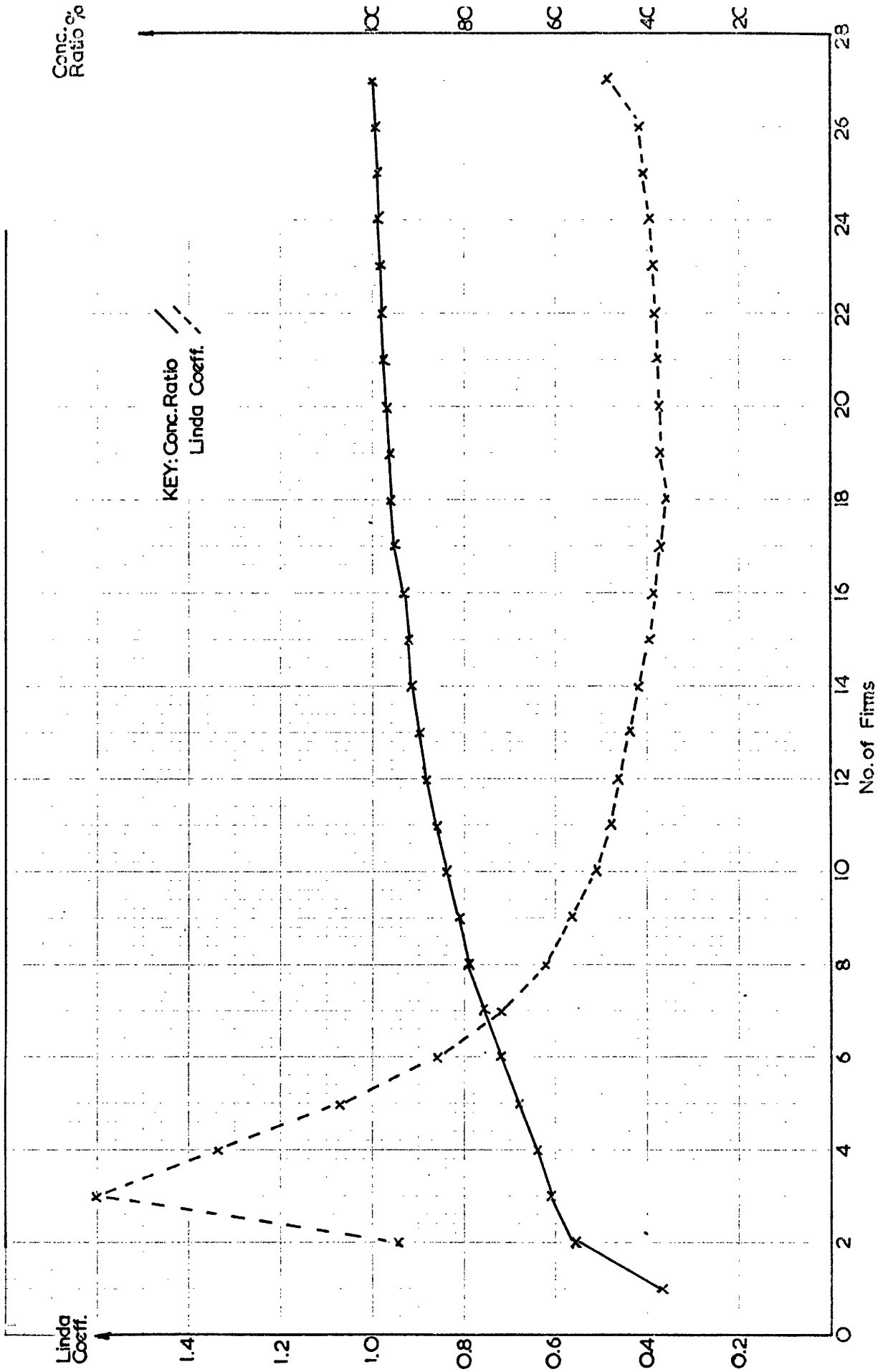
TABLE 42: PACKAGING (NOT INCL. BOARD), ANALYSIS OF TURNOVER

| | 1968 | 1969 | 1970 | 1971 | 1972 |
|--------------------------|---------------|---------------|---------------|---------------|---------------|
| No. of Companies | 27 | 27 | 27 | 27 | 27 |
| Total Turnover ('000) | 38,154 | 42,602 | 46,895 | 46,674 | 52,289 |
| Mean | 1413.111 | 1577.852 | 1736.852 | 1728.667 | 1936.630 |
| Coefficient of Variation | 2.012 | 2.117 | 2.077 | 2.036 | 2.017 |
| Gini | 0.661 | 0.670 | 0.667 | 0.656 | 0.669 |
| Herfindahl-Hirschmann | 187.017 | 203.106 | 196.816 | 190.594 | 187.755 |
| Entropy | -100.889 | - 98.640 | - 99.568 | -101.251 | -100.535 |
| Linda Index for N* | | | | | |
| Concentration Ratios % | | | | | |
| = 2 | 0.86 57.2 | 1.00 58.9 | 0.96 58.1 | 1.05 56.4 | 0.94 56.6 |
| = 5 | 1.09 69.4 | 1.19 70.0 | 1.18 69.5 | 1.12 67.8 | 1.06 68.6 |
| = 10 | 0.57 82.7 | 0.60 83.2 | 0.57 83.2 | 0.53 82.7 | 0.51 84.2 |
| = 15 | 0.39 91.9 | 0.42 91.8 | 0.41 91.9 | 0.39 91.7 | 0.39 92.6 |
| = 20 | 0.34 97.3 | 0.35 97.5 | 0.36 97.3 | 0.35 97.1 | 0.37 97.4 |
| = 27 | 0.42 100.0 | 0.45 100.0 | 0.44 100.0 | 0.43 100.0 | 0.49 100.0 |
| | | | | | |
| | | | | | |

NON BOARD PACKING: GRAPH SHOWING LINDA COEFFICIENT AND CONCENTRATION RATIO FOR 1968



NON BOARD PACKING: GRAPH SHOWING LINDA COEFFICIENT AND CONCENTRATION RATIO FOR 1972



Since 1968, the product group appears static in terms of concentration. As already explained, this is not a growth sector and the firms in the industry are long-established, this being one of the oldest converting sectors.

The highly competitive nature of the grouping has in the past caused exits from the industry, but more recently firms have continued to exist through increased specialisation. It is through such specialisation that large and small manufacturers can survive together.

Again the competitiveness of the product group and the existence of older firms with established market shares act against new entry into the industry. Similarly, takeovers have been limited, as paper bags manufacturing is not a profitable area of diversification.

This somewhat static picture is not expected to change within the near future.

SECTION 4: SUB-SECTION 3

BOARD PACKAGING PRODUCT GROUP

Folding Cartons

The Board Packaging product group can be considered in two distinct sections - the conversion of board into folding boxes and the manufacture of fibre-board packing cases. Very crudely, fibreboard packing cases represent the heavier, outer form of packaging, while folding boxes are used for the initial packing of goods.

Folding cartons are used widely to package food and non-consumable items. Plastic, cellophane, and paper/plastics mixtures are increasing in importance as packaging materials. Recognising this, many of the converters in this product group produce both paper (predominantly) and some plastic packaging items, in order to ensure the packaging buyer of the best type of packing for his particular product.

In order to produce folding boxes, converting organisations require board in many varieties. Board is obtained from both home and foreign mills. Those converters who are subsidiaries of vertically integrated groups having a board manufacturing subsidiary have guaranteed supplies of board for conversion.

Independent converting firms are in a less favourable position regarding the purchasing of manufactured board. To a certain extent they are forced to accept the selling terms of the larger board manufacturers, especially when board is in short supply.

Folding carton makers produce almost entirely to order. The nature of the product is such that it is "tailor-made" to the requirements of individual customers.

Considerable economies of scale can be obtained from long production runs. For this reason, several of the producers are reliant on a small number of regular customers. Again, the market strength of the large buyer is felt by the smaller folding carton makers: such large buyers will perhaps split an order between several small producers. This small producer cannot withhold supplies to the buyer (for instance to speed up payment) as the buyer will not miss the quantity and the producer is left with useless

"tailor-made" cartons.

Even so, the smaller firms do exist alongside the larger ones. This fact is attributable to the willingness and ability of the smaller firms to produce specialised products and to undertake small runs for individual customers.

Fibreboard Containers

Production of fibreboard cases can be further subdivided into the production of solid cases and the production of corrugated cases. Originally fibreboard containers were of the solid type, but their use has of more recent years been superseded by the use of corrugated cases, as the tables below indicate.

| Year | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 |
|------------|------|------|------|------|------|------|------|------|------|------|
| Solid | 246 | 241 | 277 | 222 | 233 | 222 | 196 | 173 | 155 | 161 |
| Corrugated | 842 | 865 | 929 | 949 | 1075 | 1146 | 1192 | 1201 | 1277 | 1399 |
| TOTAL | 1088 | 1106 | 1206 | 1171 | 1308 | 1368 | 1388 | 1374 | 1432 | 1560 |

The relative growth in the two sub-sectors is further reflected by the relative levels of capital formation over the last 10 years.

| Year | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | |
|-------------------------|----|----|----|----|----|----|----|----|----|--|
| SOLID: | | | | | | | | | | |
| Plants with laminators | 10 | 10 | 10 | 10 | 9 | 8 | 9 | 9 | 9 | |
| Number of laminators | 15 | 15 | 15 | 15 | 14 | 13 | 13 | 13 | 13 | |
| CORRUGATED: | | | | | | | | | | |
| Plants with corrugators | 52 | 52 | 55 | 57 | 59 | 64 | 66 | 70 | 70 | |
| Number of corrugators | 75 | 75 | 76 | 76 | 80 | 87 | 89 | 94 | 98 | |

Fibreboard cases are used for the outer packaging of goods. The properties users seek in packing their goods in fibreboard containers are strength to protect valuable goods in transit as well as moisture resistance. Prior to the widespread use of fibreboard cases, approximately 10 years ago, wooden boxes were used for outer packaging. Now fibreboard case manufacturers see their main competition from plastic containers. Fibreboard cases are used throughout all industrial sectors as the following end use classification indicates.

TABLE 43: END USE CLASSIFICATION - FIBREBOARD CONTAINERS - 1972

| | % |
|--|--------|
| Foodstuffs | 28.8 |
| Metal working, machines and parts, electrical machines (excl. household appliances) | 13.5 |
| Radio, TV., communication equipment, household appliances | 11.7 |
| Beverages | 9.9 |
| Agricultural produce and fresh foods | 9.6 |
| Soaps, perfumes, cosmetics, etc. | 5.2 |
| Ceramics, glassware, other non-metallic products | 3.7 |
| Chemical and allied products | 3.5 |
| Paper goods and printed matter | 3.3 |
| Other | 10.8 |
| | 100.0% |

British Fibreboard Packing Case Association

The manufacture of fibreboard cases is in two stages: the manufacture of the solid or corrugated case material, and the conversion of this material into actual cases. Obviously some firms within the industry are engaged in both processes. Other producers buy in the completed board and are concerned with the conversion process only. New entrants into the industry tend to be via the conversion process because of the initially high capital costs involved in putting down a corrugating or laminating plant.

Inputs into the manufacturing process are kraft liner in sheet form, and fluting material, usually the cheapest quality available including waste. Kraft liner has to be imported (see Manufacturing section). Obviously in times of excess demand, those manufacturers with overseas links will have priority in receiving kraft liner. As material costs are over 50% of the cost of production, individual manufacturers are vulnerable to increased costs of imports; but prices from suppliers tend to be similar.

Individual firms within the fibreboard case-making sector are generally single product firms. The particularly large firms who are part of diversified conglomerates are now beginning to move into the new plastics product market.

Manufacturers do not produce fibreboard cases for stock - every order placed with a producer is a tailor-made job. The practice of producing for stock is discouraged unless the manufacturer is totally confident of a repeat order. This reflects the normally very competitive nature of the industry - this pattern having been somewhat distorted in the present situation of short supply of paper goods generally. Manufacturers are tied to particular buyers only to the extent of inter-group trading. Competition reflects itself in the marketing strategies which are to a limited extent through industrial advertising, but largely through direct-selling salesmen.

Why does the industry appear so competitive despite a fairly high degree of concentration? Small "converting only" firms specialise in small runs and specialty products. The larger firms are more concerned with bulk orders involving long production runs to reduce costs.

Structure

The large firms in this section of the converting industry during the period 1968-1972 were Reeds, Bowaters, Mardon Packaging, Unilever, McMillan Bloedal, Tremletts and Tillotsons Corrugated Cases.

The product group is characterised by a large dispersion in the sizes of firms in the industry. Although over 100 firms have been identified in the sector, the top two account for 35% of turnover, and 75% of total turnover is controlled by the top 10. Similarly, at the lower end of the distribution, the bottom 50 or so firms appear very small in terms of turnover. This pattern is not incompatible with the nature of the product allowing the small specialists to exist alongside the "giants". The asset structure of the product group is shown in Table 44 below.

During the period examined, 1968-1972, there have been no significant changes in the concentration indices measured; the results are shown in Table 45.

TABLE 44: ASSET STRUCTURE OF FIRMS IDENTIFIED IN BOARD PACKAGING PRODUCT GROUP

| <u>Own Capital (£'000)</u> | <u>No. of firms</u> 1968 | <u>No. of firms</u> 1972 |
|----------------------------|-----------------------------|-----------------------------|
| 0 - 50 | 30 | 13 |
| 51 - 500 | 62 | 66 |
| 501 - 1,000 | 7 | 8 |
| 1,001 - 10,000 | 7 | 12 |
| 10,001 - 20,000 | 1 | 2 |
| 20,001 - 50,000 | 1 | 1 |
| 50,001 - 100,000 | 0 | 0 |
| | <u>108</u> | <u>102</u> |

The concentration ratios and Linda indices for the product group are shown in the following graphs. It will be noticed that the Linda indices show no distinct minima, suggesting that no oligopolistic grouping exists within the product group. This is the same phenomenon as was observed in the analysis of the entire converting sector discussed in Section 2.5. Because the data for box and fibreboard case manufacturers could not be distinguished, the Linda index is effectively summing two "oligopolies" and producing the results observed. This observation might have proved invalid if separation into two product groups had been possible.

TABLE 45: BOARD PACKAGING, ANALYSIS OF TURNOVER

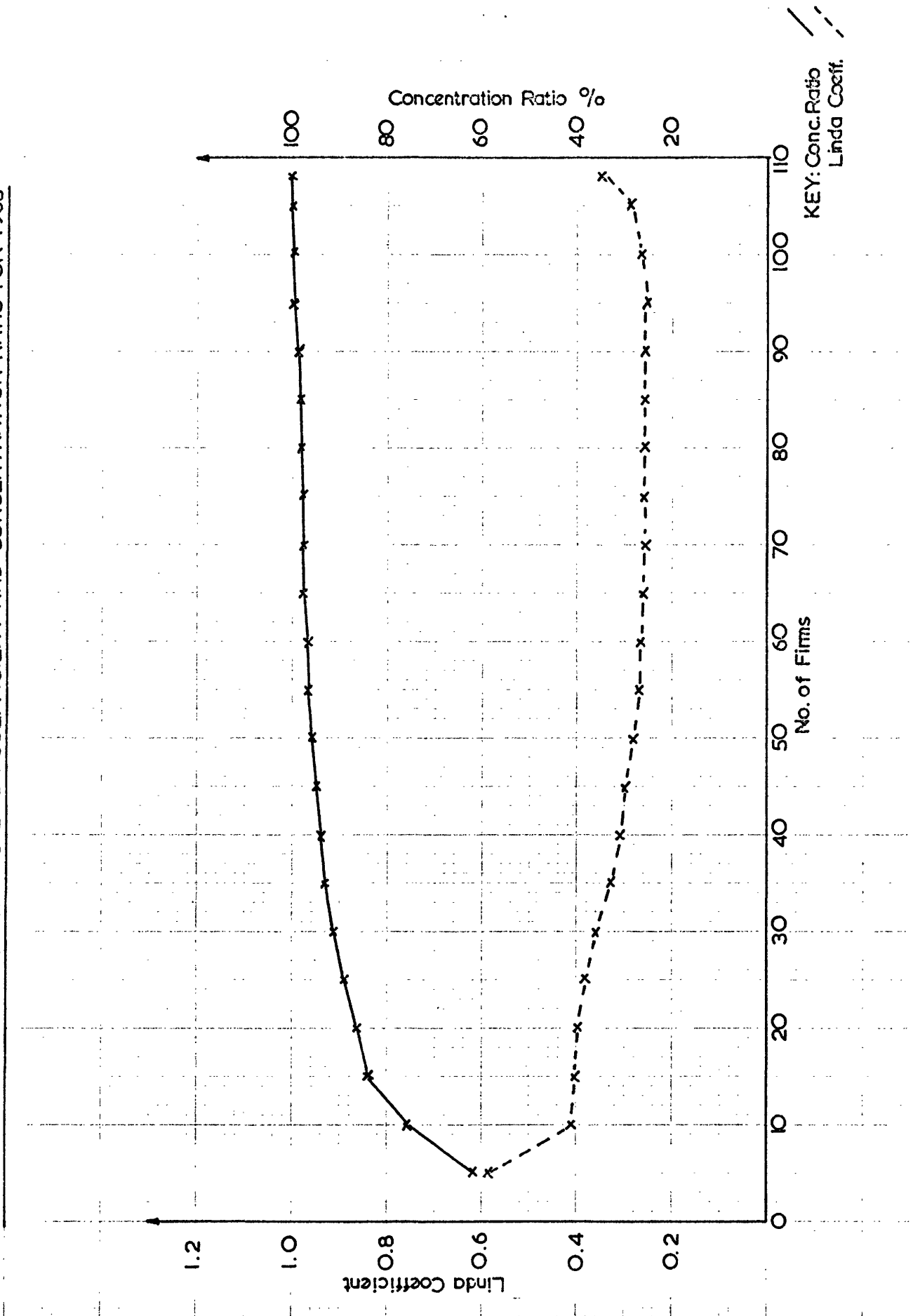
| | 1968 | 1969 | 1970 | 1971 | 1972 |
|--------------------------|--------------|--------------|--------------|--------------|--------------|
| No. of Companies | 108 | 108 | 105 | 102 | 102 |
| Total Turnover ('000) | 236,870 | 277,035 | 327,355 | 334,634 | 377,922 |
| Mean | 2193.241 | 2565.139 | 3117.676 | 3280.725 | 3705.118 |
| Coefficient of Variation | 3.271 | 3.200 | 2.971 | 2.980 | 2.947 |
| Gini | 0.829 | 0.829 | 0.822 | 0.817 | 0.821 |
| Herfindahl-Hirschmann | 108.378 | 104.126 | 93.642 | 96.871 | 94.977 |
| Entropy | -128.415 | -129.191 | -131.952 | -131.109 | -131.107 |
| Linda Index for N* | | | | | |
| Concentration Ratios % | | | | | |
| = 2 | 0.59 39.7 | 0.63 37.1 | 0.65 34.2 | 0.68 35.0 | 0.63 34.7 |
| = 10 | 0.40 77.4 | 0.38 76.8 | 0.36 74.4 | 0.37 75.2 | 0.36 74.9 |
| = 20 | 0.40 87.1 | 0.38 87.4 | 0.30 87.8 | 0.32 87.6 | 0.30 88.1 |
| = 40 | 0.31 93.8 | 0.29 94.1 | 0.29 94.6 | 0.30 94.3 | 0.30 94.7 |
| = 50 | 0.27 95.8 | 0.27 96.0 | 0.28 96.2 | 0.28 96.1 | 0.29 96.4 |
| = 60 | 0.26 97.2 | 0.26 97.3 | 0.27 97.5 | 0.27 97.4 | 0.28 97.6 |
| = 80 | 0.26 98.9 | 0.26 99.0 | 0.26 99.1 | 0.25 99.1 | 0.27 99.1 |
| = 100 | 0.27 99.8 | 0.28 99.8 | 0.29 99.9 | 0.29 99.9 | 0.30 99.9 |

TABLE 46: FINANCIAL STATISTICS OF COMPANIES IDENTIFIED IN BOARD PACKAGING PRODUCT GROUP

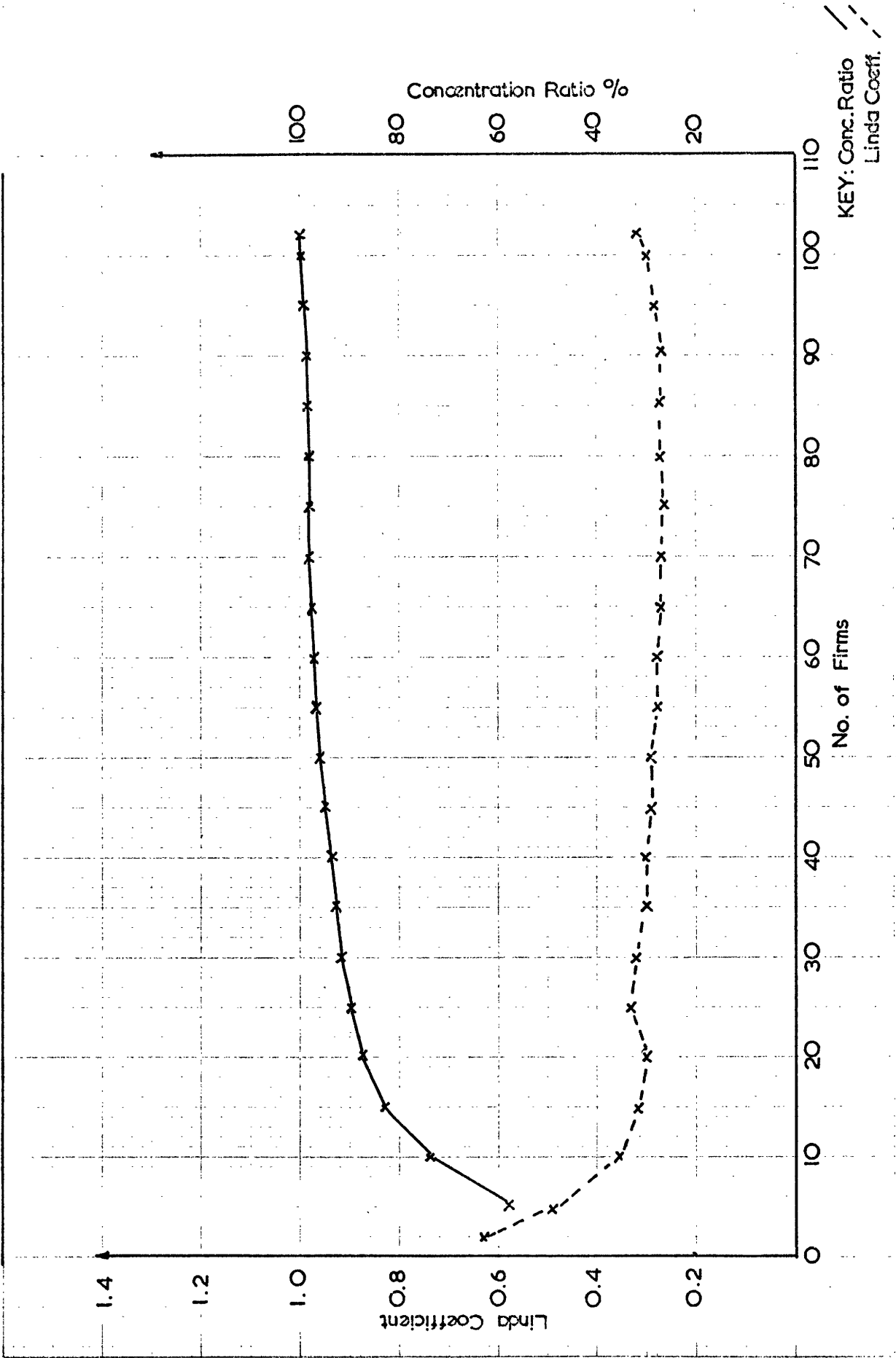
£'000

| YEAR | NUMBER OF COMPANIES | TOTAL TURNOVER | TOTAL EXPORTS | PRE-TAX PROFITS | TOTAL NET CASH FLOW | TOTAL EQUITY | TOTAL ANNUAL INVESTMENT |
|------|---------------------|----------------|---------------|-----------------|---------------------|--------------|-------------------------|
| 1968 | 108 | 236,870 | 2,130 | 16,230 | 14,286 | 91,444 | 8,835 |
| 1969 | 108 | 277,035 | 3,229 | 18,836 | 17,007 | 92,891 | 12,180 |
| 1970 | 105 | 327,356 | 5,688 | 17,857 | 17,362 | 95,685 | 18,179 |
| 1971 | 102 | 334,634 | 4,533 | 23,114 | 21,503 | 101,959 | 13,817 |
| 1972 | 102 | 377,922 | 5,162 | 28,133 | 26,245 | 108,256 | 17,712 |

BOARD PACKING: GRAPH SHOWING LINDA COEFFICIENT AND CONCENTRATION RATIO FOR 1968



BOARD PACKING: GRAPH SHOWING LINDA COEFFICIENT AND CONCENTRATION RATIO FOR 1972



SECTION 4: SUB-SECTION 4

MISCELLANEOUS CONVERTED PRODUCTS GROUP

The miscellaneous manufactures of paper and board sector does not represent an homogeneous product group as has been the case with the other sectors examined. Products classified to this group are diverse including dress patterns, crackers, cigarette filters, paper novelties, doilies and catering paperware. Such a range of products suggest that few conclusions can be drawn from the behaviour of individual firms within the grouping.

The three largest firms classified to this product group are Bunzl Pulp and Paper; Smith & Newpew; and Robinsons & Son. The last two manufacturers produce surgical dressings, babies nappies and other cellulose wadding materials. The subsidiaries of Bunzl Pulp & Paper classified to this sector produce cigarette filter materials, tape, rolls, tubes, etc.

For completeness the tables of analysis are presented below. Table 47 shows the financial statistics relating to the firms in the product group, and Table 48 summarises the concentration indices.

TABLE 47: FINANCIAL STATISTICS OF FIRMS IDENTIFIED
IN THE MISCELLANEOUS PRODUCT GROUP

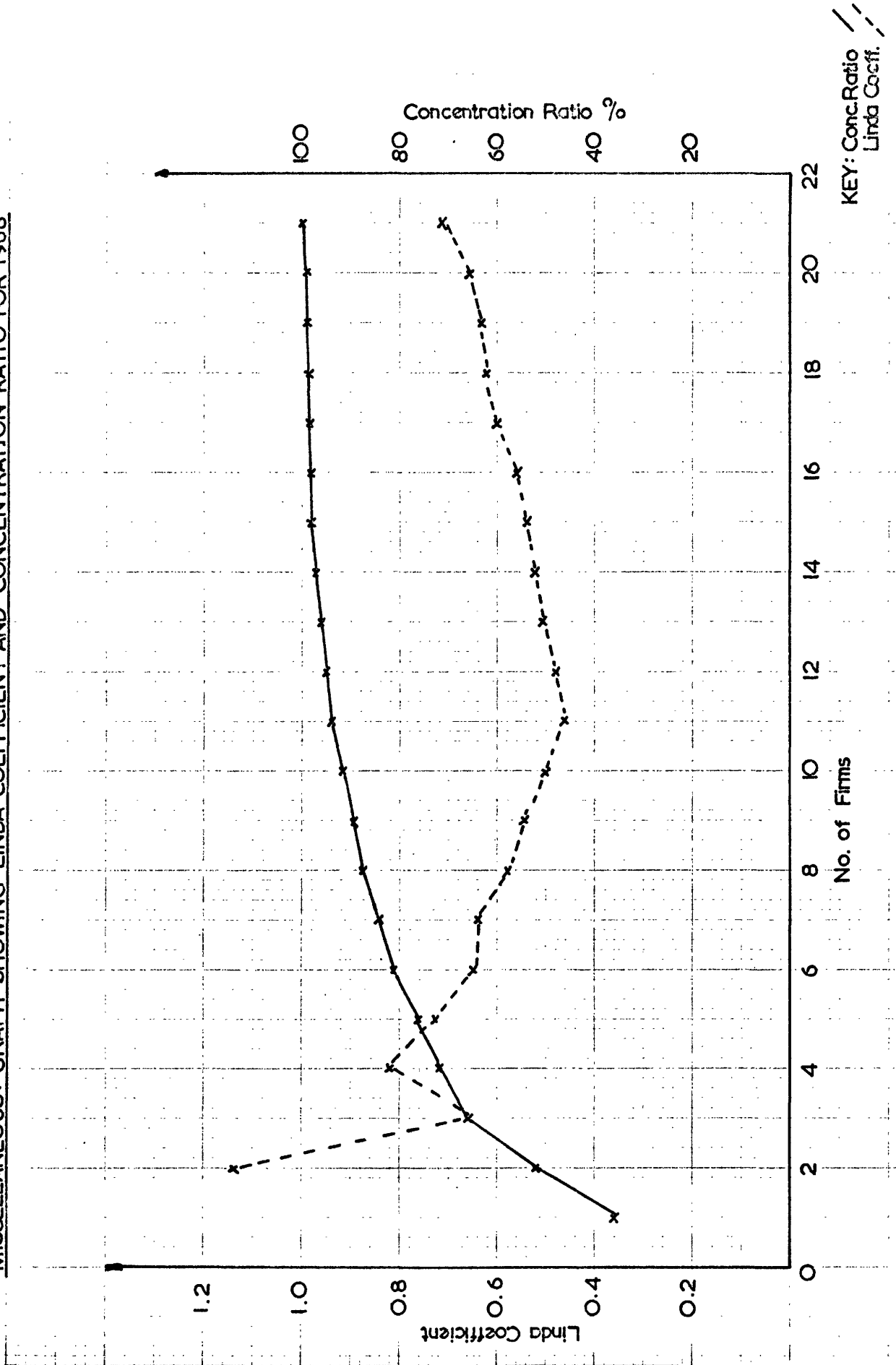
£'000

| YEAR | NUMBER OF COMPANIES | TOTAL TURNOVER | TOTAL EXPORTS | PRE-TAX PROFITS | TOTAL NET CASH FLOW | TOTAL EQUITY | TOTAL ANNUAL INVESTMENT |
|------|---------------------|----------------|---------------|-----------------|---------------------|--------------|-------------------------|
| 1968 | 21 | 63,475 | 7,468 | 5,467 | 4,261 | 20,199 | 3,685 |
| 1969 | 21 | 70,272 | 8,472 | 6,582 | 5,654 | 22,743 | 4,112 |
| 1970 | 21 | 75,090 | 7,485 | 5,825 | 5,872 | 21,645 | 3,962 |
| 1971 | 21 | 79,539 | 9,710 | 7,374 | 7,320 | 24,945 | 3,716 |
| 1972 | 21 | 85,751 | 9,472 | 7,921 | 8,248 | 26,028 | 3,303 |

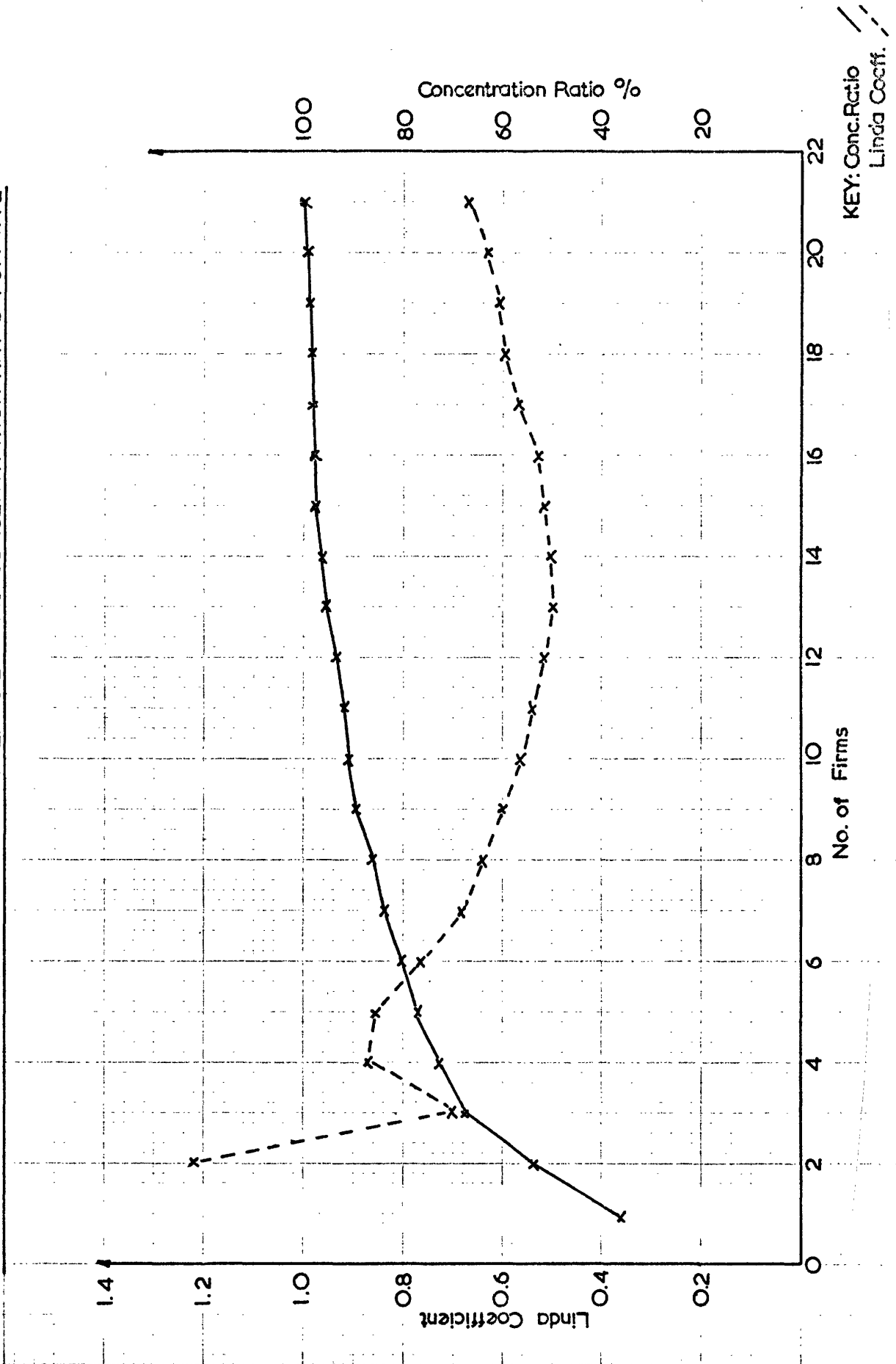
TABLE 48:
MISCELLANEOUS: ANALYSIS OF TURNOVER

| | 1968 | 1969 | 1970 | 1971 | 1972 |
|--------------------------|---------------|---------------|---------------|---------------|---------------|
| No. of Companies | 21 | 21 | 21 | 21 | 21 |
| Total Turnover ('000) | 63,475 | 70,272 | 75,090 | 79,539 | 85,751 |
| Mean | 3022.619 | 3346.286 | 3575.714 | 3787.571 | 4083.381 |
| Coefficient of Variation | 1.711 | 1.707 | 1.734 | 1.790 | 1.789 |
| Gini | 0.678 | 0.682 | 0.687 | 0.689 | 0.682 |
| Herfindahl-Hirschmann | 187.069 | 186.448 | 190.926 | 200.327 | 200.064 |
| Entropy | - 93.313 | - 93.191 | - 92.442 | - 91.422 | - 91.860 |
| Linda Index for N* | | | | | |
| Concentration Ratios % | | | | | |
| = 2 | 1.14 51.6 | 1.20 51.0 | 1.18 51.9 | 1.22 53.4 | 1.22 53.4 |
| = 5 | 0.73 76.7 | 0.70 76.7 | 0.71 78.3 | 0.81 77.9 | 0.86 77.3 |
| = 10 | 0.50 91.8 | 0.49 92.4 | 0.56 92.1 | 0.56 91.9 | 0.57 91.1 |
| = 15 | 0.55 97.8 | 0.54 98.1 | 0.55 97.8 | 0.55 97.8 | 0.52 97.6 |
| = 21 | 0.71 100.0 | 0.85 100.0 | 0.74 100.0 | 0.72 100.0 | 0.67 100.0 |
| | | | | | |
| | | | | | |
| | | | | | |

MISCELLANEOUS: GRAPH SHOWING LINDA COEFFICIENT AND CONCENTRATION RATIO FOR 1968



MISCELLANEOUS : GRAPH SHOWING LINDA COEFFICIENT AND CONCENTRATION RATIO FOR 1972



SECTION 4: SUB-SECTION 5

WALLCOVERINGS PRODUCT GROUP

During the main course of the study the analysis of those firms producing wallpaper and other paper-based wallcoverings has been excluded. It will be noted that in Section 2 the general analysis of the converting sector of the industry excluded wallpaper manufacturers. Instead, the product group is separately analysed in this section.

The reason for this approach is as follows: wallpaper manufacture is essentially a printing process whereby a pattern is applied to a base paper: the production of base paper for wallpaper is included in the manufacture of other printing and writing papers. For this reason, the analysis of the wallcoverings product group has been undertaken separately. the methodology was the same as described for the entire study.

The supply of wallpaper was the subject of a Monopoly Commission¹⁰. enquiry in the early 1960's. The largest firm in the product group, Wallpaper Manufacturers (WPM) was formed in 1899 by the voluntary amalgamation of thirty-one wallpaper firms. It was a merger-intensive firm throughout its existence until it was itself taken over by Reed Paper (now Reed International) in 1965. In 1899 it claimed to produce 98% of the total output of wallpaper, but since then there has been a downwards trend in this proportion, temporarily reversed by acquisitions. The Monopolies Commission concluded that such acquisitions may be expected to operate against the public interest, and recommended that further acquisitions should not be allowed without the permission of the (then) Board of Trade.

Developments since 1963 have also tended to limit WPM's market share. By 1966, ICI held approximately 10% and had entered the "vinyl" market; WPM were slow to follow. In addition, smaller companies were taken over by larger companies, in several instances with significant paints interests (ICI; Berger, Jenson & Nicholson; and Leyland Paints).

Throughout the period under examination, the product group has continued to be dominated by ICI and WPM, the former having significantly increased their share of the market. ICI is one of the UK's largest companies, being predominantly in the chemical industry. Because of the divisional organisation of the company, it was not possible to isolate from the consolidated accounts the financial statistics relating to their wallpaper interests only.

The financial statistics relating to the remaining companies identified in the product group are summarised in Table 49.

TABLE 49: FINANCIAL STATISTICS RELATING TO COMPANIES IDENTIFIED IN THE WALLCOVERINGS PRODUCT GROUP (Excluding ICI)

| Year | No. of Companies | Turnover | Exports | Net Cash Flow | Total Equity | Annual Additions to Investment |
|------|------------------|----------|---------|---------------|--------------|--------------------------------|
| 1968 | 8 | 35,365 | 3,105 | 3,870 | 26,083 | 1,981 |
| 1969 | 8 | 46,548 | 4,297 | 2,850 | 26,270 | 832 |
| 1970 | 8 | 52,966 | 5,195 | 1,534 | 30,362 | 1,026 |
| 1971 | 7 | 47,834 | 4,965 | 1,830 | 29,822 | 711 |
| 1972 | 8 | 38,379 | 4,487 | 2,480 | 31,967 | 1,552 |

As the statistics collected relating to this product group proved to be incomplete it was decided that any further analysis of concentration would be inconclusive.

APPENDIX A:

Comparison of Concentration Indices for all financial variables relating to companies in manufacturing and converting sectors of the U.K. paper industry;

MANUFACTURE

COMPARISON OF INDICES APPLIED TO DIFFERENT VARIABLES

| | <u>VARIANCE</u> | | | | |
|-------------------|-----------------|------|------|------|------|
| | 1968 | 1969 | 1970 | 1971 | 1972 |
| turnover | 2.03 | 2.08 | 2.10 | 2.04 | 2.05 |
| exports | 2.16 | 1.65 | 2.33 | 2.05 | 2.28 |
| profit before tax | 1.95 | 1.75 | 1.73 | 1.81 | 1.72 |
| net cash flow | 2.08 | 1.91 | 1.77 | 1.66 | 1.82 |
| own capital | 2.22 | 2.26 | 2.28 | 2.27 | 2.40 |
| gross investment | 2.07 | 2.14 | 2.10 | 2.35 | 2.70 |

| | <u>GINI COEFFICIENT</u> | | | | |
|-------------------|-------------------------|-------|-------|-------|-------|
| | 1968 | 1969 | 1970 | 1971 | 1972 |
| turnover | 0.728 | 0.736 | 0.731 | 0.719 | 0.715 |
| exports | 0.742 | 0.706 | 0.746 | 0.737 | 0.753 |
| profit before tax | 0.750 | 0.708 | 0.703 | 0.721 | 0.678 |
| net cash flow | 0.753 | 0.720 | 0.700 | 0.693 | 0.706 |
| own capital | 0.766 | 0.769 | 0.766 | 0.766 | 0.772 |
| gross investment | 0.758 | 0.780 | 0.761 | 0.788 | 0.742 |

| | <u>HERFINDAHL-HIRSCHMANN INDEX</u> | | | | |
|-------------------|------------------------------------|------|-------|------|-------|
| | 1968 | 1969 | 1970 | 1971 | 1972 |
| turnover | 80.2 | 82.0 | 80.8 | 78.2 | 78.9 |
| exports | 104.93 | 65.4 | 105.5 | 88.5 | 103.6 |
| profit before tax | 81.4 | 64.5 | 68.1 | 75.4 | 68.4 |
| net cash flow | 86.1 | 72.6 | 65.7 | 63.0 | 68.7 |
| own capital | 92.8 | 94.2 | 92.2 | 95.2 | 102.6 |
| gross investment | 82.5 | 86.1 | 80.9 | 98.7 | 125.8 |

| | <u>ENTROPY</u> | | | | |
|-------------------|----------------|--------|--------|--------|--------|
| | 1968 | 1969 | 1970 | 1971 | 1972 |
| turnover | -133.4 | -132.8 | -134.5 | -135.9 | -136.3 |
| exports | -123.8 | -134.7 | -127.1 | -129.3 | -126.0 |
| profit before tax | -128.5 | -138.2 | -135.9 | -131.6 | -138.0 |
| net cash flow | -129.0 | -136.2 | -138.6 | -138.4 | -137.9 |
| own capital | -127.3 | -127.3 | -128.9 | -127.3 | -126.2 |
| gross investment | -130.0 | -126.7 | -131.4 | -124.2 | -127.5 |

MANUFACTURE: COMPARISON OF INDICES APPLIED TO DIFFERENT VARIABLES

| VARIABLE | 1968 | 1969 | 1970 | 1971 | 1972 |
|--|---------------|---------------|---------------|---------------|---------------|
| Linda index where n* =4 Conc. ratios | | | | | |
| Turnover | 0.410 50.5 | 0.460 50.5 | 0.501 49.6 | 0.482 48.9 | 0.499 49.0 |
| Exports | 0.654 49.5 | 0.480 39.2 | 0.838 46.7 | 0.649 44.6 | 0.820 47.0 |
| Profit before Tax | 0.381 50.9 | 0.356 43.6 | 0.378 44.7 | 0.448 46.7 | 0.473 43.4 |
| Net Cash Flow | 0.435 51.2 | 0.482 45.9 | 0.324 44.8 | 0.322 42.9 | 0.450 43.6 |
| Own Capital | 0.556 52.2 | 0.586 52.2 | 0.594 51.4 | 0.453 54.6 | 0.523 54.8 |
| Gross Investments | 0.505 47.0 | 0.477 49.6 | 0.505 47.9 | 0.455 55.8 | 0.980 49.3 |

| VARIABLE | 1968 | 1969 | 1970 | 1971 | 1972 |
|---|---------------|---------------|---------------|---------------|---------------|
| Linda index where n* =10 Conc. ratios | | | | | |
| Turnover | 0.326 72.6 | 0.311 73.0 | 0.318 71.5 | 0.312 70.3 | 0.320 69.8 |
| Exports | 0.341 74.1 | 0.215 68.0 | 0.314 71.1 | 0.269 71.9 | 0.295 72.5 |
| Profit before Tax | 0.273 75.3 | 0.242 68.6 | 0.260 70.3 | 0.261 73.1 | 0.281 67.1 |
| Net Cash Flow | 0.316 75.7 | 0.276 69.8 | 0.291 67.7 | 0.258 68.2 | 0.272 68.2 |
| Own Capital | 0.336 76.5 | 0.347 76.0 | 0.338 75.3 | 0.372 76.0 | 0.394 75.8 |
| Gross Investments | 0.283 73.7 | 0.264 78.2 | 0.266 74.2 | 0.360 78.3 | 0.383 71.8 |

CONVERSION

COMPARISON OF INDICES APPLIED TO DIFFERENT VARIABLES

| | <u>VARIANCE</u> | | | | |
|-------------------|-----------------|------|------|------|------|
| | 1968 | 1969 | 1970 | 1971 | 1972 |
| turnover | 4.09 | 3.97 | 3.83 | 3.69 | 3.49 |
| exports | 5.15 | 4.74 | 4.22 | 4.15 | 3.94 |
| profit before tax | 4.02 | 3.68 | 4.01 | 3.53 | 3.26 |
| net cash flow | 3.81 | 3.66 | 3.67 | 3.31 | 3.07 |
| own capital | 4.65 | 4.42 | 3.76 | 4.05 | 3.94 |
| gross investment | 2.89 | 2.99 | 3.25 | 3.47 | 3.00 |

| | <u>GINI COEFFICIENT</u> | | | | |
|-------------------|-------------------------|-------|-------|-------|-------|
| | 1968 | 1969 | 1970 | 1971 | 1972 |
| turnover | 0.829 | 0.829 | 0.831 | 0.823 | 0.824 |
| exports | 0.905 | 0.896 | 0.898 | 0.905 | 0.910 |
| profit before tax | 0.859 | 0.847 | 0.852 | 0.854 | 0.840 |
| net cash flow | 0.845 | 0.834 | 0.837 | 0.831 | 0.822 |
| own capital | 0.834 | 0.828 | 0.777 | 0.818 | 0.824 |
| gross investment | 0.708 | 0.809 | 0.820 | 0.831 | 0.826 |

| | <u>HERFINDAHL-HIRSCHMANN INDEX</u> | | | | |
|-------------------|------------------------------------|-------|-------|-------|-------|
| | 1968 | 1969 | 1970 | 1971 | 1972 |
| turnover | 98.9 | 96.4 | 91.9 | 91.1 | 91.1 |
| exports | 179.2 | 156.7 | 128.4 | 133.0 | 133.3 |
| profit before tax | 97.3 | 84.6 | 101.7 | 87.4 | 83.4 |
| net cash flow | 87.7 | 83.7 | 85.1 | 75.8 | 73.6 |
| own capital | 126.6 | 117.9 | 88.9 | 108.1 | 115.2 |
| gross investment | 52.7 | 58.1 | 67.6 | 81.2 | 69.1 |

| | <u>ENTROPY</u> | | | | |
|-------------------|----------------|--------|--------|--------|--------|
| | 1968 | 1969 | 1970 | 1971 | 1972 |
| turnover | -140.3 | -140.6 | -141.8 | -142.0 | -140.1 |
| exports | -105.6 | -111.5 | -116.5 | -112.0 | -109.8 |
| profit before tax | -136.6 | -140.4 | -136.7 | -136.5 | -138.4 |
| net cash flow | -141.2 | -143.2 | -143.3 | -144.1 | -143.5 |
| own capital | -134.5 | -136.6 | -152.1 | -139.0 | -134.7 |
| gross investment | -166.9 | -154.4 | -149.9 | -142.9 | -144.3 |

CONVERSION

COMPARISON OF INDICES APPLIED TO DIFFERENT VARIABLES

| VARIABLE | 1968 | 1969 | 1970 | 1971 | 1972 |
|--|---------------|---------------|---------------|---------------|---------------|
| Linda index where n* =4 Conc. ratios | | | | | |
| Turnover | 0.597 54.9 | 0.549 54.6 | 0.540 53.1 | 0.552 52.7 | 0.538 53.0 |
| Exports | 0.800 72.4 | 0.735 68.6 | 0.651 63.3 | 0.418 68.7 | 0.449 68.0 |
| Profit before Tax | 0.567 52.7 | 0.545 49.0 | 0.641 51.7 | 0.492 51.5 | 0.488 50.3 |
| Net Cash Flow | 0.528 49.7 | 0.531 48.7 | 0.556 47.9 | 0.490 46.8 | 0.439 47.0 |
| Own Capital | 0.812 58.8 | 0.785 57.1 | 0.704 47.4 | 0.754 55.1 | 0.780 56.8 |
| Gross Investments | 0.457 39.2 | 0.380 42.0 | 0.528 44.5 | 0.529 48.3 | 0.431 45.1 |

| VARIABLE | 1968 | 1969 | 1970 | 1971 | 1972 |
|---|---------------|---------------|---------------|---------------|---------------|
| Linda index where n* =10 Conc. ratios | | | | | |
| Turnover | 0.475 71.0 | 0.480 70.3 | 0.479 68.7 | 0.463 68.6 | 0.467 68.7 |
| Exports | 0.727 87.1 | 0.598 84.8 | 0.425 82.3 | 0.484 85.7 | 0.474 85.7 |
| Profit before Tax | 0.384 73.5 | 0.331 72.8 | 0.414 72.8 | 0.354 73.3 | 0.381 70.4 |
| Net Cash Flow | 0.361 70.9 | 0.353 70.1 | 0.375 69.0 | 0.323 69.2 | 0.342 68.4 |
| Own Capital | 0.612 72.4 | 0.583 71.1 | 0.461 62.0 | 0.520 70.5 | 0.532 72.1 |
| Gross Investments | 0.326 55.9 | 0.300 60.0 | 0.327 64.0 | 0.333 70.6 | 0.293 68.3 |

APPENDIX B - TECHNICAL NOTE

COMPARISON OF CONCENTRATION OF FINANCIAL VARIABLES - THE EFFECTS OF
DIFFERENT RANKING

Certain methods of comparison have been suggested by economists of the EEC Commission with responsibility for co-ordination of this series of studies.¹ These depend upon the assumption that ranking of companies is similar, with respect to each of the financial variables. This assumption was found to be invalid in the two sectors of paper manufacturing and conversion.

The authors decided to examine differences in rankings according to each of the variables: turnover, exports, profits, net cash flow, equity and gross investment. The method used was that of rank correlation: firms were arranged in descending order with respect to each variable and simple correlation coefficients were computed between the different rankings of each firm. Two technical questions arose:

(a) because of "bunching" of values of certain variables, might rank correlation coefficients tend to be misleadingly low? This danger was aggravated by the uncertain accuracy of some of the data;

(b) how close to unity should a coefficient be in order to justify the use of the comparative analysis.

In order that any distortion of the kind described in (a) might be avoided, the validity of rank correlation coefficients was checked by examination of correlation between the logarithms of the corresponding series. Because of negative values of some variables (and the evident distorting effects of linear transformations to exclude these) a complete correlation-matrix of logarithms could not be produced. Where they could be calculated, these coefficients were very close to the coefficients of rank correlation.

Question (b) cannot be answered definitively, since the analysis combines both ordinal and cardinal principles. As an intuitive benchmark, it was decided to reject any coefficient which was below 0.900. Because the computation of the two sets of coefficients proved time-consuming, it was decided to confine the analysis to only one year. Because it was the middle year of the period, 1970 was chosen.

1. R. Linda: Problems of Economic Concentration and Competition (Documenti di lavoro del progetto "Il Sistema Impreditoriale Italiano" No. 2, November 1964. Available in English from the Fondazione Giovanni Agnelli).

The rank correlation coefficients for the 66 manufacturing firms were as follows:

| | Turnover | Exports | Net Cash Flow | Profits | Equity |
|------------------|----------|---------|---------------|---------|--------|
| Exports | 0.774 | | | | |
| Net cash flow | 0.863 | 0.711 | | | |
| Profits | 0.701 | 0.541 | 0.908 | | |
| Equity | 0.855 | 0.643 | 0.792 | 0.674 | |
| Gross investment | 0.870 | 0.650 | 0.772 | 0.590 | 0.805 |

Of the 15 coefficients only one (that between profits and net cash flow) exceeded 0.900. Moreover, if the 66 firms were regarded as a random sample of a larger group, none of the other coefficients would be consistent (at the 95% confidence level) with a population coefficient of 0.900².

For the converting sector (161 firms), also in 1970, the corresponding matrix is:

| | Turnover | Exports | Net Cash Flow | Profits | Equity |
|------------------|----------|---------|---------------|---------|--------|
| Exports | 0.774 | | | | |
| Net cash flow | 0.839 | 0.301 | | | |
| Profits | 0.700 | 0.287 | 0.922 | | |
| Equity | 0.828 | 0.339 | 0.783 | 0.667 | |
| Gross investment | 0.758 | 0.289 | 0.725 | 0.613 | 0.664 |

Once again, the only close rank correlation is between net cash flow and profits. The other values appear too low to justify any further analysis, which depends upon similarity of ranking.

Note that the low values associated with exports are consistent with the observation in Chapter 2, that those converters engaged in exports were generally those with special products or particular links with overseas countries. It was not expected that the ranking by exports would

2. Using Fisher's transformation, that is the (normally distributed) variable

$$z = \log e \frac{1+r}{1-r} \text{ with a standard deviation of } \sqrt{\frac{1}{n-3}}$$

correspond with that by any other variable, especially since exports are, for most firms in this sector, negligible.

APPENDIX C (a)

EXTERNAL TRADE IN MANUFACTURED AND CONVERTED PRODUCTS

EXPORTS BY ORIGINS AND DESTINATIONS

| MANUFACTURE | TOTAL ALL COUNTRIES | | COMMONWEALTH | | EEC | |
|--|---------------------|--------|--------------|-------|-----------|-------|
| | m. tonnes | £'000 | m. tonnes | £'000 | m. tonnes | £'000 |
| newsprint | 221 | 20 | 18 | 4 | 50 | 5 |
| uncoated p + w | 37,132 | 10,529 | 14,356 | 3,680 | 3,073 | 875 |
| coated p + w | 24,347 | 8,575 | 3,239 | 1,031 | 5,444 | 2,006 |
| kraft paper + board | 4,766 | 1,358 | 1,224 | 375 | 804 | 174 |
| cigarette paper in bulk | 440 | 157 | 101 | 37 | 23 | 10 |
| other machine-made paper | 93,789 | 17,771 | 14,735 | 3,672 | 50,873 | 6,649 |
| hand-made papers | 19 | 25 | 4 | 3 | 7 | 8 |
| greaseproof or parchment paper | 2,225 | 695 | 474 | 191 | 352 | 110 |
| composite paper or board | 2,970 | 711 | 1,317 | 285 | 247 | 100 |
| corrugated etc. paper and board | 13,399 | 2,511 | 5,803 | 976 | 840 | 260 |
| ruled paper + board | 2,141 | 864 | 593 | 212 | 220 | 121 |
| impregnated paper + board | 40,140 | 12,910 | 8,653 | 2,461 | 8,290 | 3,509 |
| wallpaper | 24,718 | 11,980 | 2,002 | 1,149 | 16,364 | 7,269 |
| CONVERSION | | | | | | |
| paper bags, paper board, boxes + other containers | 21,738 | 5,898 | | | | |
| packing containers of paper and paper board | 20,936 | 5,500 | 3,703 | 1,209 | 6,376 | 1,323 |
| stationery | 4,915 | 2,951 | 2,135 | 1,212 | 470 | 365 |
| exercise books, registers etc. | 4,348 | 3,284 | 2,073 | 1,499 | 262 | 259 |
| other articles of paper + board | 44,011 | 20,735 | | | | |
| cigarette paper cut to size | 1,014 | 485 | 294 | 130 | 10 | 6 |
| carbon + other copying papers cut to size | 5,224 | 5,644 | 1,677 | 1,482 | 1,049 | 1,363 |
| other paper and board cut to size | 18,712 | 6,638 | 4,690 | 1,608 | 3,714 | 1,150 |
| bobbins, spools, etc. | 654 | 304 | 122 | 56 | 188 | 55 |
| other articles of paper + board | 18,407 | 7,664 | 2,863 | 1,338 | 4,973 | 1,706 |

EXTERNAL TRADE IN MANUFACTURED AND CONVERTED PRODUCTS

IMPORTS BY ORIGINS AND DESTINATIONS

| MANUFACTURE | TOTAL ALL COUNTRIES | | COMMONWEALTH | | EEC | |
|---|---------------------|--------|--------------|--------|-----------|-------|
| | m. tonnes | £'000 | m. tonnes | £'000 | m. tonnes | £'000 |
| newsprint | 1,129,456 | 83,759 | 526,758 | 38,903 | 3,333 | 248 |
| uncoated p + w | 244,999 | 26,095 | 11,455 | 1,234 | 3,543 | 831 |
| coated p + w | 109,556 | 15,043 | 3,389 | 463 | 23,710 | 3,078 |
| kraft paper + board | 954,798 | 80,290 | 205,473 | 16,622 | 8,974 | 1,338 |
| cigarette paper in bulk | 978 | 356 | 84 | 23 | 570 | 244 |
| other machine-made paper | 369,680 | 32,488 | 24,461 | 1,309 | 21,472 | 2,530 |
| hand-made papers | 1 | 6 | 0 | 0 | 0 | 1 |
| greaseproof or parchment paper | 36,369 | 5,972 | 123 | 26 | 3,018 | 640 |
| composite paper or board | 21,574 | 1,377 | 9 | 2 | 17,982 | 1,014 |
| corrugated etc. paper and board | 35,919 | 4,964 | 4 | 1 | 1,784 | 367 |
| ruled paper + board | 178 | 221 | 0 | 1 | 52 | 104 |
| impregnated paper + board | 147,463 | 26,286 | 7,114 | 1,660 | 11,030 | 4,052 |
| wallpaper | 2,625 | 1,045 | 1 | 1 | 1,342 | 709 |
| CONVERSION | | | | | | |
| paper bags, paper board, boxes + other containers | 14,600 | 3,889 | | | | |
| packing containers of paper and paper board | 14,555 | 3,850 | 160 | 77 | 2,333 | 1,159 |
| stationery | 857 | 411 | 27 | 30 | 174 | 92 |
| exercise books, registers etc. | 2,408 | 1,577 | 204 | 138 | 822 | 581 |
| other articles of paper + board | 35,675 | 11,828 | | | | |
| cigarette paper cut to size | 1,522 | 802 | 115 | 30 | 279 | 143 |
| carbon + other copying papers cut to size | 323 | 457 | 19 | 23 | 101 | 139 |
| other paper and board cut to size | 23,701 | 7,112 | 889 | 442 | 2,120 | 1,017 |
| bobbins, spools, etc. | 854 | 328 | 3 | 2 | 348 | 197 |
| other articles of paper + board | 9,275 | 3,129 | 117 | 84 | 547 | 505 |

APPENDIX C(b)

SUMMARY: UK AND THE EEC "SIX" - BALANCE OF TRADE

| | £ million | | | | | | | | | | |
|--------------------|-----------|--------|--------|--------|--------|--------|-------|--------|--------|--------|--------|
| | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 |
| PAPER & BOARD* | | | | | | | | | | | |
| Imports | 5.72 | 6.63 | 7.35 | 6.51 | 5.94 | 6.77 | 7.14 | 8.52 | 9.71 | 12.25 | 15.51 |
| Exports | 5.06 | 5.82 | 6.54 | 6.74 | 7.59 | 7.44 | 9.06 | 11.99 | 12.56 | 13.90 | 21.10 |
| Balance | - 0.66 | - 0.81 | - 0.81 | + 0.23 | + 1.65 | + 0.67 | +1.92 | + 3.47 | + 2.85 | + 1.65 | + 5.59 |
| CONVERTED PRODUCTS | | | | | | | | | | | |
| Imports | 1.02 | 1.12 | 1.35 | 1.38 | 1.52 | 1.54 | 2.84 | 2.28 | 2.72 | 2.77 | 3.85 |
| Exports | 1.95 | 1.92 | 2.23 | 2.19 | 2.32 | 2.66 | 3.46 | 4.33 | 5.06 | 6.05 | 6.24 |
| Balance | + 0.93 | + 0.80 | + 0.88 | + 0.81 | + 0.80 | + 1.12 | +0.62 | + 2.05 | + 2.34 | + 3.28 | + 2.39 |

PAPER & BOARD based on SITC 641
 MANUFACTURES based on SITC 642

British Paper & Board Industry Federation

*includes building board

APPENDIX D : COMPANY PROFILES

Reed International Ltd.

The Dickinson Robinson Group Ltd.

Wiggins-Teape Ltd.

The Bowater Corporation Ltd.

COMPANY PROFILE

REED INTERNATIONAL LIMITED

Reed International Limited is a British based organisation and is the ninth largest U.K. company. It has an annual turnover in excess of £597 million and employs some 80,000 people - 17,000 of them overseas in 44 countries where Reed has interests.

The principal activities of Reed International and its subsidiary companies are the manufacture and merchandising of building products (plastic pipes and guttering, sanitary ware, pitch fibre pipes); wall-coverings including paint, textiles and furnishing fabrics; "do-it-yourself" products; pulp, paper and board products; paper and plastic packaging and stationery; and the printing and publishing of newspapers, consumer and business magazines, books, and other general printing.

The companies carrying out these activities are grouped into five main divisions, and their shares of total turnover in 1973 were as follows:

ANALYSIS OF 1973 TOTAL SALES AND PROFITS

| Division | Sales | | Profits | |
|------------------------|-------|-----|---------|-----|
| | £m | % | £m | % |
| Paper & Paper Products | 294.4 | 41 | 21.3 | 44 |
| Decorative Products | 150.9 | 21 | 10.4 | 21 |
| Publishing & Printing | 201.7 | 28 | 9.5 | 20 |
| Building Products | 20.3 | 3 | 3.5 | 7 |
| Other Activities | 40.8 | 7 | 3.7 | 8 |
| Total | 708.1 | 100 | 48.4 | 100 |

Reed Group Limited

One of the five main divisions - Reed Group Limited - embraces the majority of the paper and board manufacturing and the paper-converting and packaging interests in the U.K.

Reed Group Limited employs some 20,000 people in a total of five separate operating divisions and one service division:

Reed Paper & Board (UK) Ltd. (incl. Spicer-Cowan Ltd.)

Reed Corrugated Cases Ltd.

Reed Medway Division

Field, Sons & Co. Ltd.

Spicers Ltd.

Reed Transport & Shipping Division

Reed Paper & Board (UK) Ltd.

One of the largest manufacturers of paper and board in the world, Reed Paper and Board employs some 8,000 people and produces about one-fifth of the total U.K. output of paper and board on some forty machines at eleven mills.

Products include - newsprint, printing and writing papers, wrapping papers, tissue papers, special purpose papers, printing, packaging and specialty boards.

Through Spicer-Cowan, Reed Paper and Board has the largest paper merchanting organisation in Europe.

Reed Corrugated Cases Ltd.

One of the largest producers of corrugated fibre-board cases in Europe, Reed Corrugated Cases employs over 5,000 at its thirteen factories making over 30 million cases weekly.

The main activity of the company is the production of protective packaging for a wide cross-section of British Industry. In addition, the company offers a packaging advisory service to customers.

A specialist group of factories produces paper tubes, corrugated paper products, corrugated greaseproof and glassines for the food and confectionery industry.

Reed Medway Division

Reed Medway Sacks pioneered the development and utilisation of multi-wall paper sacks in the U.K. for packaging and refuse disposal.

Sacks are currently produced for packaging a wide range of commodities from animal feeds to fuel, and for local authority and industrial refuse disposal.

Field, Sons & Co. Ltd.

This company produces high quality cartons and display boxes, converting over 50,000 tonnes of packaging board each year at its three factories.

Spicers Ltd.

Through Spicers Ltd., Reed is a major manufacturer of envelopes, business and personal stationery, and many other converted paper products, as well as being a coater and laminator of a wide range of basic materials. Spicers employs more than 3,000 people at 24 factories in the U.K.

The Wallpaper Manufacturers Limited

Wallpaper Manufacturers (WPM) became part of Reed in 1965 and is the largest decorating products organisation in the world. 18,000 people are employed in W.P.M.s eight divisions: wallcoverings, paint, household textiles, Polycell (do-it-yourself products), Sanderson, merchandising and two retailing divisions.

The wallcoverings division produces from eight mills in the U.K. over 3,000 designs of wallpapers and vinyls. It has the largest share of the U.K. wallcoverings market and is a strong exporter.

COMPANY PROFILE

THE DICKINSON ROBINSON GROUP

The Dickinson Robinson Group is a British-based organisation employing over 20,000 people in the U.K. Recent statistics* indicate that the Group is one of the most profitable companies in the U.K. paper industry.

The principal activities of the Group are the manufacture and marketing of envelopes, branded stationery and papers, and of packaging materials from paper, board, plastics and metal foils. There are also important activities in specialised engineering. In 1973 the turnover and contribution to trading profit of the Group's activities were as follows:

ANALYSIS OF 1973 TOTAL SALES AND PROFITS

| Division | Sales | | Profits | |
|--------------------------------------|-------|-----|---------|-----|
| | £m | % | £m | % |
| Envelopes, stationery and packaging: | | | | |
| UK: | 162.0 | 69 | 14.4 | 68 |
| Overseas: | 63.7 | 27 | 6.1 | 29 |
| Engineering | 9.5 | 4 | 0.8 | 3 |
| Total | 235.2 | 100 | 21.3 | 100 |

The U.K. companies carrying on these activities are grouped into five principal divisions: the paper and board division; the envelope-making and manufactured stationery division; the packaging division; the consumer products division; and the engineering division.

* Management Today, October 1974

The Paper and Board Division

This division comprises the five mills of John Dickinson & Co. Ltd. engaged in paper and board manufacture, which are as follows:

| | | |
|-----------------------------|---|---|
| Croxley Mills, Watford | : | printing, writing and specialty papers |
| Nash Mills, Hemel Hempstead | : | pulp board |
| Keynsham Mill, Bristol | : | coated and uncoated MG packaging papers |
| Fife Paper Mills, Scotland | : | fine papers, MG, carbonless copy papers |
| Balerno Mills, Balerno | : | carbonless copy papers |

Envelope Making and Manufactured Stationery Division

The remaining mills of John Dickinson & Co. Ltd. are engaged in converting the products of the manufacturing division into final product forms, which are as follows:

| | | |
|---------------------------|---|---|
| Aspley, Hemel Hempstead | : | commercial envelopes, paper and film bags, personal stationery, commercial notebooks and drawing books, document wallets and files, paste-boards, printers' cards and continuous stationery; Production machinery for own use. |
| Malago Works, Bristol | : | paper and film bags for general packaging purposes. |
| Northern Works, Liverpool | : | commercial envelopes, carrier bags and personal stationery. |
| Basildon Works, Tottenham | : | commercial envelopes, labels and table stationery; Production machinery for own use. |
| Leighton Buzzard Factory | : | rigid transparent boxes. |

Certain departments within the division specialise in the production of sterilization packaging for use in hospitals.

Packaging Division

Eleven subsidiaries within this division are concerned primarily with paper and board packaging, the remaining seven are engaged in allied activities and distribution. The types of paper and board packaging manufactured are as shown overleaf:

- Robinson Sacks : multiwall paper sacks, baler bags and refuse sack equipment.
- Kent Kraft Mills : kraft paper for sacks.
- RWP Flexible Packaging : flexible packaging, coated papers, laminates of paper, foil and plastic films, packaging systems.
- Robinson Cartons and Printing : cartons, envelopes, and colour-printed packaging systems.
- New Merton Board Mills : lined and unlined chipboard and fibreboard combined.
- John Laird and Son : cartons, boxes, flexible packaging, labels, colour printing, corrugated cases and corrugated greaseproof.
- DRG Cups : disposable drinking cups, plates and combines.
- Shirley Box : cartons, rigid boxes and packaging systems.
- Robinson Boxes : solid and transparent rigid boxes.
- DRG Hospital Supplies : disposable hospital products.
- Robinson Multiple Packaging : multi-unit packaging.

Consumer Products Division

This division comprises the three mills of Adhesive Tapes Ltd. and Industrial Sealants Ltd.; the products manufactured include self-adhesive tapes, special adhesives, gummed paper and tapes.

COMPANY PROFILE

WIGGINS TEAPE LTD.

Wiggins Teape Ltd. is the largest manufacturer of fine and specialty papers in the United Kingdom. In addition to being papermakers, Wiggins Teape are also converters and merchants of a wide range of papers and allied products, with twelve paper mills and six factories in Britain and others in Belgium, Eire, Latin America, Africa and Asia. It also has sales offices and warehouses in many parts of the world and is the largest exporter of paper from the U.K.

Wiggins Teape's most important product is carbonless copying paper, produced at the Company's mills in South Wales and Belgium. Other papers which are leaders in their respective fields are natural tracing, photographic, gummed, heat-seal and self-adhesive papers, all produced in the U.K. Cigarette tissue paper is the principal produce in Indian and Brazilian mills.

Total Group turnover exceeded £180 million in 1973; the following table shows a breakdown of total production:

ANALYSIS OF TURNOVER IN 1973

| | <u>% of total</u> |
|--|-------------------|
| Commercial and packaging papers | 25 |
| Fine and industrial papers | 23 |
| Drawing, office and photographic paper | 10 |
| Stationery | 6 |
| Gummed paper and adhesives | 10 |
| Merchanting | 9 |
| Miscellaneous | 17 |
| | <hr/> |
| | 100% |

In 1970 Wiggins Teape Ltd. was taken over by British American Tobacco Co. Ltd. The main activity of British American Tobacco and its subsidiaries is in the tobacco industry, but it also has sizeable interests in retailing and the paper and cosmetics industry.

British American Tobacco is the world's largest manufacturer of tobacco products including cigarettes, cigars and pipe tobacco, although tobacco products are not sold on the domestic U.K. market.

The Group's interests in the cosmetics industry comprise the Yardley, Lenthéric, Morny, Germain Monteil, Scandia and Tuvaché companies.

In addition to the 25.6% interest acquired in 1971 in Horten A.G., a leading department store organisation in West Germany, British American Tobacco has acquired other substantial U.K. interests in retailing more recently.

In addition to Wiggins Teape, British American Tobacco is the joint owner with the Imperial Group Ltd. of Mardon Packaging International Ltd., which produces a wide range of packaging and promotional materials in the U.K. and Europe.

The following table shows an analysis of the turnover and profits of the British American Tobacco Co. in 1973:

ANALYSIS OF B.A.T. 1973 TOTAL SALES AND PROFITS

| Division | Sales | | Profits | |
|------------------|--------|-----|---------|-----|
| | £m | % | £m | % |
| Tobacco | 2162.1 | 77 | 193.7 | 78 |
| Retail | 334.1 | 12 | 12.9 | 5 |
| Paper | 230.3 | 8 | 18.7 | 7 |
| Cosmetics | 46.2 | 2 | 2.5 | 1 |
| Other activities | 35.0 | 1 | 21.9 | 9 |
| Total | 2807.7 | 100 | 249.7 | 100 |

COMPANY PROFILE

THE BOWATER CORPORATION

The Bowater Corporation is a British-based company with significant overseas interests, employing over 20,000 people in the U.K. alone.

The company, through its subsidiaries, is the largest producer of newsprint in the world, as well as being a substantial manufacturer of woodpulp and a wide range of printing and coated stationery, packaging paper, hardboard and other products. Subsidiaries operated in association with Scott Paper Company of the U.S.A. produce, in the U.K. and Australia, household tissues and hygienic paper products.

The company is also an important producer in the packaging industry of both the U.K. and Europe. The following table shows a geographical analysis of company performance:

GEOGRAPHICAL ANALYSIS OF SALES AND PROFITS IN 1973

| £m | U.K. | North America | Australasia | Europe | Far East | Other Overseas |
|------------------|-------|---------------|-------------|--------|----------|----------------|
| Sales | 425.6 | 249.5 | 91.3 | 148.0 | 66.5 | 17.9 |
| % of total sales | 42.6 | 25.0 | 9.0 | 15.0 | 7.0 | 1.4 |
| Profit | 17.6 | 17.4 | 5.6 | 4.1 | 3.4 | 1.1 |

As part of the company's policy to broaden its base, a Building Products Division was formed in 1970. This division manufactures building components, factory-made housing units, bedroom and dining-room furniture and carpets. An analysis of performance in each of the divisions is shown in the following table:

ANALYSIS OF 1973 TOTAL SALES AND PROFITS

| Division | Sales | | Profits | |
|-----------------------|--------------|------------|-------------|------------|
| | £m | % | £m | % |
| Paper and pulp | 199.5 | 20 | 18.7 | 38 |
| Packaging | 70.7 | 7 | 5.7 | 12 |
| Building products | 97.7 | 10 | 7.4 | 15 |
| Tissue products | 54.9 | 6 | 6.0 | 12 |
| Trading and transport | 576.1 | 57 | 11.2 | 23 |
| Total | 998.9 | 100 | 49.0 | 100 |

The subsidiaries of the Corporation within the U.K. paper industry are described below together with the product markets in which they operate.

Paper Group

- Bowaters U.K. Paper Co. : Management company; manufacture of newsprint, roll and blade coated papers, printing, stationery and packaging papers.
- Bowaters Paper Sales : Distributors of products of U.K. Paper Co.
- The Donside Paper Co.
(50% Bowater/50% Reed Intl.) : Blade coated and uncoated papers.

Packaging Group

- Bowater Packaging : Management and holding company; manufacture of corrugated and solid fibreboard containers, sacks, drums, cartons and other packaging products.
- Bowater Containers : Distributors of corrugated and solid fibreboard containers of Bowater Packaging.
- Bowater Flexible Packaging : Distributors of flexible packaging products of Bowater Packaging.
- Bowater Industrial Packaging : Distributors of sacks, drums, paper and foil products of Bowater Packaging.

APPENDIX E

OFFICIAL GOVERNMENT INDICES OF WHOLESALE PRICES - COMMODITIES PRODUCED IN THE U.K.

| | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Paper + board (excl. building board) | 100.0 | 101.9 | 104.4 | 104.9 | 104.6 | 113.0 | 117.3 | 128.5 | 136.6 | 142.5 |
| Paper - uncoated | 100.0 | 101.6 | 103.6 | 103.9 | 103.5 | 112.3 | 116.1 | 126.3 | 134.4 | 140.4 |
| Paper - coated | 100.0 | 101.7 | 103.1 | 103.8 | 103.1 | 111.3 | 112.9 | 123.0 | 128.2 | 132.9 |
| Board - uncoated | 100.0 | 103.0 | 108.8 | 109.7 | 109.8 | 116.4 | 125.4 | 140.9 | 151.6 | 157.8 |
| Board - coated | 100.0 | 103.0 | 105.3 | 106.7 | 107.1 | 115.7 | 120.9 | 131.9 | 140.9 | 145.3 |
| Printings + writings (incl. newsprint) | 100.0 | 101.6 | 103.6 | 103.7 | 104.5 | 114.7 | 118.2 | 129.0 | 136.9 | 143.1 |
| Food wrapping papers | 100.0 | 102.9 | 106.5 | 107.0 | 105.7 | 112.9 | 115.2 | 122.2 | 136.1 | 140.6 |
| Kraft wrapping papers | 100.0 | 102.7 | 103.5 | 104.5 | 101.0 | 112.3 | 118.4 | 130.4 | 135.3 | 145.7 |
| Other wrapping + packing papers | 100.0 | 100.6 | 103.3 | 103.2 | 100.9 | 98.8 | n/a* | n/a* | n/a* | n/a* |
| Household, toilet papers + tissues | 100.0 | 102.2 | 104.5 | 105.7 | 103.4 | 113.8 | 116.1 | 125.4 | 131.0 | 138.1 |
| Industrial + special purpose papers | 100.0 | 100.9 | 102.2 | 102.8 | 102.4 | 111.6 | 115.4 | 125.1 | 135.6 | 139.7 |
| Packaging boards | 100.0 | 103.2 | 110.3 | 111.0 | 111.2 | 118.5 | 128.7 | 145.8 | 156.8 | 162.5 |
| Industrial + special purpose boards | 100.0 | 103.3 | 104.8 | 105.5 | 105.5 | 109.8 | 115.1 | 125.3 | 135.2 | 143.1 |
| Cardboard boxes, cartons + fibreboard packing cases | 100.0 | 102.8 | 108.6 | 110.2 | 110.5 | 114.3 | 122.7 | 137.6 | 148.4 | 157.2 |
| Paper sacks | 100.0 | 106.1 | 110.1 | 112.1 | 112.7 | 120.1 | 117.3 | 127.6 | 132.8 | 143.1 |
| Paper bags | 100.0 | 101.9 | 104.8 | 106.0 | 103.4 | 108.2 | 113.0 | 125.1 | 134.4 | 149.0 |
| Manufactured stationery | 100.0 | 100.4 | 103.1 | 107.0 | 107.3 | 113.1 | 119.9 | 132.9 | 146.4 | 155.8 |
| Wallpaper | 100.0 | 99.8 | 100.8 | 112.7 | 116.2 | 129.7 | 124.2 | 143.6 | 157.7 | 171.4 |

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British Paper & Board Industry Fed.

*no longer published by Department of Trade and Industry

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