COMMISSION OF THE EUROPEAN COMMUNITIES
DIRECTORATE-GENERAL COMPETITION
IV/A-3

A STUDY OF THE EVOLUTION OF CONCENTRATION IN THE DANISH PHARMACEUTICAL 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.

THE DANISH PHARMACEUTICAL INDUSTRY

NIELS JØRGENSEN

CONTENTS:

Introduction

This analysis of the Danish pharmaceutical trade has taken place during 1974, and it is one of a number of analyses of a similar kind which are made or have been made at the instance of the EC Commission in each member country of the Common Market in order to analyse the relationship between concentration and competition. A knowledge of this relationship is useful in connection with the administration of the provisions of the Rome Treaty as to competition, viz. the articles 85 to 90.

In 1974, there have been made analyses of three trades in Denmark:

(1) Radio and Television (ISIC sub-group 3731)
(2) Electric Household Appliances (ISIC sub-group 3722)
(3) Drugs (ISIC sub-group 3194)

These trades have been selected because they

(1) have a considerable size
(2) are not monopolized
(3) do not have an atomistic structure.

In Denmark the analyses have been made by

Professor, Master of Economics, Th. Herborg Nielsen.
Lektor, Master of Economics, Jens Vestergård and
Adjunkt, Master of Economics, Niels Jørgensen.

This analysis has been made by
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Summary and Main Conclusions

The object of the present analysis of the Danish pharmaceutical trade for the period 1968-1973 has been to describe its structural development and to give an estimate of its development of the near future on that basis. This has been done through a description of the general trends of the total Danish pharmaceutical sector, a more detailed description, quantitatively as well as qualitatively, of the Danish pharmaceutical industry and the development in its concentration and through a description of the competitive situation for 8 important product markets.

Section 1 is a brief introductory section whose main purpose is to delimit the enterprises included in the Danish pharmaceutical industry and to delimit the final products conceived of in the following exposition as pharmceutical products. This section also states which sources have supplied information to the analysis.

Section 2 is a general section dealing with the essential development trends. Firstly, the total production of pharmaceutical products in Denmark is described, and it is ascertained that it has grown considerably, i.e. almost doubling during the period. Secondly, we deal with the development in the delimited trade. From 1968 to 1973, there has been a vigorous increase in both turnover, number of employees, as well as wage bill, but it is pointed out at the same time that both the wage bill and the turnover have grown considerably more than the number of employees. The number of enterprises in the trade has been almost unchanged over the period. Following these trade statements there is a more detailed description of the MEFA-enterprises. It appears from this description also that the production per employee has grown considerably. It appears moreover, from a distribution of the employees on functions that the pharmceutical enterprises employ an important part of their employees in research and control departments. Thirdly, the development in the Danish foreign trade with pharmaceutical products is described. It appears from the tabulations that imports as well as exports have shown a vigorous growth where both have almost doubled, but exports have, however, exceeded imports to an ever larger extent. It is pointed out that the EC-countries have

the largest dominance as far as imports are concerned, especially West Germany and UK, while Scandinavia, Sweden especially, is the most important export market of the pharmaceutical industry. Finally, section 2 shows the development in the Danish consumption of medicine. We see also here a vigorous increase, and it appears that the gross turnover of the pharmacies has grown by more than 50 per cent. It also appears that the main part of the medicine consumed are pharmaceutical specialities and the part which is subsidized is very large. At the same time, however, a comparison of prices shows that the prices of drugs have grown less than the average of consumer goods.

Section 3 contains a description of the development in various concentration measurements and an evaluation of the future development in the concentration in the Danish pharmaceutical industry. It appears from the development in the values of the inequality indices - the coefficient of variation, the Gini coefficient, the Herfindahl-Hirschmann index and the Entropi index - that the trade has seen a growing inequality between its enterprises, buton the other hand that this increase has been relatively slight. The increase is mainly due to the fact that the largest of the enterprises haveall grown, while the small enterprises have stagnated. Thus it appears also from the various concentration ratios that the largest of the trade's enterprises account for a slightly larger share of both turnover as well as number of employees and wage bill. On the other hand this increase is very modest. This means in other words that it is a shift between the largest of the enterprises which is due to the growing inequality within the trade as it expresses itself in the inequality measurements. This is also confirmed by the Linda index values which show a considerable increase over the period.

It is also ascertained in this section that the Danish pharmaceutical industry is mainly Danish-owned, that most of the enterprises are family joint stock companies, and that it, by and large, is the same enterprises which are in the trade in 1973 that were also in the trade in 1968. On this basis and on the basis of the development trends in product development, production costs, research costs and marketing costs we must conclude that a further concentration of the Danish pharmaceutical industry is to be ex-

pected in the years to come. This concentration need not necesarily take place in the way that Danish enterprises are bought by the large foreign combines; it may also be caused by fusions and an integrated cooperation especially within research. We also conclude that the share of the Danish pharmacies of the total production will be falling until it stabilizes at a somewhat lower level.

Section 4 is a qualitative description of the Danish pharmaceutical trade. After a brief exposition of the existing structure with producers, importers, whole-salers, pharmacies, and public control, the seven largest producers of medicine are described. The main product lines are stated, how conditions as to ownership are and which subsidiary and sales companies they have established during the years. Finally, it is stated which product groups the enterprises produce or sell apart from medicine. It appears from this description that the industry is Danish-owned, that the industry is internationally oriented, and that there is only a limited diversification - the enterprises are largely pure pharmaceutical factories. In a later section we also show the close connection between the Danish and the Swedish pharmaceutical industries. Finally, three small sub-sections indicate which foreign enterprises are represented on the Danish market and how the wholesale trade and the retail trade are organized.

Section 5 is an analysis of a number of different product markets. We open, however, with a discussion of the general competitive situation for pharmaceutical preparations. It is noted that there is a large number of product markets, and that the individual products have a relatively short existence. Therefore, competition takes place partly by furthering existing products, partly by launching new preparations. The marketing of new products is different, however, according to the degree of innovation which the preparation introduced represents. The registration of pharmaceutical specialities, including the problem with names, is stated as another aspect in the evaluation of the competitive situation in the individual product markets. It is indicated that the pharmacies have a preferential position, and that restrictions as to names may have limited the number of suppliers on the individual narrow product markets.

Then 8 product markets are analysed: psychopharmacological drugs, tranquilizers, antibiotics, vitamins, analgesics, contraceptive pills, insulin and sulphonamides, and CR_4 and L_4 are calculated for the last three years. In all product markets a minority of suppliers are predominant, yielding a relatively high CR_4. In one individual market there is an acutal monopoly. It is typical, however, that different enterprises are predominant in the different product markets, so that no single enterprise can be said to have any dominant influence on the total Danish market.

1. Delimitations

1.1. Delimitation of Enterprises and Firms Within the Trade

To delimit the enterprises of the trade the same principles as those employed by the National Bureau of Statistics at the making up of Industristatistik have been used. Cf. for instance Industristatistik 1971, Statistiske Meddelelser 1974, 3.

This delimitation has been chosen to be able to use to the widest extent possible the surveys and results of the official industrial statistics as a starting point and basis for comparisons.

Enterprises manufacturing drugs are delimited along the following lines:

(1) An enterprise is understood as a local unit exercising an economic activity. If a local unit exercises several important activities, and there are no possibilities of registering any distinction of them, the activities are registered under one unit, and the main activity forms the basis for the classification of the unit in the trade.

(2) Only enterprises with at least 6 workers or salaried employees are considered industrial enterprises.

(3) Only enterprises achieving the main part of their value added through productive activity are considered industrial enterprises.

(4) Only enterprises achieving the main part of their turnover within the final products mentioned in 1.2. are included in trade 3194 - pharmaceutical factories.

This delimitation implies that no pharmacy is included.

The firms of the trade are delimited along the following lines:

A firm is understood as a corporation aggregate exercising one or several economic activities in one or several local units. Thus, a firm may comprise one or several enterprises.

In the trade production of drugs are included firms whose main activities fall within the production of the final products mentioned in section 1.2.

1.2. Delimitation of the Final Products of the Pharmaceutical Trade

Final products are understood as goods or services supplied to others.

Drugs are found in chapters 29 and 30 in the Brussels nomenclature or in chapter 54 in the SITC nomenclature.

The final products of the trade consist of the following main product groups:

	SITC	BTN
Vitamins and provitamins	541.10	29.38
Penicillin, streptomycin, tyrocidin and other antibiotics	541.30	29.44
Alkaloids of opium, cocaine, quinine and other vegetable alkaloids, their salts and other derivatives	541.40	29.42
Hormones	541.50	29.39
Glycosides and derivatives	541.61	29.41
Organotheurapeutic glands and other organs and their extracts	541.62	30.01
Bacterial products, serum and vaccines	541.63	30.02
Remedies	541.70	30.03
Cotton wool and the like impregnated or coated with phramceutical preparations or in retail sale packages	541.91	30.04
Other pharmaceutical products	541.99	30.05
Sulphonamides	512.86	29.36

The main group which will be treated most detailed in the following is BTN 30.03 which is also called pharmaceutical specialities.

1.3. Information and Statistical Material

The Danish pharmaceutical industry has turned out to be an extremely unapproachable trade. None of the enterprises have published their accounts before 1973 after which date it is prescribed by the law to do so, and only a few small enterprises have been prepared to fill in the questionnaires submitted to them. In return some importers of drugs and sales companies have supplied some information. Therefore, the analysis is based to a wide extent on information and statistical material from other sources than the actual enterprises.

To a wide extent, section 2 is based on statistical material from the publications of the National Bureau of Statistics:

Industristatistik (Industrial Statistics)
Produktionsstatistik (Production Statistics)
Import- og eksportstatistik (Import and Export Statistics)
and from the publications published by the trade associations MEFA and the Danish Pharmaceutical Chemists' Association.

Section 3 is based on information from
Aktieselskabsregistret (The Danish Register of Companies)
Industristatistikken (Industrial Statistics)
Greens danske fonds og aktier (Green's Danish Stocks and Shares)
Kompas Danmark
The 500 largest enterprises in Denmark
Submitted questionnaires and
Interviews with trade experts and managers.

Apart from the above-mentioned, section 4 is based on information from published reports in Denmark and Sweden as to supply of drugs and announcements from the Monopolies Authorities plus a publication published by MEFA in 1973: 40 years with drugs.

The analyses in section 5 are based on the turnover figures from selected Danish pharmacies and on information from the National Health Service.

2. Development Trends In the Trade

2.1. The Production of Pharmaceutical Products

Table 2.1. shows the total Danish production of pharmaceutical products for the period 1968 to 1973. Pharmaceutical products are understood as pharmaceutical specialities and bulk goods as delimited in section 1.2.

The table includes the production of this type of products for the total Danish industry whether the enterprises in question are classified under trade 3194 or not.

The products are stated in prices ex factory, and during the period these prices have risen only slightly. It appears from the table that the production has almost doubled during the period and that the main part of the production are manufactured goods - pharmaceutical specialities. The production of drugs of the Danish pharmacies is not included in the figures.

2.2. The Pharmaceutical Industry (Trade 3194)

Table 2.2. shows the development in the Danish pharmaceutical industry during the period 1968-73. The number of enterprises is almost unchanged, and it is also to a wide extent the same enterprises which existed in 1968 that are in the trade to-day. Furthermore, the enterprises have almost the same relative sizes to-day as in 1968. The largest enterprises are all members of the trade association MEFA, and these enterprises will be described in detail in the following.

The total turnover, including about 15 per cent trade turnover, has almost trebled during the period, while the number of employees has only grown from 3,126 to 6,020. In other words, the turnover per employee has grown considerably as it also appears from the table.

The total wage bill, however, has more than trebled during the 6 years. This development is a result partly of a vigorously increasing wage level in Denmark generally and partly of the fact that the enterprises employ a group of highly qualified

employees whose salaries have grown more than the average wages.

If we look at the MEFA enterprises alone, table 2.3. also illustrates the increased productivity in the trade and by its grouping of the employees table 2.4. illustrates the fact that a very substantial part of those employed are salaried employees.

Finally, tables 2.5. and 2.6. shows the development in two of the most disputed cost items. Table 2.5. shows a substantial increase in the MEFA enterprises' costs to public relation and advertising from 1968 to 1972, and table 2.6. shows an equally pronounced increase in research costs.

Table 2.1. The Danish Production of Pharmaceutical Products (million Dkr).

	1968	1969	1970	1971	1972	1973
Total production	471	528	592	657	735	827
Bulk products of this	109	118	148	154	141	178

Source: Product statistics from the National Bureau of Statistics.

Table 2.2. Development In the Pharmaceutical Trade 1968-73.

	1968	1969	1970	1971[x)]	1972	1973
Number of enterprises	24	25	28	29	27	27
Total turnover million Dkr	425	494	573	862	973	1170
Number of employees	3,126	3,556	3,339	5,284	5,672	6,020
Turnover per employee 1000 Dkr	134	139	171	163	172	194
Total wage bill million Dkr	104	117	129	253	301	358

Source: The National Bureau of Statistics: Industristatistik and own calcualtions.

x) The vigorous increase in 1971 is mainly due to the fact that Novo is now classfied in the trade.

Table 2.3. The Production of Drugs of the MEFA Enterprises 1968 and 1972.

	1968	1972
The production of drugs of the MEFA enterprises million Dkr	380	660
Production personnel	2,411	2,504
Production value per employee in the production 1000 Dkr	158	264

Source: Medicinsk Forum 1973, no. 3.

Table 2.4. The Personnel of the MEFA Enterprises 1968 and 1972

	1968		1972	
	number	%	number	%
Research	712	17	785	18
Production	2,411	58	2,504	57
Control	221	5	262	6
Sales	428	10	424	9
Administration	421	10	427	10
Total	4,193	100	4,402	100

Source: Medicinsk Forum 1973, no. 3.

Table 2.5. Direct Costs to Public Relation and Advertising of the MEFA Enterprises 1968 and 1972.

	1968		1972		
	million Dkr	%	million Dkr	%	
Advertisements	2,882	22	4,709	24	
Printed papers	3,026	23	3,401	18	
Pharmaceutical advisers	5,368	40	8,257	43	
Pharmaceutical tests	1,128	8	1,195	6	
Other	958	7	1,810	9	
Total	13,362	100	19,372	100	

Table 2.6. Research and Development Costs of the MEFA Enterprises 1968 and 1972

	1968	1972	
Research costs million Dkr	45	65	

Source: Medicinsk Forum 1973, no.3.

Table 2.7. shows Denmark's imports of pharmaceutical products distributed on EC member countries for the period. Here, the EC countries account for a substantially larger share than exports do. In 1973 almost 50 per cent of the imports came from the enlarged Common Market.

Also with respect to imports are West Germany and UK Denmark's most important trading partners within the EC with exports to Denmark in 1973 of 92 and 76 million Dkr, respectively. It appears from the table, furthermore, that the exports to Denmark forthe other countries within the EC have stagnated.

Outside the EC, Switzerland, USA, and Sweden are important exporting countries.

If table 2.7. is compared to figure 2.1. it appears that the growth in imports is based mainly on bulk products, while imports of pharmaceutical sepcialities are stagnant.

The growth in both imports as well as exports illustrates the internationalization that has taken place in the Danish pharmaceutical industry as a consequence of a pronounced specialization in product groups.

2.3. Danish Exports and Imports of Pharmaceutical Products.

The Danish pharmaceutical industry is a pronounced exporting industry. If we compare table 2.8. which shows Danish exports of pharmaceutical products distributed on EC countries for the period, with table 2.1. which shows the total Danish production of these products, it appears that an ever larger share of this production is exported.

It appears from table 2.8., furthermore, that the enlarged EC takes a substantial part of these exports, but that the share, however, amounted to about 28 per cent only in 1973.

In contrast, figure 2.2. clearly illustrates where the most important markets of the Danish pharmaceutical industry are situated - viz. in Scandinavia. In 1973 the exports to Sweden, Norway and Finland totalled 191 million Dkr or almost as much as total exports to the enlarged EC. Apart from EC, USA, Spain, and Switzerland are large recipient countries.

With 69 million Dkr West Germany is by far the largest recipient country of the EC countries followed by UK with 36 million Dkr. As a whole the exports to the individual EC countries have grown steadily during the period.

The rest of the exports is distributed on a large number of countries both in the rest of Europe as well as Asia, America, and Africa which also appears from figure 2.2.

Table 2.9. shows the distribution of exports on groups of preparations. The group penicillin and other antibiotics is clearly the most important, but it must be noted that the exports of insulin totalling 103 million Dkr make Denmark the world's largest exporter of this product.

Figure 2.1. shows, among other things, the exports of pharmaceutical specialities which amounted to about 425 million Dkr in 1973. If this figure is compared with the figures in table 2.2. for total exports, it appears that the share of bulk products of the exports has grown during the period.

Table 2.7. Danish Imports of Pharmaceutical Products Distributed On Countries For the Period 1968-1973 (million Dkr).

	1968	1969	1970	1971	1972	1973
Belgium - Luxemburg	8	8	10	10	11	10
France - Monaco	4	4	5	6	7	8
The Netherlands	21	23	24	28	20	24
Italy	7	10	10	14	10	11
West Germany	37	48	70	79	75	92
Original EC-countries	77	93	119	137	123	145
Eire	1	-	1	-	-	-
UK	34	36	38	55	41	76
Present EC-countries	112	129	158	192	164	221
Other countries	144	171	197	192	208	235
Total imports	256	300	355	384	372	456

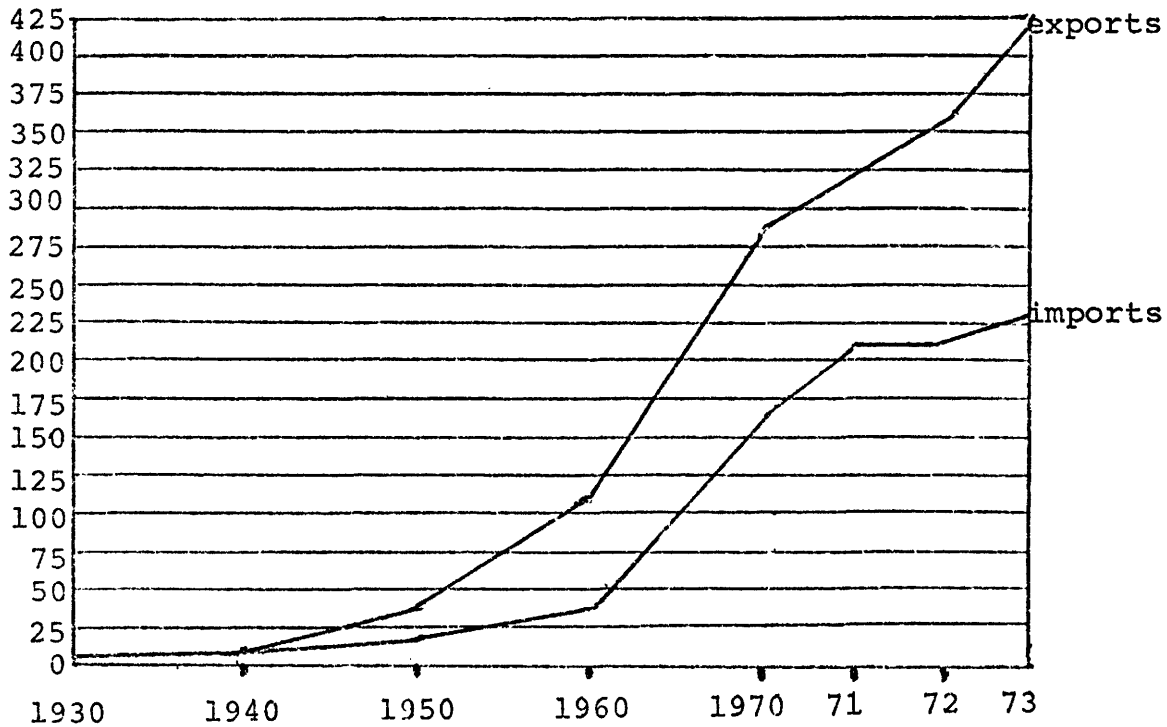
Source: Danmarks Vareindførsel og Vareudførsel.

Table 2.8. Danish Exports of Pharmaceutical Products Distributed On Countries For the Period 1968-1973 (million Dkr).

	1968	1969	1970	1971	1972	1973
Belgium - Luxemburg	7	9	9	12	12	13
France - Monaco	13	13	13	16	15	25
The Netherlands	13	18	22	26	27	30
Italy	4	8	12	14	10	17
West Germany	34	36	48	49	55	69
Original EC-countries	71	84	104	117	119	154
Eire	3	4	5	4	6	10
UK	17	21	28	25	22	36
Present EC-countries	91	109	137	146	147	200
Other countries	285	312	376	413	437	521
Total exports	376	421	513	559	584	721

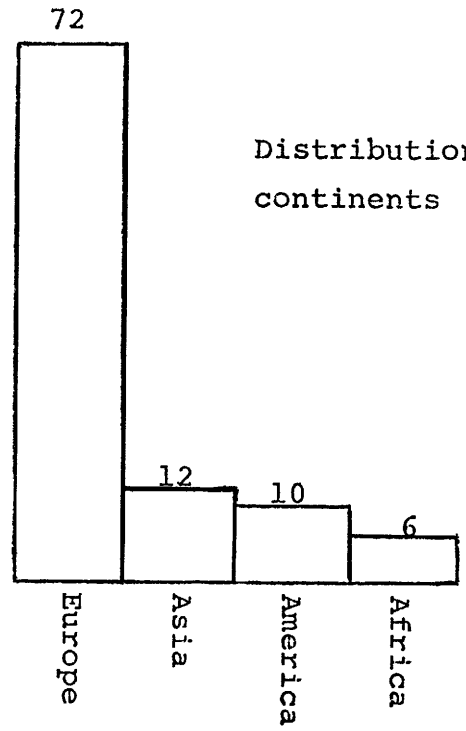
Source: Danmarks Vareindførsel og Vareudførsel.

Figure 2.1. Imports and exports of pharmaceutical specialities 1930-1973.

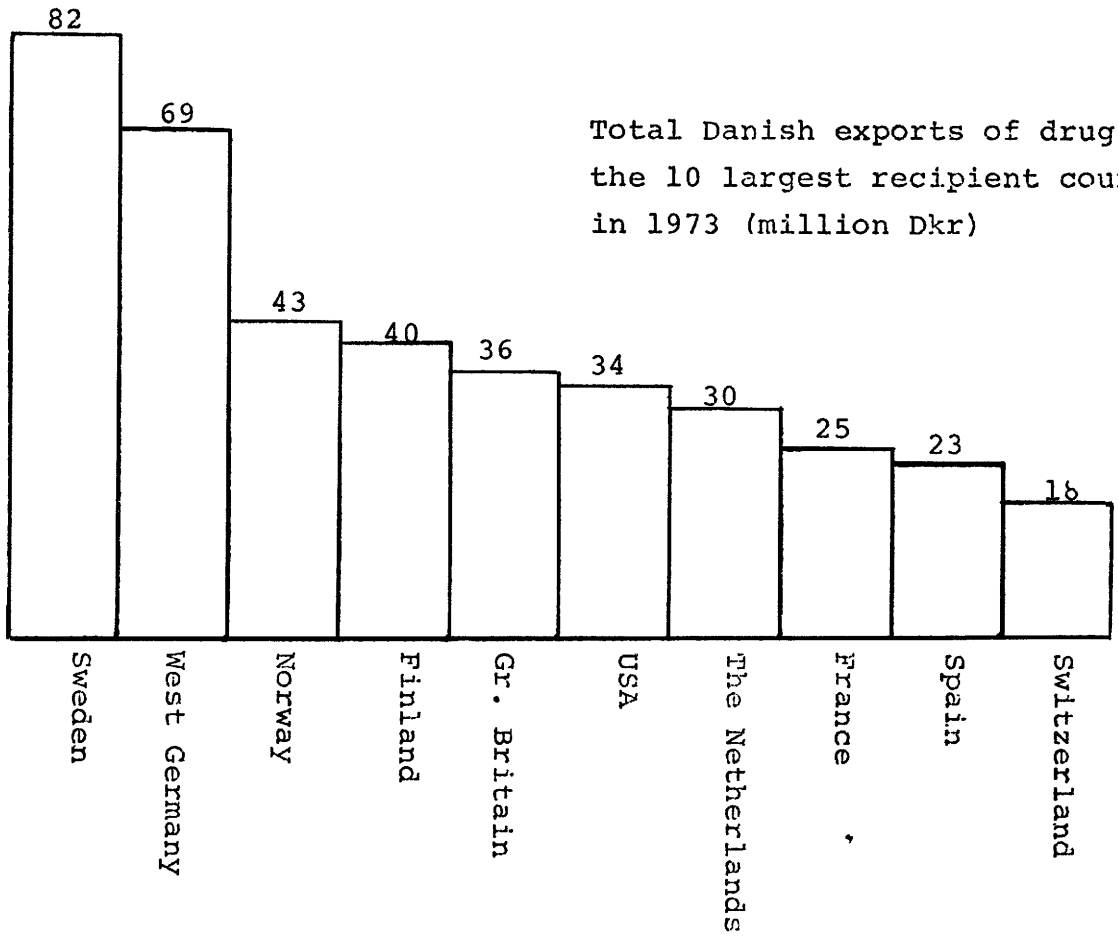


Source: Statistical material from the National Bureau of Statistics.

Figure 2.2. Danish Exports of Pharmaceutical Products in 1973.



Distribution of exports on continents (per cent)



Total Danish exports of drugs to the 10 largest recipient countries in 1973 (million Dkr)

Table 2.9. Danish Exports of Pharmaceutical Products in 1973 Distributed On Groups of Preparations.

Groups of preparations	million Dkr
Penicillin and other antibiotics	218
Insulin	103
Vitamin and vitamin preparations	87
Sulphonamides	52
Psychopharmacological drugs	51
Other	210
Total	721

Source: Danmarks Statistik. Danmarks vareindførsel og vareudførsel.

2.4. The Danish Consumption of Drugs.

The pharmacies are the retail outlet for drugs, cf. section 4. In 1972 there were 348 pharmacies in Denmark which have a number of chemist's shops attached to them. It appears from table 2.10. that the number of pharmacies has been slightly falling during the period under consideration. The gross turnover of the parmacies, however, has grown during the same period by more than 50 per cent from 617 million Dkr in 1968 to 962 million Dkr in 1972. In 1973 the gross turnover of the pharmacies reached 1,016 million Dkr exclusive of V.A.T.

Most drugs for human consumption are prescribed by doctors in a prescription, the recipient then fetching his goods at the pharmacy. It also appears from table 2.10. that about $\frac{3}{4}$ of the turnover of the pharmacies is turnover deriving from prescriptions. Table 2.11. shows the distribution in per cent of prescriptions on pharmceutical specialities and on other drugs, i.e. drugs manufactured by the pharmacies. It will be seen that the share of pharmaceutical drugs has been steadily growing during the whole period both as to number as well as to amount.

It appears from figure 2.4. that the turnover of the Danish pharmacies totalled 993,8 million Dkr inclusive of V.A.T. in 1971. Drugs prescribed accounted for 635 million Dkr and of these 502 million Dkr were entitled to subsidies. To arrive at the total annual expenditure on drugs for human consumption it is necessary to further add the hospital supplies of 71,4 million Dkr and the drugs sold by the chemist's shops totalling 164,4 million Dkr. The hospital dispensaries, however, make purchases of drugs directly from producers and importers and have a production of their own. This turnover is estimated to be twice as large as the pharmacies' sales to the hospitals. If these items are added it appears that in 1971 the total consumption of drugs for human consumption totalled about 1,000 million Dkr.

With the purpose of analysing the consumption of drugs in Denmark in connection with a revision of the system of subsidies to drugs the prescriptions received by every pharmacy during one day at the end of 1971 were analysed. By dividing the preparations prescribed in therapeutic groups it turned out that the distribution of the consumption in Denmark in 1971 was as illustrated by figure 2.5. The hatchings indicate the subsidized part of the turnover. In 1971 the subsidies to that part of the drugs which were entitled to subsidies amounted to 75 per cent. Thus, the public expenditure in 1971 to drugs entitled to subsidies totalled $\frac{3}{4}$ of 502 million Dkr = 375 million Dkr.

Figure 2.3. shows the development in prices of some important Danish-produced preparations. If these prices are compared to the retail price index for the same period it appears that while the consumer price index grew by about 25 per cent, the prices of these preparations grew by an average of 10 per cent only.

Table 2.10. Total Turnover and Turnover Deriving From Prescriptions of the Danish Pharmacies During the Period 1968-72.

	1968	1969	1970	1971	1972
Number of pharmacies	353	353	352	349	348
Gross turnover million Dkr	617	687	747	844	962
Of this sales deriving from prescriptions million Dkr	451	510	563	642	736

Source: Undersøgelser over Apotekernes Driftsforhold, nr. XXXVII, Apotekerfonden 1973.

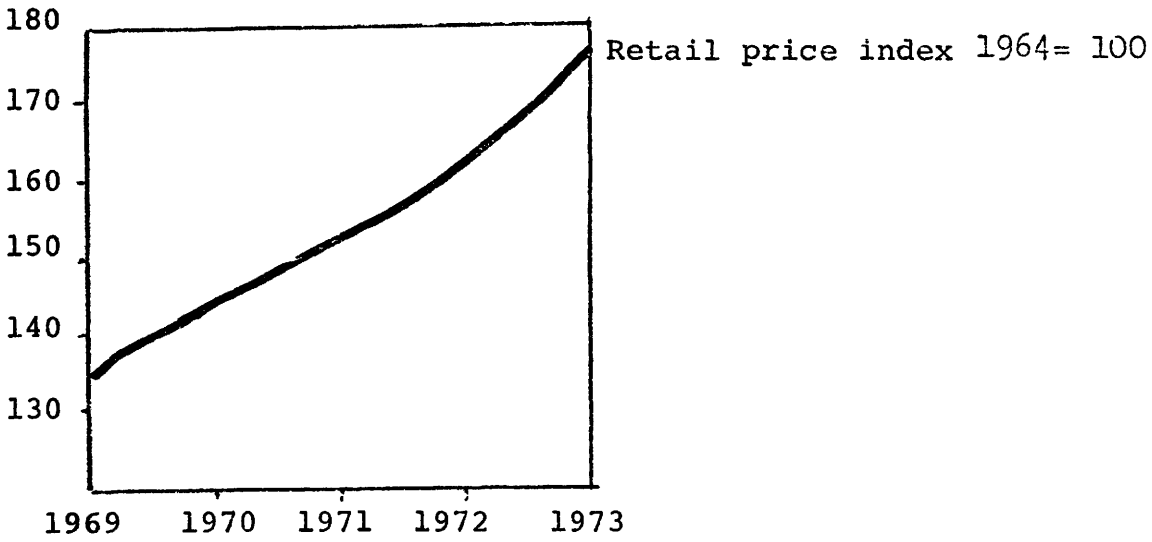
The figures are stated exclusive of V.A.T.

Table 2.11. Prescriptions to Individual Persons. Distribution In per cent.

		1968	1969	1970	1971	1972
Number	Pharmaceutical specialities	67.9	68.9	70.3	71.4	72.4
	Other	32.1	31.1	29.7	28.6	27.6
Amount	Pharmaceutical specialities	82.2	82.2	83.9	84.7	85.5
	Other	17.8	17.2	16.1	15.3	14.5

Source: Undersøgelser over Apotekernes Driftsforhold, nr. XXXVII. Published by Apotekerfonden 1973.

Figure 2.3. Some prices of drugs in relation to retail price index during the period 1969-1973.



The 8 most sold Danish-produced preparations 1973.
Consumer price inclusive of V.A.T.

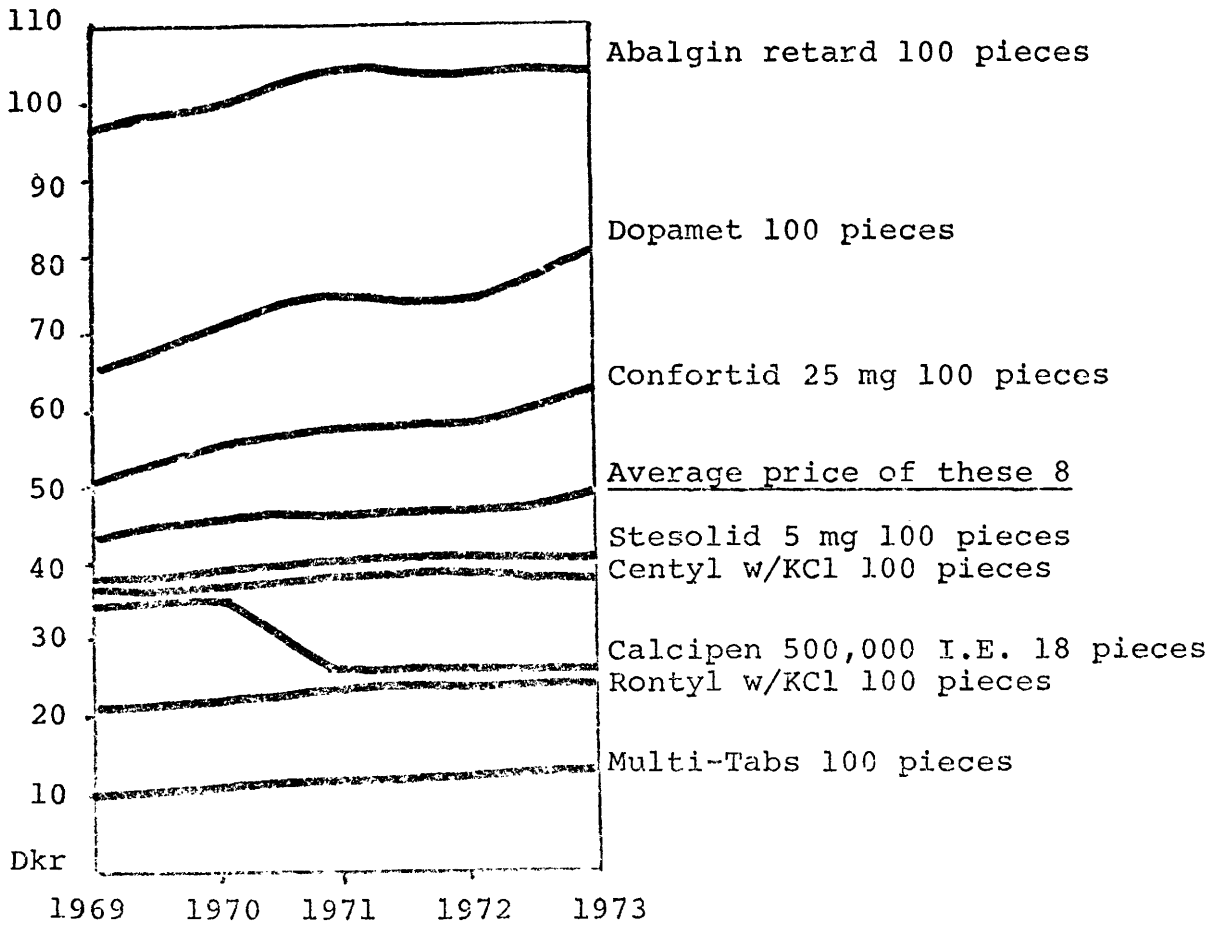
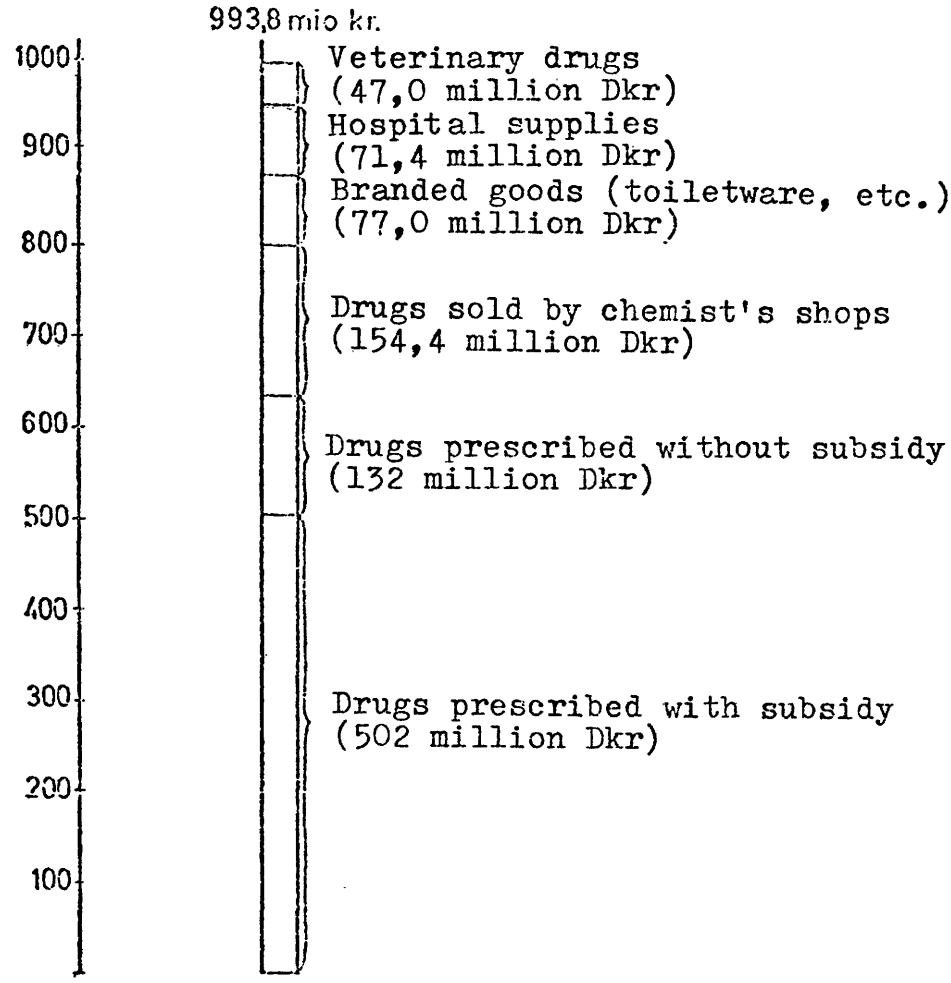


Figure 2.4. The turnover of the pharmacies inclusive of V.A.T. 1971.



Source: Receptundersøgelsen.

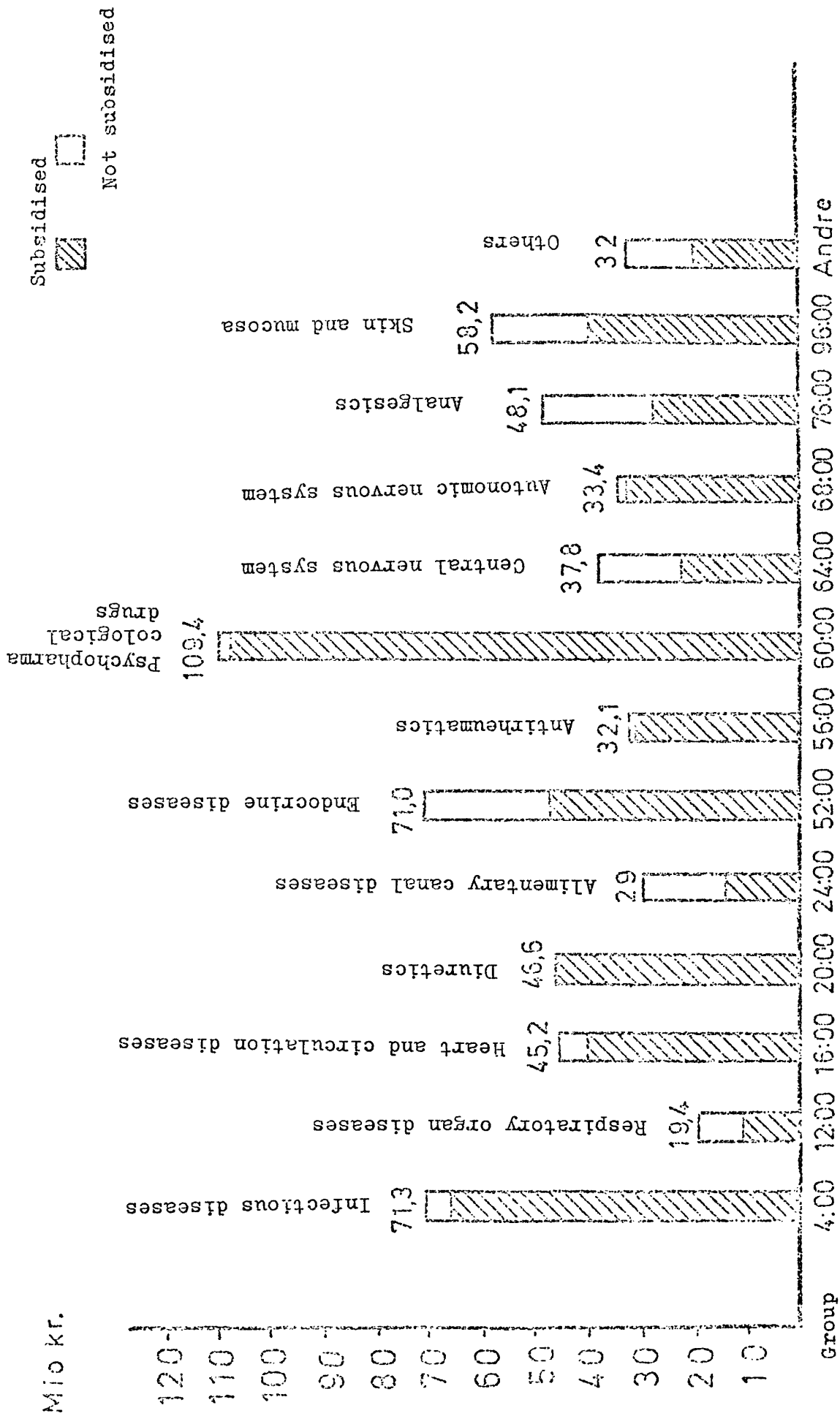


Figure 2.5. Annual turnover in million Dkr within the various therapeutic groups 1971.

3. The Development In Concentration In the Danish Pharmaceutical Industry.

3.1. The Development In Various Concentration Indices Over the Period 1968-73.

Section 2.2. gave a description of the Danish pharmaceutical industry for the period 1968-1973. This section will further illustrate this development by means of a number of concentration measurements, each of which deal with different aspects of industrial concentration.

These concentration measurements give an idea of the distribution of size of the enterprises included in the trade, as we assume that size is a reasonably good indicator for the position or power of an enterprise. We can distinguish between measurements of absolute concentration and inequality measurements. The former is a measurement of e.g. the part of the total turnover referable to a small number of large enterprises, while the latter is a measurement for that percentage of the total number of enterprises in the trade controlling a certain percentage of e.g. the total turnover.

This analysis applies 4 measurements for inequality: the coefficient of variation, the Gini coefficient, the Herfindahl-Hirschmann index and the Entropi index, while two measurements concern absolute concentration, viz. the concentration ratio and the Linda index.

In appendix A there is a more detailed explanation of the individual concentration measurements. The appendix contains also the main tables for the respective indices.

Inequlity Measurements

The coefficient of variation is a measurement for the relative spreading of the various variables as it is the standard deviation divided by the mean value. This makes it also a measurement for the inequality within the trade. The smaller the coefficient of variation, the more equal are the enterprises in the trade and the lower will be 'the concentration'.

The development in the coefficient of variation for the three variables is shown in figure 3.1. For all three variables, the coefficient of variation has been increasing at first, then slightly falling. This somewhat growing inequality in the trade is an indication of the fact that the largest enterprises have grown larger, while the small enterprises have stagnated. The vigorous increase in 1971 is mainly imputable to the fact that Novo is classified under the pharmaceutical industry that year. The stronger increase in the variable 'wages and salaries' may probably be explained by the fact that only the largest enterpriseshave definite research departments with highly salaried staffs and that the shares of wages and salaries of the largest enterprises, therefore, have grown in relation to those of the small enterprises.

The Gini coefficient is also a measurement for spreading. It is a measurement of the degree of unequal sizes of the enterprises of the trade. If the Gini coefficient is 0, it means that all the enterprises of the trade are equal as to size. It gives no indication, however, whether there are 20 or 200 enterprises in the trade. The Gini coefficient is a summing up of the information conveyed by the Lorenz curve.

The development of the Gini coefficient for the three variables is shown in figure 3.2. Like the coefficient of variation, the Gini coefficient also shows a growing inequality over the period. Here, too, the addition of a large enterprise means that the coefficient jumps to a higher level where it stabilizes. Apart from that there has been a moderate increase in inequality.

The Herfindahl-Hirschmann index is a concentration measurement which takes into consideration both the number of enterprises in a trade and the inequality of size between them. Other things being equal, a larger number of enterprises in the trade and/or a larger equality will diminish the index value. As data both about inequality and number are combined, a comparison of the various index values is most likely to make sense, when the number in the trade, as here, is fairly constant.

Irrespective of the number of enterprises in the trade, the index value will approach 1000 when the largest enterprise's share of the trade approaches 100 per cent. The minimum value of the index

will be reached when all enterprises are of the same size, and this limit varies with the number of enterprises.

The development in the index values for the Danish pharmaceutical industry is given in figure 3.3. The development is largely the same as for the previous two indices.

The Entropi index is the fourth inequality measurement, and the measurement that attaches most importance to the small enterprises. As it will appear from figure 3.4. the values have been fairly stable over the period.

Concentration Measurements

The concentration ratio and the Linda index belong together.

Whereas the concentration ratio gives a simple exposition of the paucity of a trade, thus giving an idea whether it is clearly dominated by a small group of enterprises, the Linda index measures the relative sizes of the enterprises for which the concentration ratio has been calculated.

The concentration ratio is obtained from the concentration curve of the trade. This curve is drawn in a system of coordinates, where the abscissa axis indicates the number of enterprises - from the largest to the smallest - while the ordinate axis indicate the cumulated percentage of the variable for the number ofenterprises plotted on the abscissa axis. The height of the curve above any point x on the abscissa axis measures the percentage of the total size of the trade accounted for by the x largest enterprises- i.e. the concentration ratio.

For the Danish pharmaceutical industry, the curve is vigorously rising from left to right, thus indicating a fairly concentrated trade. This appears from figures 3.5. to 3.7. It also appears that the concentration curves have shown almost no shifts for the three variables over the period.

As mentioned, the Linda index is a measurement for the inequality within the various spot tests. For all years and for all variables the largest inequality is found between the two largest enterprises in the trade n=2. The development in these maximum values for the

three variables is shown in figure 3.8. At first, it is slightly increasing and then it jumps to a higher level, again as a consequence of the fact that Novo enters the trade. In contrast, there are slight differences as to for which spot tests the Linda index assumes its minimum value, but here, in return, the fluctuations are not so pronounced as for the maximum values. The development in the minimum values for the three variables is shown in figure 3.9.

Figure 3.1 Development in Variation Coefficient

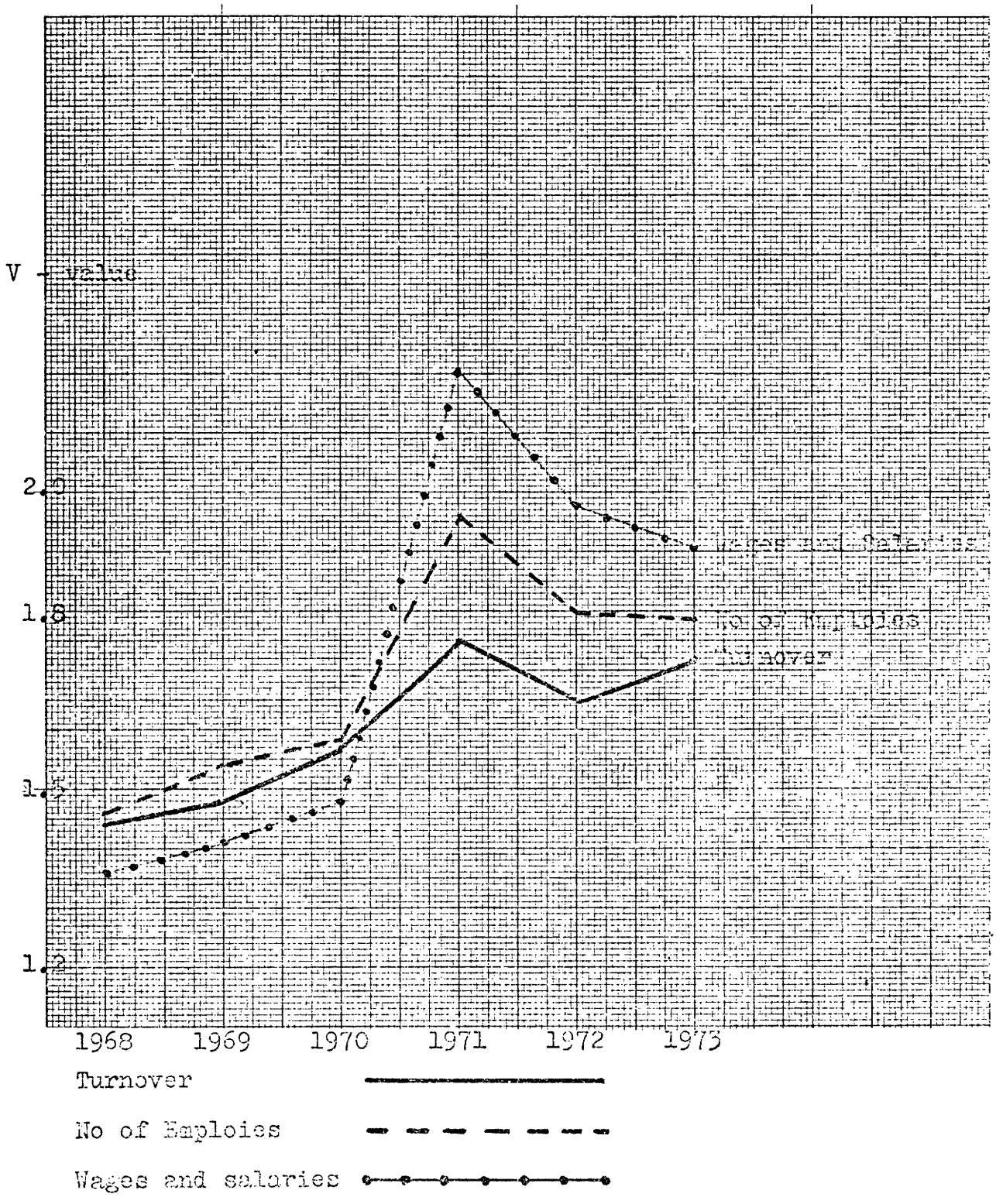


Figure 3.2 Development in the Gini Coefficient

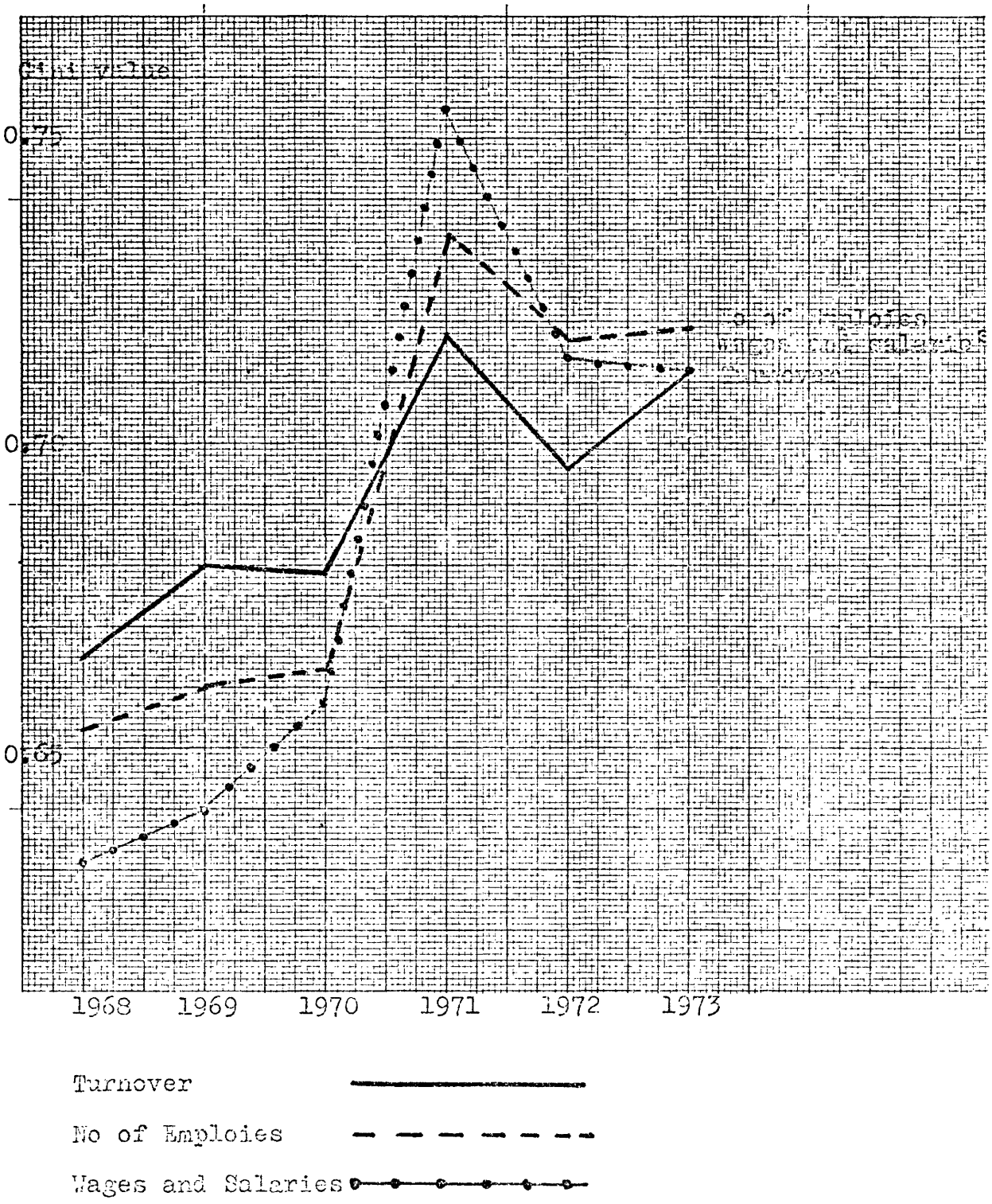


Figure 3.3 Development en the Herfindahl-Hirschmann Index

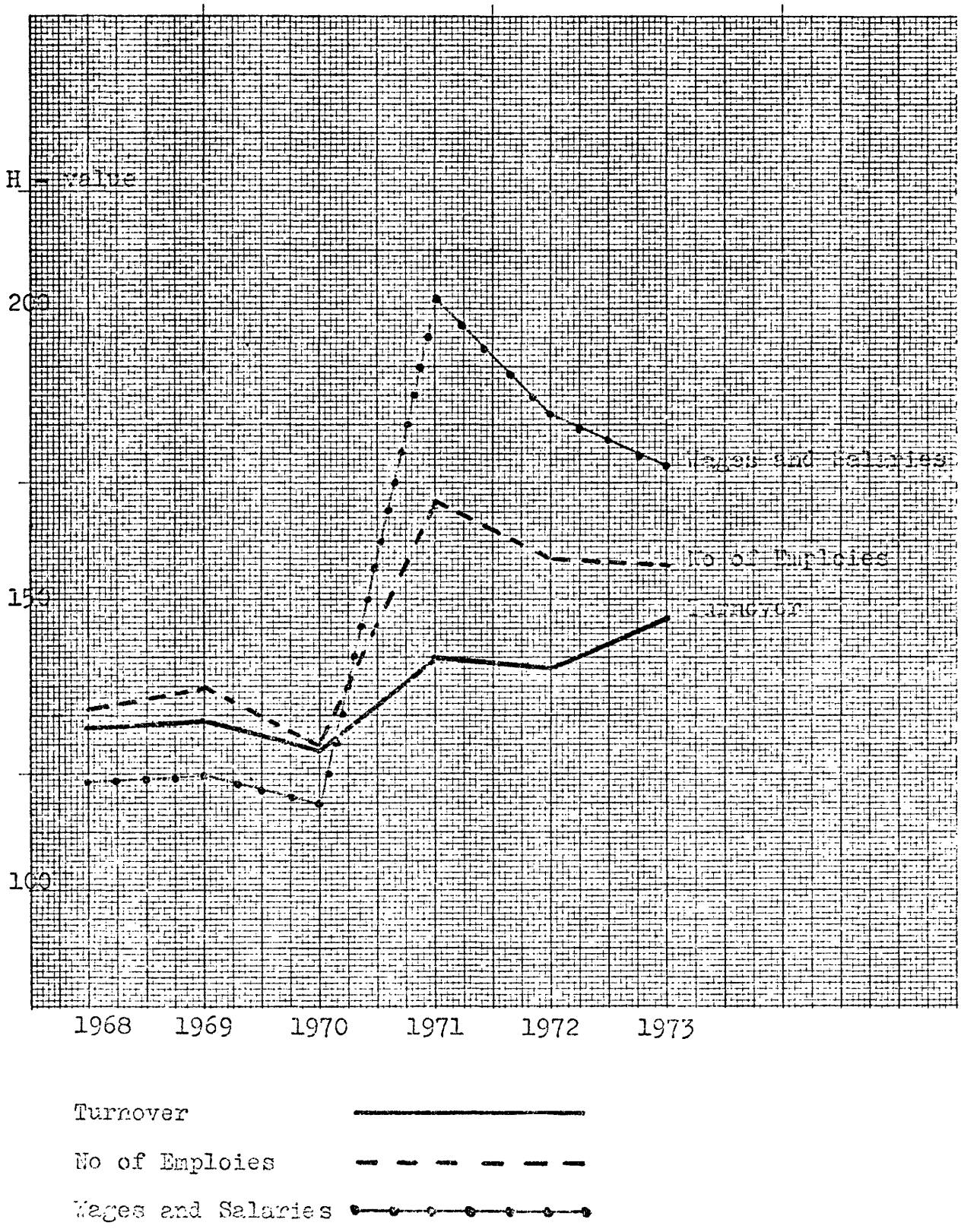


Figure 3.4 Development in the Entropy Index

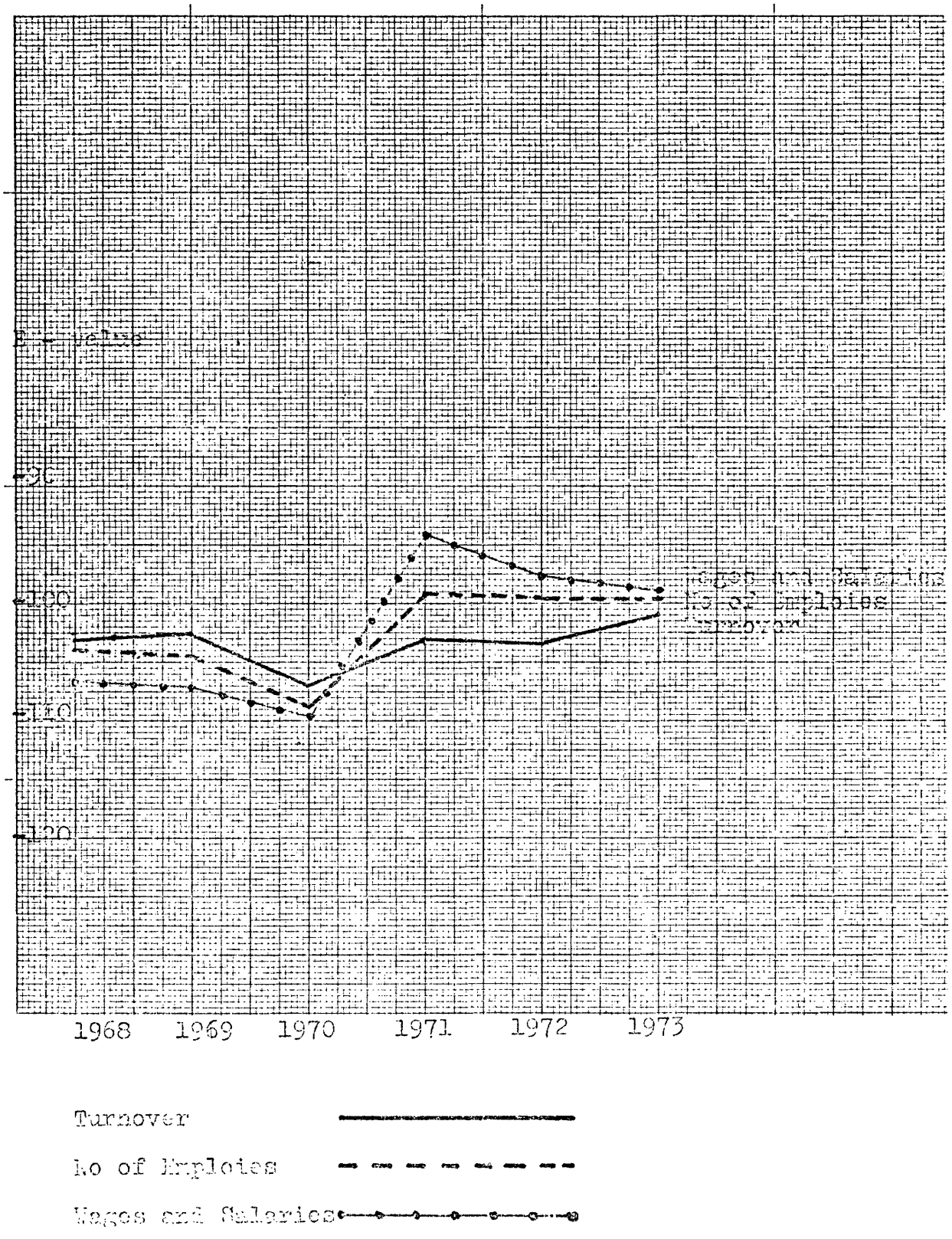
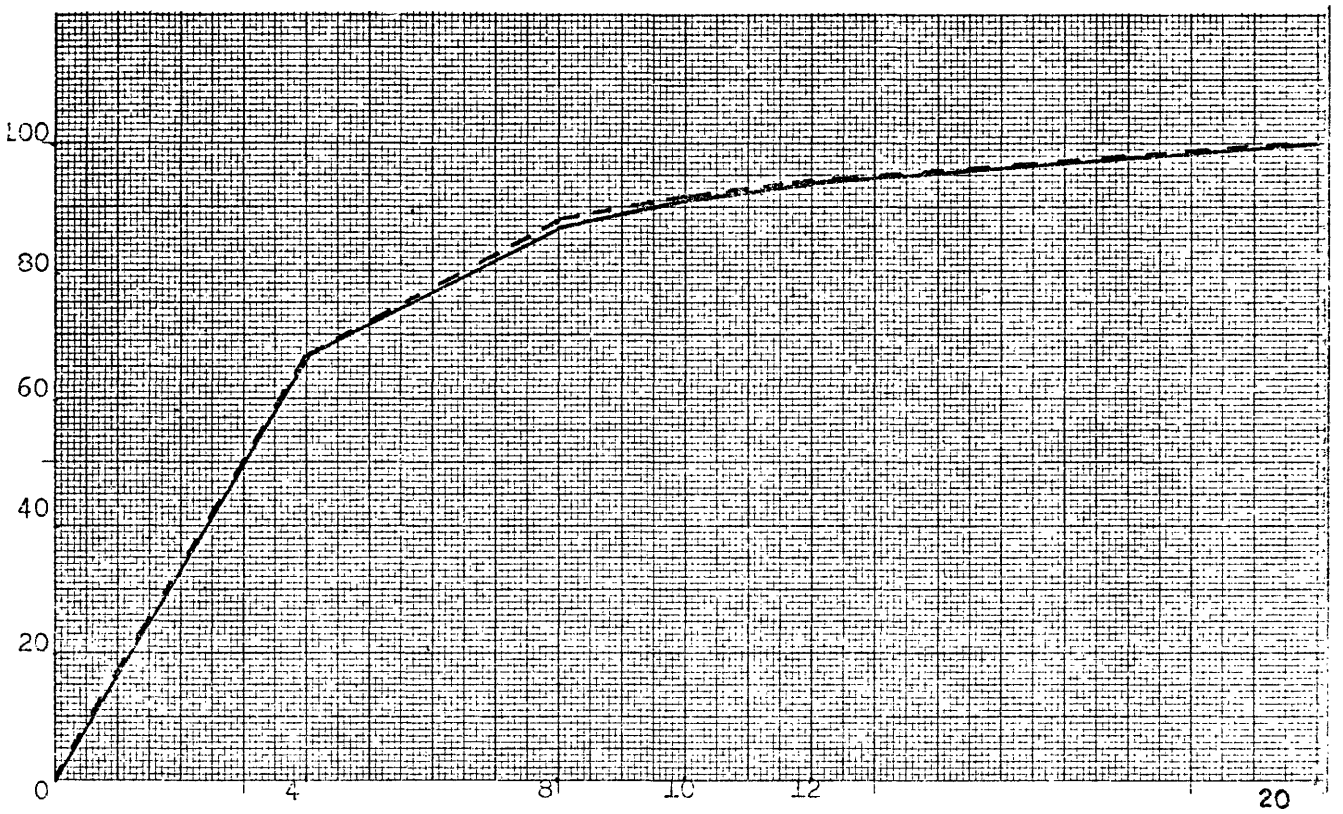


Figure 3.5

The Concentration Curve: Turnover



1968 ——————

1973 — — — — — —

Figure 3.6

The Concentration Curve: No of Emploies

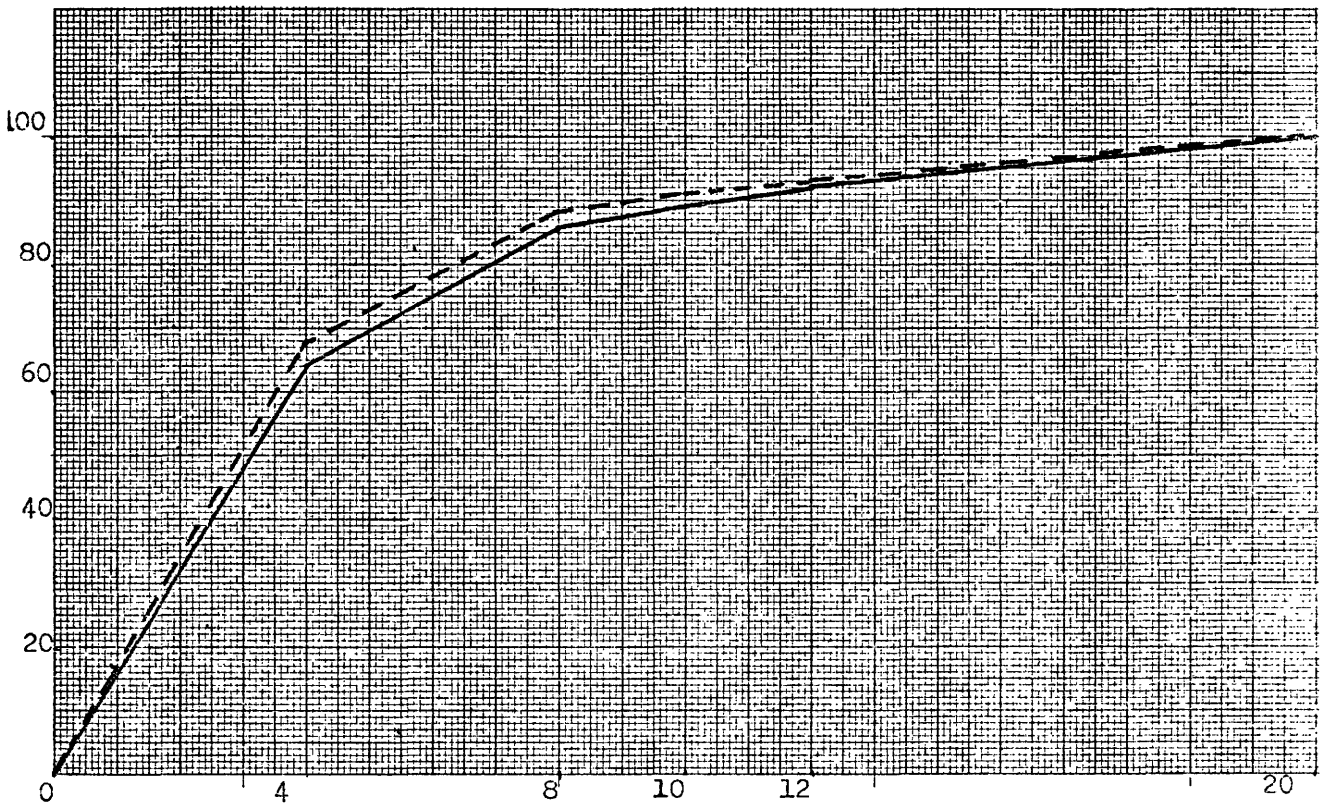


Figure 3.7

The Concentration Curve: Wages and Salaries

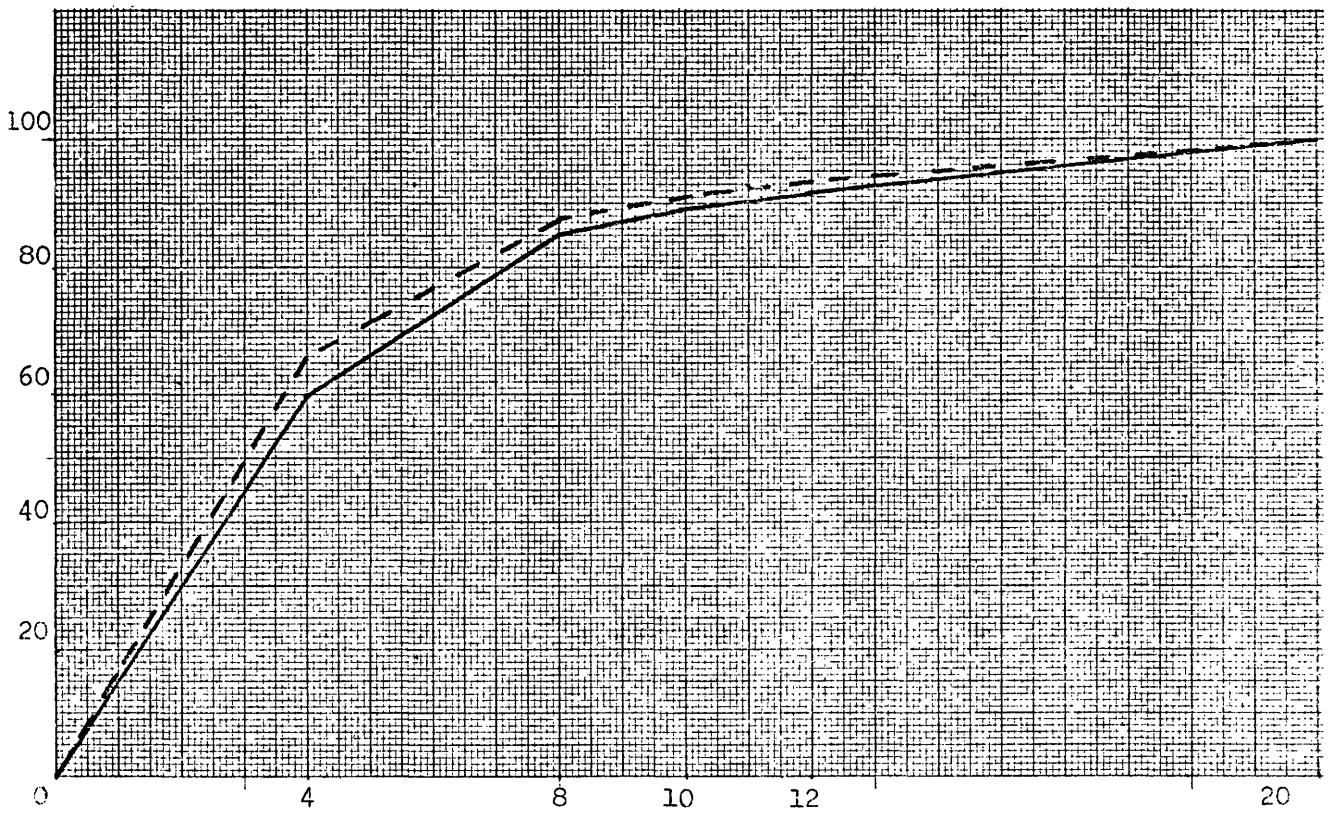


Figure 3.8

Development in the Lindaindex: Maximum value.

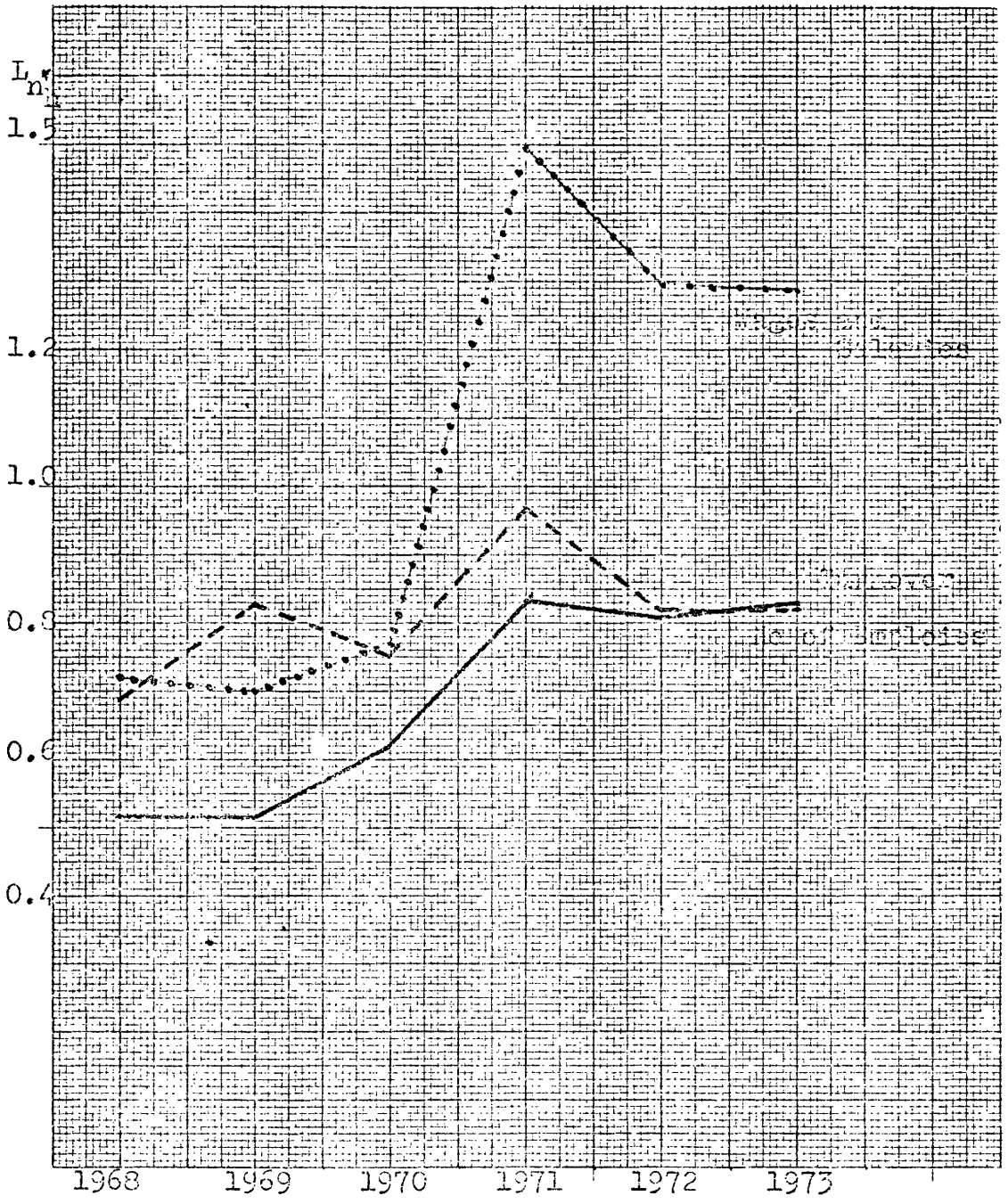
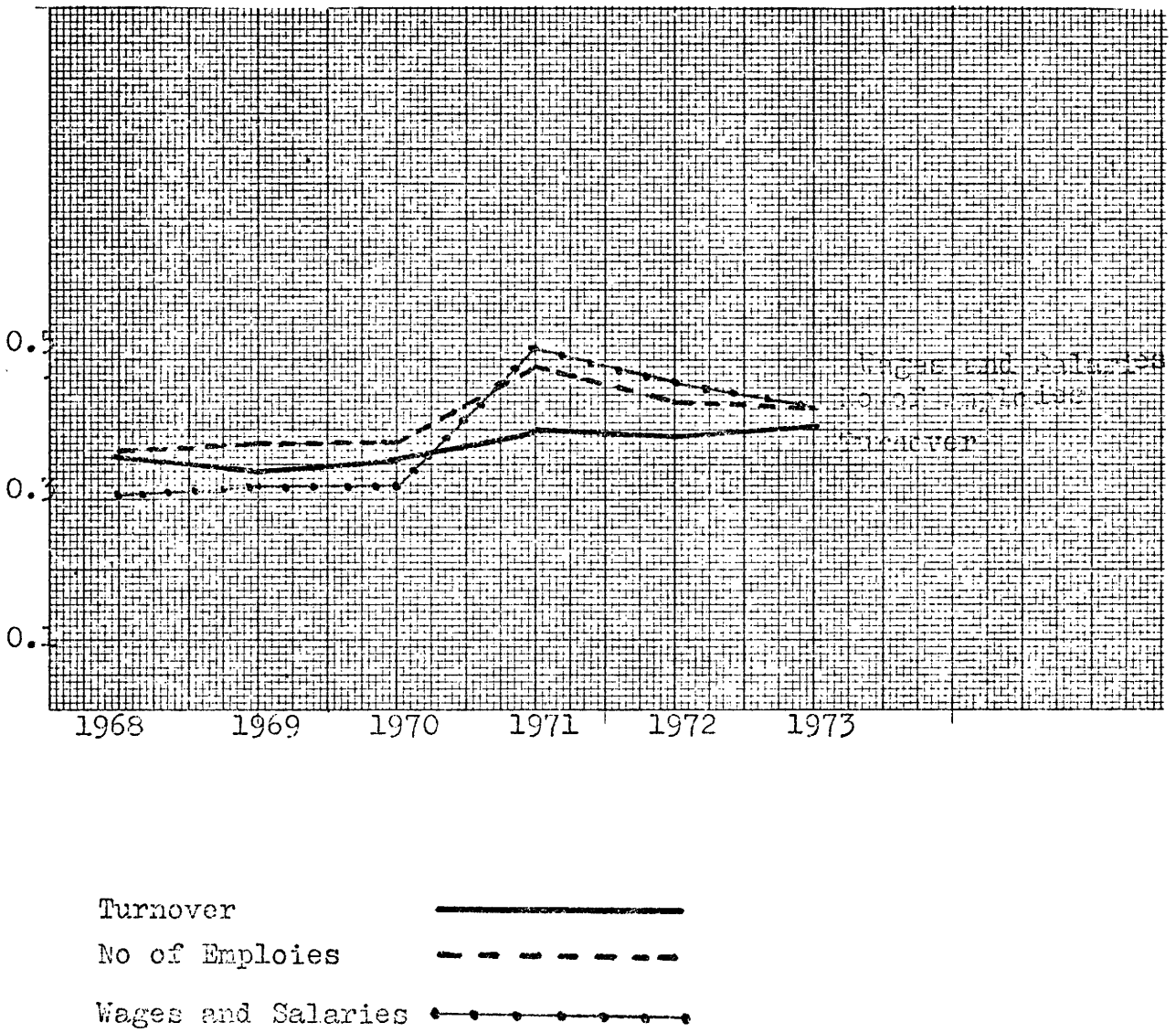


Figure 3.9

Development in the Lindaindex: Minimum value



3.2. An Estimate of the Development Within the Danish Pharmaceutical Industry

For several reasons the production of drugs must be assumed to be suitable for Denmark:

(1) The country has an educational level which makes it possible for a pharmaceutical industry to recruit a sufficient qualified personnel.

(2) The country has a well-established pharmaceutical statistical material and a developed hospital service.

(3) As far as weight and quantity are concerned, the consumption of raw materials is modest.

The negative factor is that Denmark is a small national market area whose demand is not alone able to support an independent pharmaceutical research.

The Danish pharmaceutical industry as delimited by the National Bureau of Statistics consits of a small number of relatively large enterprises and a large number of small enterprises.

The total number of enterprises has not changed very much during the last 6 years, and the structure has not changed either. It can also be ascertained that the largest Danish pharmaceutical factories are the same as those which have been predominant during the last 15 to 20 years. Thus, the concentration has increased, because the largest enterprises have experienced a substantial growth, while the medium-sized and small enterprises are still at the same level.

The main part of the Danish pharmaceutical industry has always been on Danish hands, and most Danish enterprises are still managed by descendants of the original owners.

The growth in the pharmaceutical industry is mainly a result of the utilization of the latest advances within the pharmaceutical research: antibiotics, psychopharmacological drugs and oral contraceptives. In addition, Denmark has a special advantage in the production of insulin because of the pre-

sence of a great number of pigs within a relatively small geographical area and a vigorously growing need for vitamins.

By and large the latest pharmaceutical advances are utilized by now, however, i.e. there is actually nothing new about the preparations appearing within the fields in question.

Because of that, the problems faced by the producers have assumed another character:

(1) The research must be applied to other than the usual fields.

(2) The marketing becomes more important.

(3) Advantages as to production may become decisive.

During recent years, the Danish pharmaceutical factories have made fairly good profits. It must be expected, however, that these profits will be reduced in the years to come, because:

(1) There has been no new category of drugs during recent years to replace antibiotics, psychopharmacological drugs and oral contraceptives, and it must be expected that remedies against cancer and colds will be long in coming.

(2) Higher research costs have reduced the speed of appearances of new drugs.

(3) It must be assumed that the prices of drugs will be subjected to an increased supervision partly from the National Health Service and partly by the Monopolies Authorities possibly taking over the price control. A changed system of subsidies for medicine with the consequence of higher expenses for the consumers may damp down the consumption of certain categories of drugs.

(4) Endeavours of the enterprises towards diversification will contribute to the equalizing of profits, because new product lines may have difficulties in reaching the same high level of profitability which is traditional in the production of drugs.

Economies of scale at the production stage is less important in the pharmaceutical industry than in the majority of other industies.

In return, the costs for research and development and for information and advertising have increased during recent years.

To carry through a large research project requires a certain number of researchers from different disciplines. The number may be 60 to 100 men. Minimum requirements of this type imply that small enterprises cannot undertake certain types of projects or that the project will require very much time. At the same time certain indivisibilities imply that the utilization of the capacity of the research department may be increased by working simultaneously at several projects and with doubling of certain functions.

The research activities is that part of the activities of the pharmaceutical industry where the advantages of large units are most evident, and these advantages have increased during recent years. Economies of scale are increased by the superiority which the large enterprises have obtained through better possibilities of a distribution of risks by aiming at several independent projects.

It is assumed in the trade that it costs 15 to 20 million Dkr over 5 to 7 years to develop a regular new product. To a large extent, therefore, the Danish pharmaceutical industry has had to consider Scandinavia its domestic market. This also appears from export statistics, cf. figure 2.2. For many preparations, satisfactory sales in Scandinavia will not be sufficient to cover the growing development costs. In other words, if the Danish pharmaceutical industry must develop its own preparations based on its own research in the future, it will be necessary with marketing/establishing in a number of countries outside Scandinavia. Of course, this will engage a number of resources.

The concentration within the Danish pharmaceutical industry is relatively small. This is apparently due to two circumstances:

(1) There has been no generation problems. The majority of the growth has taken place during so few years that there has been no alternation of generations during that period.

(2) The results of the enterprises have been so good that they have been able to finance to a large extent the expansion themselves.

At the same time competition has been restrained to some extent by the rather restrictive Danish pharmaceutical legislation.

There is much, however, pointing towards an increased competition in the next 5 to 10 years, both in form of fusions and buyings as well as in the form of increased cooperation between both Danish pharmaceutical factories mutually and between Danish and foreign pharmaceutical factories.

First, the research departments of the various enterprises are 'too small', cf. above. They are able to embark upon a limited number of projects only, and therefore, the risk of a lacking product development will be great. As the research departments of the various Danish enterprises do not overlap to any noticeable extent, and as the research costs, as mentioned, are rising the conditions for a concentration of the research are favourable.

The necessity of increased exports from the Danish enterprises also points towards an increased concentration in one way or the other. One possibility is fusions of Danish enterprises, thus reducing marketing costs. Another possibility is the buying and selling of licenses from and to foreign enterprises. A third possibility are joint ventures, i.e. a Danish enterprise in cooperation with a foreign enterprise establishes a new enterprise, marketing for instance preparations manufactured by the Danish enterprise in various countries. Thus, the Danish enterprise contributes with the preparations in the new enterprise, while the foreign enterprise contributes for instance with the sales organization.

A third circumstance pointing towards a future concentration is the proprietory conditions of the Danish pharmaceutical industry. In the near future an alternation of generations in the management must be expected. It is possible that the new generation will further fusions or sales. Up to now, the cooperation within the trade has been rather limited. This is due to the fact that the large enterprises have had a patriarchal management which has been reluctant to take up new products which had not been developed in their own enterprise. It must be expected that this attitude towards cooperation will change, too.

Furthermore, the requirements as to production have increased. G.M.P. (good manufacturing practice) places a number of restrictions on the enterprises with regard to hygiene, control, air condition, etc. which of course add to the costs. These costs may probably be reduced through a cooperation between several enterprises.

During the sixties, all large Danish enterprises have received offers of letting themselves be bought up. They have not, however, wanted to come under foreign influence, and as mentioned the profits of the Danish enterprises have been fairly good. In a future situation with smaller profits, such offers of buying will be more tempting for the owners.

All things considered, the future will probably see an increased concentration partly due to fusions, partly due to sales to foreign countries and partly due to a closer cooperation. Thus, it must be assumed that within 10 years there will hardly be more than 3 or 4 large Danish pharmaceutical producers left.

Apart from the large enterprises there are at the moment about 20 small ones. This structure may seem surprising considering the above comments. The reasons why these relatively many small enterprises have been able to hold out are:

(1) The have no research as such.

(2) They have specialized to a wide extent.

(3) They have been able to survive because they have produced some old products which are still demanded to some extent, but which requires so much time for readjustment, that the large enterprises have eliminated them from their assortments.

(4) The small enterprises have a greater flexibility in their production (they can produce short series).

In spite of these circumstances, it must be expected that the number of small enterprises will be somewhat reduced, and a certain replacement must be expected.

The Production of the Pharmacies

The pharmacies' share of the total turnover of the Danish market constitutes about 25 per cent. This share has been slightly falling during recent years. The rest, 75 percent, is equally distributed among the Danish producers and importers, the situation being, however, that the Danish industry is losing ground in favour of the importers.

The pharmacies have agreed to centralize the production of their drugs, as the Danish Pharmaceutical Chemists' Association has concluded an agreement with a number of pharmaceutical chemists about manufacturing and control of certain drugs. Apart from direct sales to the public, the producing pharmacies in question are obliged to supply these articles to the stage of distribution only, indicated by the Association.

It must be assumed that the pharmacies which do not carry out any actual research or development will keep a market share of 20 per cent as a consequence of the centralization process. It is intended to further centralize the production of the pharmacies, so that, in reality, the main part will be manufactured in 10 large pharmacies which in reality will become small factories. A few preparations with a large water content will still be manufactured in the individual pharmacies.

The increased centralization has, of course, posed some problems as to distribution. To solve these problems, the Danish Pharmaceutical Chemists' Association bought two thirds of the share capital in the whole sale company Bang og Tegner in 1972, and in October 1972 the Association concluded an agreement with this firm about the distribution of bulk galenics, i.e. drugs or semi-manufactured drugs in unbroken packages intended for delivery from the producing pharmacies to the purchasing pharmacies.

The distribution of the first preparations for the concentrated production system started on 1st November 1972.

4. A Qualitative Description of the Danish Drug Industry

4.1. Main Structure

In schematic form figure 4.1. shows the structure of the Danish pharmaceutical sector, including the position of the Danish drug industry.

1. Production of Drugs

In Denmark drugs are manufactured partly by pharmaceutical factories, partly by pharmacies. As a rule, those drugs manufactured by factories are specialities which are subject to registration with the Speciality Register of the Danish National Health Service in order to be sold, whether they have been manufactured in Denmark or abroad. Before registration with the Speciality Register the information on a drug supplied by the manufacturer is tested by the Speciality Board of the National Health Service.

The Danish Pharmacies Act stipulates a number of perequisites for registration. These perequisites and the severe test of the product for which registration is applied, have had the effect that the number of Danish drug specialities, about 1300 at the moment, is low compared to other countries.

According to the Danish Pharmacies Act the pharmacies have permission tomanufacture drugs. Those drugs manufactured by pharmacies are not subject to registration, but they must satisfy requirements as to purity, etc. These requirements are listed in the pharmacopoeia and other official collections of formulas.

Drugs manufactured by pharmacies may be divided into 3 main groups:

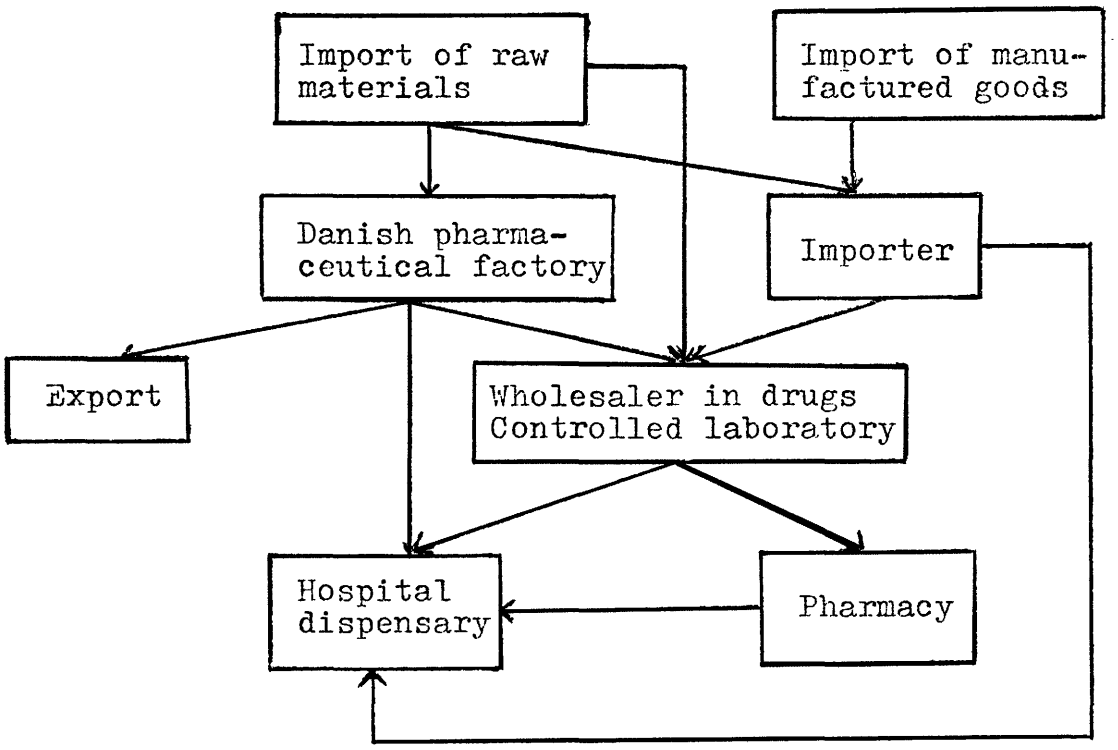
(1) Standard preparations manufactured according to prescriptions accessible to the public at pharmacies or controlled laboratories, but packed at the dispensing pharmacy.

(2) Individually compounded preparations manufactured for the individual patient according to the prescription.

(3) 'Simple' drugs, i.e. preparations consisting of uncompounded drugs and substances, where the manufacturing process at the pharmacy consists mainly in weighing, etc.

The Danish Pharmaceutical Chemists' Association runs a special laboratory (the DAK laboratory) for development and control of and information about drugs and other goods manufactured by pharmacies.

Figure 4.1. The Structure of the Danish Pharmaceutical Sector



2. Wholesaling

Drug specialities are distributed to the retail outlet (the pharmacies) by wholesalers. The Danish Pharmacies Act does not require any authorization for this distribution activity, but the existing firms are authorized as controlled wholesale companies. The Pharmacies Act does not contain any provisions for that matter as to authorization and control of wholesale companies. The pharmacies deal mutually in their own goods.

3. Retailing

As a main rule the retailing of drugs is restricted to the pharmacies, this restriction being part of the public control with the dispensing, storage, etc. of drugs. The Danish Ministry of Home Affairs stipulates which drugs may be offered for sale, dealt in and dispensed completely or partly outside the pharmacies.

The lay-out and running of the pharmacies is subject to a thorough public regulation and supervision.

The sales prices of the pharmacies are fixed by the Government to ensure among other things uniform prices of drugs all over the country.

4. Hospital Dispensaries

There are 11 hospital dispensaries with a total turnover (exclusive of V.A.T.) of approx. 70 to 80 million Dkr. This corresponds to a little more than half the drug consumption of the hospitals, the other half being supplied by the pharmacies. The hospital dispensaries may supply only the patients and personnel of the hospital service with drugs, but sick quarters, camps and depots of the armed forces, some mental hospitals and other drug consuming institutions are also supplied from a hospital dispensary.

5. The Danish Governmental Serum Institute and the Danish Governmental Veterinary Serum Laboratory

In reality the two above mentioned institutes have a kind of monopoly of manufacturing and dispensing serum and vaccines.

Serum, vaccines and other bacteriological preparations are not subject to registration as drug specialities before they are sold.

6. Public Control

The National Health Service is - with recourse to the Danish Ministry of Home Affairs - the supreme control authority within the field of drugs.

The speciality factories, the controlled laboratories and the wholesale companies, the importers of pharmaceutical specialities and pharmacies, hospital dispensaries and chemists' shops are inspected.

Advertising of drugs is authorized and controlled by the National Health Service, which also receives notification of the speciality prices of the factories. The prices charged by pharmacies for those drugs manufactured by them are fixed on the basis of calculations made by the National Health Service, which also registrates the pharmaceutical specialities.

7. Prices of Drugs

The consumer prices of drugs are fixed by the drug scale of charges which is confirmed by Royal decree.

The consumer prices of drugs manufactured by pharmacies is the sum of the prices fixed by the scale of the goods employed. It is calculated by the National Health Service on the basis of the purchase prices paid by the pharmacies, to which is added a work compensation fixed by the Government, among other things.

The price of pharmaceutical specialities is notified by the factory to the National Health Service. The notified price is the purchase price paid by the pharmacy. To this is added the profit fixed by the scale. Thus, there is no control of the prices.

The price which the consumers have to pay for a drug depends on whether the drug in question is subsidized or not. The granting of subsidies isdetermined by the Minister for Social Affairs on recommendation by the National Health Service and the Committee on Drugs. A new system of subsidies was introduced in April 1973.

8. Advertising

Public advertising of goods which are effective or preventive against diseases are subject to restrictions which are by far more extreme than the requirements of the legislation concerning fair and loyal competition. The reason for this is that the people should not be actuated to take medicine without medical consultation, neither should they be encouraged to unnecessary consumption of drugs or other goods which are intended to cure or prevent diseases.

The main rule is, therefore, that the law prohibits advertising of any article which is effective or preventive against diseases or symptoms of diseases, but that the National Health Service may allow such advertising. Advertising of drugs by means of screen advertising, advertisement boards, etc. is prohibited. Newspaper advertising of drugs must be approved beforehand by the National Health Service. The Health Service take counsel with a special Advertising Board, where the press is also represented.

As for doctors, dentists, veterinaries and pharmacists this approval of advertisements is not required, but the National Health Service may take action against incorrect or inadequate advertising.

4.2. The Danish Pharmaceutical Factories

In 1973, 27 firms could be classified as pharmaceutical factories. In that year they had an average of about 600 employees and a total turnover of approx. 1170 million Dkr.

Only 8 of these 27 firms had more than 200 employees and only 4 had a turnover of more than 100 million Dkr.

The 6 largest combines plus one additional combine whose main activity is not manufacturing of drugs proper are described below.

The largest Danish pharmaceutical factories cooperate through the trade association MEFA.

1. Novo Inudstri A/S

Production

This combine is the largest in Denmark within drug production with a total turnover in 1973 of 379 million Dkr and 2100 employees, 1800 of whom are employed in Denmark. Approximately 165 million Dkr of the turnover originate in the sale of enzymes for industrial use. The firm is the world's largest producer of enzymes. About 100 million Dkr of the turnover of drugs come from the sale of insulin. Novo is the world's second largest producer of insulin and the world's largest exporter. Apart from this a substantial part of the turnover is accounted for by antibiotics, and the firm is among the world's largest suppliers of V-penicillin. Novo also produces medical enzymes, steroid preparations etc.

In 1973, the export of drugs and enzymes totalled 92 per cent of total sales.

Capital

Figure 4.2. shows the structure of Novo Industri A/S. The share capital of the parent company has been increased several times, the last time in April 1974 to 135 million Dkr. The share capital is divided between 45 million Dkr in A-shares and 90 million

Dkr in B-shares. 1.000 Dkr of A-shares give 10 votes while 1.000 Dkr of B-shares give only one vote. The ratio between the two classes of shares must not be upset. The B-shares are negotiable papers.

All A-shares are owned by Novo's Fund - a proprietary institution established by the founders of the company in 1951. According to the regulations a majority of the members of the board of the fund must not be shareholders in the parent company.

Figure 4.2. The Novo Combine

	Novo Industri A/S Share capital: 135 million Dkr	Novo Terapeutisk Laboratorium A/S Share capital: 40 million Dkr
Production and sales companies	Schweizerische Ferment A.G. Basle Acquired 1968 Share capital: Sfr 300,000	Novo Industrie Pharmaceutique Paris and Chartres - Founded 1959 Share Capital: FF 2 million
	Novo Industries (Pharmaceuticals) (Pty.) Ltd. Johannesburg - Founded 1959. Share capital: Rand 8,000	Novo Industrie G.m.b.H. Mainz - Founded 1958 Original capital: Dmark 900,000
Sales companies	Aldepha A.G. Zurich - Acquired 1969 Share capital: Sfr 50,000	Novo Industri AB Malmö - Founded 1972 Share capital: Skr 50,000
	Novo España S.A. Madrid - Founded 1974 Share capital: Ptas 5 million	Novo Industri A/S Oslo - Founded 1965 Share capital: Nkr 10,000
	Novo Enzyme Corporation Mamroneck, N.Y., USA Founded 1969 Share capital: US $ 100,000	Novo Industri Oy Helsinki - Founded 1972 Share capital: Fmk 50.000

Sales companies (continued)	Novo Industri GmbH Vienna Founded 1974 Share capital O. Sh. 100,000
Information offices	N.V. Novo Industri S.A. Brussels Founded 1967 Wetenschappelijke Dienst Nederland Amsterdam Founded 1963

Companies are being established in Belgium.

The firm has initiated an extensive investment programme, including among other things the building of a new insulin factory. In the next 5-year-period the budget includes investments in plants of about 300 million Dkr. The activity abroad is restricted mainly to the establishment of sales companies in various countires, last in Austria and Belgium. There are plans, however, to establish an enzyme factory in USA.

Diversification

Apart from the fact that drugs and enzymes are produced for industrial use there is no diversification.

2. Løvens kemiske Fabrik (Leo Pharmaceutical Products Ltd. A/S)

Production

This combine is the second largest within the trade, but the parent company is the largest pharmaceutical factory proper in Denmark. The company has about 2000 employees in its service, including 1100 to 1200 in the parent company.

Leo Pharmaceutical Products Ltd. produces mainly antibiotics and diuretics, but analgesics, vitamins and hormones are also produced.

Capital

The combine has the following structure:

Løvens Kemiske Fabrik
Production company
(Leo Pharmaceutical Products Ltd. A/S)
Industriparken 55, 2750 Ballerup.
Founded 1908, converted into a limited company in 1962.
Share capital: 20 million Dkr.

Løvens Kemiske Fabrik
Trading company
(Leo Pharmaceutical Products Trading Ltd. A/S)
(Löwens Chemische Fabrik Handelsgesellschaft A/S)
Founded 1951.
Share capital: 30 million Dkr.

Other Danish companies within the combine:

Panther Plast Aktieselskab, founded 1933, converted into a limited company in 1965.
Share capital: 5 million Dkr.

Companies abroad:

Löwens Kemiska Fabrik Aktiebolag, Malmö, founded 1960
Share capital: Skr 500,000

Lövens Läkemedel Aktiebolag, Malmö, founded 1966
Share capital: Skr 5,000

EFA Company Ltd., Athens, founded 1958
Share capital: Drs 550.000

Leo Pharmaceutical Products Belgium S.A., Brussels,
founded 1967,
Share capital: Bfr 3 million

Laboratoire Leo, France (S.A.), Paris and Dreux,
founded 1933, converted into a limited company 1960,
Share capital: FF 3 million

Leo Laboratories Limited, Hayes, Middlesex, England,
founded 1960,
Share capital: £ 300,000

Leo Laboratories Limited, Dublin, founded 1958,
Share capital: £ 124,000

Leo Pharmaceutical Trading Limited, Dublin, founded 1973,
Share capital: £ 1,000

Løvens kemiske Fabriks Handelsaktieselskab,
Oslo

The main part of the products are manufactured by the combine in Denmark and the rest in a factory in Ireland, which supplies the British market, and by a factory in France which supplies the French speaking markets. The other foreign companies are sales companies.

The shares in the parent company are not freely negotiable, the large majority is owned by manufacturer K. Abildgaard.

Diversification

The basic point of view of the firm is that the combine should produce drugs first and foremost, and, therefore, the diversification is very limited. The plastics factory is an exception, and so is also partly the production of vitamin preparations.

3. H. Lundbeck og Co.

Production

This combine employs a total of about 1400 persons of whom about 650 are employed by the parent company in Copenhagen.

The main product lines of the firm are psychopharmacological drugs, products for local combating of infections and cancer remedies. Apart from that the firm manufactures products within the product groups analgesics and sulphonamides, among others.

Capital

The combine is organized in the way that the firm H. Lundbeck og Co. A/S, with a share capital of Dkr. 35 million together with its subsidiary company Kefalas A/S, with a share capital of Dkr 45 million, is owned by the Lundbeck Foundation, founded by the late Mrs. Grete Lundbeck.

AB Leo, Helsingborg, Sweden, with a share capital of Skr. 30 million is owned by Kefalas A/S.

The Danish company H. Lundbeck og Co. has the following foreign subsidiary companies:

The Lundbeck Corporation,
New York.

L.I.C., Lundbeck Industries Chimiques,
Paris.

Lundbeck Arzneimittel G.m.b.H.,
Vienna.

Lundbeck S.A.,
Brussels.

Oy H. Lundbeck & Co. Ab,
Helsinki.

H. Lundbeck & Co. (Holland) N.V.,
Amsterdam.

Lundbeck AG,
Zurich.

AB H. Lundbeck & Co.,
Malmö.

Lundbeck G.m.b.H.,
Hamborg.

H. Lundbeck & Co. A/S,
Oslo.

AB Leo-Intressenter,
Helsingborg.

Lundbeck Ltd.,
Luton, England.

Diversification

The firm produces some perfumery, especially skin cream, and it distributes a number of products manufactured abroad, e.g. hair spray and deodorant.

4. A/S Dumex

Production

Originally, this combine had the aim of handling the total Danish export of drugs, but the firm never managed to become a unified export organization, but became an independent firm. The combine employs about 500 persons in the Danish parent company.

The main product line are psychopharmacological drugs and to a lesser extent vitamins and antibiotics, but the firm also offers products within most main product groups of drugs.

Capital

Until 1973, the Dumex combine was owned by ØK (the East Asian Company) - the largest trading company in Scandinavia. At that moment, about 1250 persons were employed, and the combine consisted of the following companies:

Companies in Denmark:

A/S Dumex Agro
A/S Dumovit
A/S Vitapharm

Companies abroad:

Dumex Ltd. Bangkok, founded 1957,
Share capital: Tcs 25 million

Dumex Sdn. Bhd., Kuala Lumpur, founded 1959,
Share capital: M$ 650,000

Dumex Ltd., Lagos, founded 1960,
Share capital: N£ 5.000

Dumex Ltd., Accra, founded 1965,
Share capital: NC 101,000

P.T. Dumex Indonesia, Jakarta, founded 1968,
Share capital: US $ 937,000

Dumex GmbH,
Hamborg.

Dumex Ltd.,
Durban.

OY Dumex AB,
Helsinki.

Dumex Läkemedel AB,
Helsingborg.

Dumex SpA,
Milano.

A/S Dumex,
Oslo.

Dumex Pty., Ltd.
Melbourne.

Dumex Ltd.,
London.

And with factories in Denmark, Thailand, Malaysia, Indonesia and Nigeria.

In 1973, ØK concluded an agreement with the large Canadian combine, Canadian Development Corporation, about exchange of a number of companies. ØK acquired the share majority in a number of CDC companies within the fields of forestry and mining. In return, CDC's subsidiary company, Connaught Laboratories, acquired the share majority in Dumex - Copenhagen and interests in a number of other companies, owned by this combine.

Diversification

One of the Danish subsidiary companies, A/S Dumex Agro, is supplier of vitamins and antibiotics to the livestock of the farming sector. Furthermore, the combine produces forage supplements and baby-food.

5. A/S Ferrosan

Production

The combine Ferrosan was founded in 1919-20, and it now has a total of 1000 employees. Of these, about 350 are employed by the Danish parent company.

The main product groups of the firm are vitamins, tuberculosis remedies and psychopharmacological drugs.

Capital

Ferrosan is a Dano/Swedish firm, whose parent companies are the two sister companies A/S Ferrosan, Denmark, with a share capital of 8 million Dkr and AB Ferrosan, Malmö, Sweden, with a shar capital of 3 million Skr.

The two companies are owners of shares in each other.
The owners of the two companies are descendants of the founders of the companies - the families Andersen and Rynè.

The two parent companies are co-owners of a number of sales companies:

OY Ferrosan AB, Helsinki, founded 1954.
Share capital: Fmk 600.000

A/S Ferrosan, Oslo, founded 1960.
Share capital: Nkr 10,000.

A/S Norfarma, Oslo, founded 1967.
Share capital: Nkr 240,000.

Ferrosan International A/S and AB, Copenhagen, founded 1970. Share capital D.kr. 100.000 and S.kr. 100.000.

Apart from those, the Danish parent company has 3 subsidiary companies:

A/S KEMOVIT, founded 1943, producing agrochemical products and forage supplements.
Share capital: Dkr 5 million.

A/S DANOCHEMO, founded 1948, producing and distributing vitamin concentrates f r pharmaceutical use and feed supplements, disinfectans etc.

Share capital: D.kr. 400.000.

A/S REMEDIA, founded 1957, distributing toothpaste, vitamins, cosmetics etc. to Danish wholesalers.

Share capital: D.kr. 200.000.

Diversification

Apart from what is listed under the Danish subsidiary companies it may be mentioned that Ferrosan is the largest supplier of disinfectants in Denmark, and that the firm produces various enriched foodstuffs.

6. A/S Alfred Benzon

Production

A/S Alfred Benzon is the oldest pharmaceutical factory in Denmark (founded in 1919).

The combine has about 800 employees, 350 of these being employed by the Danish parent company.

The main part of the production of drugs is concerned with such fields as rheumatic diseases and metabolic disturbances. Also analgesics and remedies against ulcers and seasickness are produced.

About half of the company's turnover originates in semi-pharmaceutical products such as articles for the care of children and above all special kinds of chewing gum and troches. As will be seen, a high degree of diversification.

Capital

The parent company has a share capital totalling 12 million Dkr. The shares are not freely negotiable, they are owned by descendants of the founders, the families Benzon and Thorsen.

The other parent company of the combine, A/S Mecobenzon, is Denmark's largest wholesale company for drugs with a share of the market of about 60 per cent. Until 1972, half of this firm which also has a share capital of 12 million Dkr, was owned by A/S Medicinalko, a company substantially influenced by ØK - the former owner of Dumex. Now A/S Alfred Benzon owns the whole share capital in Mecobenzon.

Apart from these two companies, the following companies are affiliated with the combine:

In Denmark:	Danimed A/S Share capital: Dkr 250,000
	Chr. F. Petri's eftf. I/S

Abroad:

A/S Alfred Benzon
Oslo.

Oy Alfred Benzon AB
Helsinki.

Benzons Farmaceutiska AB
Helsinki.

Alfred Benzon (U.K.) Ltd.
Bollington, Cheshire, England

Alfred Benzon B.V.
Maarsbergen

Alfred Benzon S.A.
Brussels

Alfred Benzon GmbH
Hamborg

Alfred Benzon GmbH
Zurich

Alfred Benzon Ges.m.b.H.
Vienna

7. A/S Grindstedværket

Production

This company is not a pharmaceutical factory proper, but on the other hand, in 1973 the turnover of its drug production - sold through its subsidiary company A/S Syntetic - totalled about 96 million Dkr, which makes it one of the large suppliers. Another reason for including the firm here is that its production is not based so much on pharmaceutical specialities, but on synthetic drugs which form part of the production of other pharmaceutical factories.

Furthermore, A/S Grindstedværket, which employs about 1100 persons, has close connections with the Danish food industry.

Capital

Together with its subsidiary A/S Syntetic and the firms

Danlac A/S,
Dansk Gærings-Industri A/S,
I. Krüger A/S, and
M. Aarsleff & Co. A/S.

A/S Grindstedværket is a subsidiary company of A/S Danisco.

Diversification

Apart form drugs, the company produces emulsifiers, enzymes and stabilizers, aromatic substances and essences for the food and stimulants industries.

8. The Connection Between the Danish and the Swedish Pharmaceutical Industries

The Danish and the Swedish pharmaceutical industries are closely connected. Figure 4.3. is a list of the largest Swedish and Danish pharmaceutical factories and their relations.

Sweden		Den mark	
Number of employees			Number of employees
5.880	The Astra Combine	Novo	1.850
1.500	Pharmacia	Løven	1.100
850	Kabi	Lundbeck	650
600	Leo	Dumex	500
450	Ferrosan	Ferrosan	350
		Pharmacia	220

H. Lundbeck & Co. A/S and AB Leo, Helsingborg, a subsidiary company of Kefalas A/S, is owned by the Lundbeck Foundation. Ferrosan, Denmark and Ferrosan, Sweden are sister companies. Pharmacia, Denmark is a subsidiary company of Pharmacia, Sweden. The other Danish pharmaceutical factories have sales companies in Sweden and the Astra Combine has a sales company in Denmark.

4.3. The Importers

About half the turnover of pharmaceutical specialities stems from foreign producers who sell their products either through special drug importers or through their own sales or subsidiary companies. The main part of the multinational drug producers are represented in the Danish market. The following large foreign companies have subsidiary/sales companies in Denmark:

Hoffman - La Roche	Upjohn
Ciba - Geigy	Winthrop
Sandoz	Abbott Laboratories
ICI	Astra
Bristol	Pharmacia
Ames Company	Bayer
Merck, Sharp og Dome	Hoechst
Pfizer	Schering A/G
Reiker (3M)	Boehringer Ingelheim
G.D. Searle	Connaught
Squibb	Organon

Furthermóre, preparations form the following large foreign firms are sold:

Lederle	Knoll
Wyeth	Philips - Dupher
Eli Lilly	Roussel
Schering Corporation	Janssen
Lepetit	Boots
Bofors	Kabi

The establishing has been gradual, the normal start being that an importer deals in the products of the firm, and when the turnover has grown sufficiently large, a sales company is established. In a few cases, small Danish firms have been bought and used as sales companies. Multinational drug producers have not invested in production plants in this country (Pharmacia being an exception).

The drug importers co-operate in the trade organization MEDIF.

4.4. The Wholesale Trade

The pharmaceutical articles - manufactured goods as well as raw materials - are distributed from the factories or importers through wholesalers to the pharmacies. Exceptions are only the hospital dispensaries which are supplied directly from factories or importers. The only function of the wholesalers is the distribution proper, they have nothing to do with the actual sales promotion or the fixing of prices. As far as pharmaceutical specialities are concerned, the factories and importers fix the prices which the pharmacies have to pay, and the wholesalers are allowed certains discounts on this price. The wholesale discounts which are dictated mainly by the producers, amount to 8 to 15 per cent on the price paid by the pharmacies. As the wholesalers have no direct influence on the price determination, there is no actual competition on prices. The wholesalers can compete, however, on terms of delivery and payment, and in this connection the granting of long-term interest-free trade credits has played an important part. Therefore, the pharmacies have incurred substantial trade debts with the wholesalers, totalling as much as 125 million Dkr, but it is uncertain who finances the bulk of the debts, the wholesalers or the speciality suppliers. At the moment there are 4 wholesale firms supplying pharmaceutical specialities to the pharmacies. These 4 firms are:

(1) Mecobenzon A/S (Subsidiary company of the pharmaceutical factory Alfred Benzon)
(2) Nordisk Droge og Kemikalie-Forretning
(3) K.V. Tjellesen
(4) A/S Max Jenne

On 1st April 1974, a fifth wholesaler closed down. The pharmacy-owned wholesale firm Bang og Tegner distributes the production of the pharmacies.

Mecobenzon is by far the largest of the wholesalers dealing in specialities with a share of the market of about 60 per cent. Nordisk Droge og Kemikalie-Forretning is the only one of the other three of any substantial importance.

In the present situation, each of the four wholesalers can supply all articles from the importers and the domestic producers. Recent years have seen some misgivings as to this system of distribution, however. Attempts have been made to establish a one-channel distribution, so that an importer or a pharmaceutical factory could supply their products through a wholesaler, and direct distribution, so that the various suppliers could supply directly to the pharmacies of the country through a common distribution centre.

These attempts have failed, however, partly because of the Danish Monopolies Authorities, and therefore the original system is still in existence.

4.5. The Pharmacies

As mentioned earlier the retailing of drugs is restricted almost exclusively to the pharmacies. According to law, the pharmacies are obliged to follow the prescriptions of the doctors exactly, so that a pharmacy product cannot be substituted for an approved speciality. As a consequence of this obligation, the pharmacies cannot decide themselves which specialities to deal in, but they must be in a position to deliver any speciality on the market. They must be able to procure with the shortest notice possible, what they do not have in stock.

As has appeared, the pharmacies are monopolists within the product line in question, as they have a monopoly of dispensing pharmaceutical preparations according to prescriptions. They also have a monopoly of manufacturing drugs that cannot be registered as specialities according to provisions at present in force.

As per 31st December 1973, the 348 pharmacies in the country had 6.793 employees, of whom 789 were pharmacists and 1167 chemist's assistants. It is those two groups of personnel who are in charge of the production of the pharmacies.

5. Analyses of Product Markets

5.1. The General Competitive Situation for Pharmaceutical Preparations

5.1.1. The Product Development

Very schematically the pharmaceutical trade may be characterized as an oligo-political trade where the development of new products and the information and advertising efforts are the predominant means of competition.

In the post-war period the most salient feature of the policy of the drug producers have been an extensive launching of new products. This product policy has implied that it has been necessary to increase the costs of information and advertising in connection with the launching. At the same time it has created a radically changed situation on the market, as the individual enterprise for a certain time obtains relatively well-protected market positions for its new products. The prodominant competition of earlier days with considerable price competition on the market with standardized products is now unusual in the pharmaceutical field (cf., however, the market for contraceptive pills).

A high rate of renewal of products and the consequent product differentiation implies a protection of the market positions of the established enterprises through difficulties of establishing on the lèvel of both production as marketing. It now requires relatively large financial resources to establish new enterprises in the trade of an order which will influence the competitive situation. The vigorously increased costs which are necessary for the development and introduction of new preparations on the market are of decisive importance here.

The pharmaceutical market is compounded by a large number of more or less dinstinctively delimited product markets. Of course, thedelimitation is concerned with fields of application. The flow of product innovations during the post-war period has had the result that the number of markets have been vigorously increased while the differentiation between uniform preparations has made the market situation difficult to survey.

For the enterprises the splitting of the markets means a protection against price competition. In many cases, the differentiation gives the individual preparations 'its own market', where the competition from other preparations is negligible. Like in other trades, the line between product differentiation within a product market and the division in more product markets is often difficult to draw.

At the same time the research and development efforts always imply a threat, however, to the market positions of the existing preparations. In trades of this type it may be expected that the individual product at a given time have very large market shares, but that the market shares are subjected very easily to vigorous shifts. This will also appear from the following analyses of product markets.

The average life-time of drugs is 10 years. This fast rate of renewal does not necessarily mean, however, that the market positions of the enterprises are insecure, i.e. that the potential competition from other pharmaceutical enterprises is great on the individual markets. The obstacles to establishing may often be considerable also on the market level, so that shifts between the ratio of market shares of the preparations mainly occur among the already predominant enterprises. This is partly due to the fact that the pharmaceutical field constitutes a very large research field, and that the individual enterprises as a consequence of this have chosen to concentrate their largest research projects on a small number of partial fields. Thus, the number of potential competitors may be relatively limited.

5.1.2. The Competition Activities

The competition on the pharmaceutical markets may be said to take place on two levels:

(1) The competition between existing preparations takes place by means of prices and advertising. To a certain extent, the conditions for such a competition in the individual product markets may be illustrated by structure data such as market shares. Often the degree of concentration will be very high, cf. for instance the market for tranquilizers. Monopoly and

strongly concentrated oligopoly situations will be registered. As a rule the relative market positions are locked in the short run and attempts to obtain substantial changes trough active price competition or advertising campaigns are unusual.

(2) The most important and most resource requiring competition, however, takes place in connection with the launching of new products. The means of competition here assume the character of investments. They are research and development efforts and often a very large use of resources in connection with information and advertising at the launching. The conditions for this competition cannot, of course, be illustrated by market shares or the like, which are only a later registration of the results of the efforts of the enterprise. Important indicators are probably the research resources of the enterprises in the product field in question, the situation as to patents and the sales resources which the enterprises possess. These indicators are almost impossible to quantify, however.

Somewhat simplified, there are three kinds of launching of new preparations:

(1) New drugs which are clearly superior to the existing alternatives by certain forms of treatments. This means that such a preparation establishes a new product market or soon may gain a predominant position on an existing market. Examples are contraceptive pills and psychopharmacological drugs.

(2) So-called 'me-too' preparations which show small divergences from the preparations already in the product market in question. The supply of such preparations partly through the development efforts of the established suppliers, partly through new establishments, results in a high degree of product differentiation on many product markets. To a wide estent the development efforts are done by the enterprises which already have a strong position in the product market in question. Their launching, then, may be seen as an important effect of the competition between the few which characterizes the majority of the product markets. Often the large enterprises launch a considerable number of relatively uniform preparations on 'their' markets simultaneously. Thus, Lundbeck for instance offers 10 preparations on the market for psychopharmacological drugs.

(3) Synonymous preparations, i.e. products which as to application are considered completely or almost completely exchangeable with some existing preparations. Establishing of such a preparation is possible if the enterprise has found a new production process for instance, thus obtaining a patent of process. As a rule, however, this involves product fields where the patent has expired or where the existing preparations have not been able to obtain the protection secured by a patent. A condition for a successful launching is here that the sellers can convince the decision-makers that the preparation is actually as good as the products of the competitors. In contrast to the 'me-too' preparations, the price competition can be assumed to play an important part at the launching. Synonymous preparations are found for instance on the markets for antibiotics and psychopharmacological drugs.

Statistical structure data are difficult to interpret. They present a snapshot, so to speak, of a space of time, where changes are rapid beacuse of the product innovations. The structural picture obtained by tabulating one year's market shares reflects completely different phases in a development and completely different competition conditions. A decisive difficulty of a dynamic description of the competition and the structural development in the individual product markets is lacking information about the use of resources for research and development and about advertising and information in the individual product markets.

5.1.3. Registration and Competition

An important aspect of the competitive situation in the Danish market is the relationship between drugs manufactured by the pharmacies and pharmaceutical specialities including registration of pharmaceutical specialities and provisions for approval of individual names for them.

The Danish Pharmacies Act defines pharmaceutical specialities as drugs ready for use sold in packages made by the manufacturer and intended for the user under an individual name or under a common name fixed by the National Health Service with the trade name or trade mark of the manufacturer attached.

The drugs, however, manufactured by the pharmacies are excepted from the provisions for specialities and so are the serum, vaccines, and other bacteriological preparations manufactured by the Governmental Serum Institutes.

The relatively severe requirements which must be satisfied before a preparation can be registered as a pharmaceutical speciality have had the effect that the number of pharmaceutical specialities is relative modest. At the moment about 1300 pharmaceutical specialities are registered.

According to a proposal for a new act on drugs which is to be read in the Danish 'Folketing' during autumn 1974, a large part of the preparations manufactured by the pharmacies is also to be registered as pharmaceutical specialities. At the same time, the perequisites for registration will be eased, so that an increase in the number of specialities of 700 to 100 is to be expected.

The pereqisite for registration which will be abolished if the Bill is passed is a pereqisite which is not found in other countries. It is a demonstration of a desire to maintain a price regulating competition between the pharmaceutical industry and the producing pharmacies. In short, it says that the effective substance in a drug must not be a common commodity. If it is such a commodity its appearance must be due to a therapeutically important discovery made by the applicant or the production must require a special technique. The perequsite has had the effect that the pharmacies have obtained an actual monopoly for a number of products, e.g. within the field of analgesics (cf. section 5.5.)

In connection with the registering of specialities their names are also considered. The provision in the Act now in force about names is unique among the provisions of other countries, and it is also based on the desire to safeguard the production of the pharmacies against unfavourable conditions with reference to a price regulating effect, among other things. It is also a demonstration of a fear that free access to individual names would bring a large number of uniform products on the market under different names, thus causing a confusion of names.

According to the provision (section 74 of the Act), the main rule is that specialities must be registered under a common name. The permission to use individual names requires that the manufacturer can document that he has performed an especially valuable effort in the supply of drugs to the population. The provision is practised in the way that the permission to use the individual name is granted to the inventor and to the Danish enterprise which first launches the preparation on the Danish market. As a main rule, the drugs manufactured by the pharmacies are sold under common names.

It is to be assumed that this provision has limited the number of specialities offered for sale, especially those produced abroad, and therefore, it has influenced the concentration in the individual product markets. With such a provision, some enterprises may have desisted from marketing a product in Denmark under a common name, when they can market the product under its individual name in all other countries. The provision about names is also giving the pharmacies a preferential position, as the prescription only stating the common name may and probably will be attended to with preparations manufactured by the pharmacies.

It is too early to give an estimate of what the provision about names will contain under the new Drugs Act, as this is the most important subject of controversy. This is of course due to the fact that it involves large commercial interests, also with respect to advertising. There can hardly be any doubt either that almost any change in the provision about names will imply a change in the competitive situation between the three parties on the market: the pharmacies, the domestic producers, and the foreign producers.

5.2. Analyses of Product Markets

The following section includes 8 analyses of product markets which may be divided into 3 groups:

(1) Psychopharmacological drugs
    Tranquilizers
    Antibiotics
    Analgesics
(2) Vitamins
    Contraceptive pills
(3) Insulin
    Sulphonamides

Group 1 are the largest product markets on the Danish market for pharmaceutical preparations. It must be noted, however, that the group tranquilizers is part of the group psychopharmacological drugs.

Group 2 are those product groups which deviate most from the general competitive pattern within pharmaceutical preparations. These are partly standard products, and the consumers decide to a wide extent which preparations are to be bought.

Group 3 constitute 2 interesting product markets. The insulin market is the most concentrated market within the pharmaceutical market and the market for sulphonamides is a relatively new and vigorously growing product.

The delimitation of the individual product markets follows the lines employed by the two trade organizations MEFA and MEDIF in their common trade statistics.

It must be emphasized that the turnover of pharmaceutical specialities and preparations manufactured by the pharmacies is considered and of that again only what is sold through pharmacies and other retailers for human consumption. Thus, bulk products are not included. Furthermore, it must be emphasized that the analyses state purchase prices paid by the pharmacies. If the turnover of the pharmacies stated in selling prices is wanted, the profit margin of the pharmacies must be added. For the turnover of specialities manufactured by the enterprises which are members of MEFA, the profit margin amounted to an average of 33 per cent in 1968 and an average of 38 per cent in 1972.

5.3. The Danish Market for Psychopharmacological Drugs

In this connection psychopharmacological drugs are understood as the two main product groups psycholeptics and psychoanaleptics. Psycholeptics are agian divided into two main groups: neuroleptics and tranquilizers, while psychoanaleptics consist of the two main groups antidepressives and psychostimulants. The largest of these product markets and also the most concentrated is the market for tranquilizers, and among these especially the market for benzodiazepinderivates. In the following the total market for psychopharmacological drugs will be analysed first, followed by an analysis of the Danish market for tranquilizers.

5.3.1. The Total Market for Psychopharmacological Drugs

On this market 35 enterprises offer preparations for sale. Apart from that, the Danish pharmacies transact a modest quantity. 11 of the suppliers are Danish producers. In spite of the large number of suppliers the market is dominated by a few enterprises accounting for about 70 per cent of the turnover in 1972. The four largest suppliers who had a market share of 62 per cent of total turnover in 1972 are:

	Market share 1972
Dumex	28 per cent
Hoffman La-Roche	17 -
Lundbeck	12 -
Ferrosan (Wyeth)	5 -

The total turnover stated in purchase prices paid by the pharmacies was for the individual years:

	1969	1970	1971	1972	1973
Turnover million Dkr	56,3	65,7	73,0	77,0	76,7

Thus, the psychopharmacological drugs constitute the largest product market on the Danish market for drugs. Because of a change in the system of subsidies in 1973, this year saw a fall in turnover in proportion to the turnover in 1972.

	1970	1971	1972
CR_4	62	59	62
L_4	0.858	0.715	0.758
CR_8	73	70	73
L_8	0.638	0.613	0.664

5.3.2. Tranquilizers

As mentioned this product market is the largest within the product group psychopharmacological drugs. The total turnover also in purchase prices paid by the pharmacies is stated below:

	1970	1971	1972
Turnover million Dkr	32,5	34,0	37,2

In this market the concentration is considerably lower than in the total market for psychopharmacological drugs. The number of suppliers is 9, but the four smallest suppliers have a negligible market share, so that there are only 5 real suppliers. These 5 suppliers are:

	Market share 1972
Dumex	53 per cent
Hoffman La-Roche	34 -
Ferrosan (Wyeth)	7 -
Gea	4 -
Lundbeck	1 -

	1970	1971	1972
CR_4	98	98	98
L_4	1.491	1.379	1.710

The relatively large Linda-index values illustrate the great difference between the two largest and the two smallest suppliers.

The most important Dumex preparation 'Stesolid' must be considered a synonymous preparation to Hoffman La-Roche's preparation 'Valium' and the same applies to the Dumex preparation 'Risolid' and the Hoffman La-Roche preparation 'Librium'. The prices of the Dumex preparations are about 10 per cent lower than the prices of the Hoffman La-Roche preparations.

During the last year the prices of tranquilizers have been critisized because they were found to be too high. This is due to the fact that Hoffman La-Roche lowered their prices on the British market. Similar price reductions are wanted on the Danish market.

5.4. The Danish Market For Antibiotics.

After psychopharmacological drugs, antibiotics are the main product group with the largest turnover. The main product group can be divided into broad-spectered and medium-spectered antibiotics, where the broad-spectered are tetracyclines, chloramphenicol, and broad-spectered penicillins, and where the medium-spectered are erythromycin, streptomycin, and medium-spectered penicillins. The table below shows the total turnover of antibiotics stated in purchase prices paid by the pharmacies:

	1968	1969	1970	1971	1972	1973
Total turnover million Dkr	45	49	55	61	63	59

During the period, the turnover has been steadily increasing with the exception of 1973 which saw a fall compared to 1972 of about 4 million Dkr. This fall was due to a vigorous price reduction of tetracycline of about 20 per cent.

The number of suppliers in this product market is relatively large, viz. 5 domestic producers and 18 importers, but the market is dominated to a large extent by a small number of suppliers. Although the number of importers is large, imported preparations accounted for anly one third of the turnover. The largest suppliers and their approximate market shares are shown below:

	Market share 1972
Løvens Kemiske Fabrik	22 %
Novo	13 %
Astra	15 %

	1970	1971	1972
CR_4	69	66	65
L_4	0.363	0.451	0.346

5.5. The Danish Market for Analgesics

This product is highly dominated by products manufactured by the pharmacies. This dominance is due partly to the perequisites for registration mentioned above, partly to the fact that the mild analgesics can be obtained without prescription. Thus, the retail monopoly of the pharmacies may often become decisive in the consumers' choice of brands. The pharmaceutical factories cannot register the mild analgesics as pharmaceutical specialities, and customers who ask for headache tablets at a pharmacy will be given boxes of tablets manufactured by the pharmacies. It must be assumed that the competitive situation will be influenced by the expected relaxations of the perequisites of registration in 1974/75.

There are 21 suppliers of analgesics in Denmark beside the pharmacies. Of these 7 are domestic producers. Total turnover for the respective years stated in purchase prices paid by the pharmacies was:

	1969	1970	1971	1972	1973
Turnover million Dkr	45,8	49,7	52,4	57,5	59,4

The most important suppliers and their market shares (per cent of total turnover) in 1972 are stated below:

The Danish Pharmacies	57 per cent
Sandoz	9 -
Alfred Benzon	9 -
Løven	4 -

	1970	1971	1972
CR_4	78	79	80
L_4	1.880	1.642	1.691

5.6. The Danish Market for Vitamins

The market for vitamins differs from the other product markets analysed here in that there is amore intensive distribution. Apart from pharmacies vitamin pills are also sold by grocers, supermarkets and druggists. This makes it difficult to calculate the total turnover. The turnover of the pharmacies for the respective years are stated below. The turnover is calculated on the basis of purchase prices paid by the pharmacies.

	1970	1971	1972	1973
Turnover million Dkr	18,7	21,9	23,1	24,8

It is the pharmacies themselves first and foremost who sell vitamins through the pharmacies, as they account for about 50 per cent of the turnover, but besides there are three fairly large suppliers, viz. Ferrosan, Dumex and Pharmacia. The latter two enterprises did not enter the market until 1971.

A tentative estimate of the turnover outside the pharmacies may be rated at about 7 or 8 million Dkr per year. The uncertainty of the figures is due to the fact that the sales of the cooperative societies and the largest private-owned chain cannot be calculated. The largest suppliers in this market are Ferrosan and Dansk Droge Import. Løven, in addition to that, is sole supplier to the cooperative societies.

Apart from the Danish pharmacies, there are a total of 7 suppliers of vitamin pills for human consumption. Of these, Hoffman La-Roche is the only foreign enterprise with a negligible market share. The approximate market shares of the largest suppliers were in 1972.

The pharmacies	36 per cent
Ferrosan	32 -
Dansk Droge	16 -
Dumex	8 -
Pharmacia	5 -

The sales of vitamins for veterinary use are dominated completely by A/S Vitapharm, a subsidiary company of Dumex.

The index below is calculated on the basis of the total turnover of vitamins for human consumption on the Danish market.

	1970	1971	1972
CR_4	99	91	89
L_4	2.850	0.581	0.635

The large values in 1970 are due to the fact that there were only 5 suppliers, and that the Danish pharmacies had more than 50 per cent of the total turnover.

5.7. The Danish Market for Contraceptive Pills

7 enterprises offer contraceptive pills for sale in Denmark. Of these 4 are Danish and 3 are foreign. One of the foreign enterprises (Wyeth) sells its products through the Danish enterprise Ferrosan. In addition to that the Danish pharmacies manufacture and sell their own product.

The total turnover of contraceptive pills stated in purchase prices paid by the pharmacies is stated below:

	1970	1971	1972
Turnover million Dkr	11,4	14,9	16,0

It must be assumed that the market is about covered so that the turnover will only grow with the price increases and the number of women able to give birth to children.

Contraceptive pills differ from the other pharmaceutical specialities in that the various brands do not differ very much, and that both doctors as well as consumers can ascertain this fact. They are, in other words, typical standard articles offered for sale in the same quantities and packages. The consequence of this is that prices are uniform. The market shares of the individual enterprises have not been very constant during recent years, however. This is due to the appearance of new suppliers and the introduction of new brands.

The largest suppliers and their approximate market shares in 1972 appear form the tabulation below:

Schering A/G	30 per cent
Wyeth	27 -
Novo	18 -
Searle	8 -

It most be noted that Novo did not enter the market until 1971.

	1970	1971	1972
CR_4	85	80	85
L_4	0.521	0.479	0.561

5,8. The Danish Market for Insulin

Insulin is a remedy applied in the treatment of diabetes. It is offered for sale in the form of a liquid and is injected into the organism to reduce the sugar content of the blood. Also a number of oral antidiabetics are used for this purpose and thus these are partly substitutes for insulin.

There are two suppliers of insulin on the Danish market: Novo and Nordisk Insulin laboratorium. While Novo is the world's largest exporter of insulin, the enterprise sells almost no insulin in Denmark. Thus, Nordisk Insulinlaboratorium has a regular monopoly on the Danish market.

The total turnover of insulin on the Danish market for the various years is stated below:

	1969	1970	1971	1972	1973
Total turnover million Dkr	3	3	4	5	5

There are 10 suppliers on the market for oral diabetics. Of these 4 are Danish producers. In 1972 the total turnover of these preparations was approx. 4 million Dkr. The largest suppliers were Hoechst and Lundbeck with market shares of 33 per cent and 30 per cent, respectively.

5.9. The Danish Market for Sulphonamides.

The number of suppliers in this product market is 12 of which 6 are domestic producers. The total turnover for the various years was:

	1969	1970	1971	1972	1973
Total turnover million Dkr	4,2	4,3	4,6	6,4	11,6

It appears that the turnover has grown vigorously during the last couple of years. This is due to the appearance of new combination preparations. This has also resulted, of course, in a substantial shift between the ratio of market shares. The increase in the share of Gea has been especially great. The largest suppliers on the market are:

	Market share 1972
Hoffman La-Roche	31 per cent
Gea	16 -
Pharmacia	16 -

	1970	1971	1972
CR_4	49	50	66
L_4	0.456	0.382	0.666

TABLE OF SYMBOLS

n = total number of units (firms or units of economic activity) making up the industry.

n^* = number of units selected:

- for each hypothesis: 2, 3, 4, 8, 10, 12, 15, 20 etc.
- or constituting the sample analysed.

M = average value of the variable.

V = variation coefficient.

G = GINI coefficient.

H = Herfindahl-Hirschman index.

E = entropy index.

CR = share of the first n^* units (either 4, 8, 10, 12, 15, 20 etc. or of the sample n^* selected) in the total of the variable.

L = Linda index: The value of this index is calculated according to the n^* hypothesis used (either $n^* = 2, 3, 4, 8, 10, 12$ etc. or: n^*, n^*_h, n^*_m).

n^*_h = number of units corresponding to the maximum value of the L index within the sample analysed.

n^*_m = number of units corresponding to the minimum value of the L index within the sample analysed.

L_s = arithmetic mean of the L indexes on the basis of the hypothesis $n^* = 2$ to n^*_m, the formula thus being:

$$L_s = \frac{\sum_{n^*=2}^{n^*_m} L_{n^*}}{n^*_m - 1}$$

Preliminary remarks

I. The tables are based on the methodology developed by the Commission of the European Communities for quantitative studies on concentration trends by industry (see First Report on Competition Policy, Part III, pages 157-167- April 1972; Second Report on Competition Policy, Part III - pages 147-161, April 1973).

II. The basic data have been assembled on the responsibility of the institutes which were asked to collect them, as indicated in the heading of each table.

III. Given the documentation available, the contents of each table conform by and large to the plan indicated in the explanatory notes below.

Explanatory notes to the tables

1. Table I shows the trend between 1968 and 1973 in the total figures for the following three variables:

   sales
   employment
   wage and salary bill

   The table concerns both the total number of units (firms or units of economic activity) making up the industry(n) and a sample (n*).

   Here the sample comprises the largest firms in the industry. Their number varies according to the degree of oligopoly in the industry and also according to the individual statistical sources available.

   As regards the three variables (sales, employment, wage and salary bill) the trend in the figures relates both to the industry total and to the sample.

2. Table 2 shows the trend of concentration for three variables - sales, employment and wage and salary bill.

The measures and indexes used in this table are obtained from the following formulae:

	Limits	
	Lower	Upper
M = arithmetic mean $M = \frac{x}{n}$	>0	x
V = variation coefficient $V = \frac{\sqrt{\frac{\sum_{i=1}^{n} (x_i - M)^2}{n}}}{M}$	0	$\sqrt{(n-1)}$
G = Gini coefficient $G = \frac{1}{n \cdot x} \sum_{i=1}^{n} \left[(i-1).Fx_i - i.Fx_{i-1} \right]$	0	$\frac{n-1}{n}$
H = Herfindahl-Hirschmàn index $H = 1000 \frac{V^2 + 1}{n} = \frac{1000}{x^2} \sum_{i=1}^{n} x_i^2$	$\frac{1000}{n}$	1000
E = entropy index $E = 100 \sum_{i=1}^{n} \frac{x_i}{x} \log \frac{x_i}{x}$	$100(-\log n)$	0

The definitions of the formulae are given for simple statistical series. It is assumed, therefore, that the value of the variable is known for each unit of the set.

n = number of units in a set (1)

x = total value of the variable in a set

i = unit i

x_i = value of the variable for unit i

Fx_i = accumulated value of the variable up to unit i

3. Table 3 is intended to show the trend since 1968 in the level of concentration of large firms. It comprises three sheets, one for each of the variables used, in the following order:

sales
employment
wage and salary bill

Each variable is intended to highlight a given aspect of the structure of the sample comprising the large firms and enables significant comparisons to be made between the trends in different variables.

Here the trend in the level of large firm's concentration is measured by Linda indexes and concentration ratios.

The Linda index is calculated for each variable, while the concentration ratios relate to the first three variables (sales, employment, wage and salary bill).

In Table 3 the L index is not calculated in respect of the entire industry (n) but only for the sample (n^*) and for the various hypotheses 4, 8, 10, 12, 15, 20 etc. within the sample.

The table also gives the maximum value (Ln^*_n) and the minimum value (Ln^*_m) of the various L indexes, calculated in the interval between $n^* = 2$ and $n^* =$ entire sample.

The Linda index is defined as follows:

$$L = \frac{\sum_{i=1}^{n^*-1} \frac{EO_i}{n^*}}{n^* - 1}$$

(1) It should be remembered that small and family businesses have sometimes had to be disregarded.

where:

$$EO_i = \frac{\frac{A_i}{i}}{\frac{A_{n^*} - A_i}{n^* - i}} = \frac{n^* - i}{i} \cdot \frac{A_i}{A_{n^*} - A_i} = \frac{n^* - i}{i} \cdot \frac{A_i}{1 - A_i}$$

A_i = cumulative share of the first i undertakings in the set selected

$A_{n^*} = 100\% = 1$

That is to say:

(a) The L or L_{n^*} index is the arithmetic mean of the $(n^* - 1)$ ratios of oligopoly equilibrium (EO), each being divided previously by n^*.

(b) Each EO ratio is expressed by the average size of the first i firms and that of the remaining $(n^* - i)$ firms, where i, in turn, has the values 1 (expressing the ratio between the size of the largest firm and the average size of all the other firms in the sample of the industry selected) to $n^* - 1$; this is why the number of EO ratios in question is exactly $n^* - 1$.

The upper and lower limits of the L index are ∞ and $\frac{1}{n^*}$ respectively. (1)

The formula for the concentration ratios is the following:

$$CR_{n^*} = \frac{100}{x} \sum_{i=1}^{n^*} x_i$$

where:

n^* = number of units selected:
for each hypothesis: 2, 3, 4, 8, 10, 12, 15, 20 etc.
or constituting the sample analysed.

The upper and lower limits of CR_{n^*} are 100 and > 0 respectively.

4. Table 3 bis is intended to provide an analytical description of the structure of the large firms for each year under consideration.

There are in fact sheets, one for each year, from 1968to 1973. This enables significant comparisons to be made between the indexes calculated on the basis of the different variables. As they relate to the same period and are based on the same hypotheses of n*, these indexes are homogeneous.

It should be stressed that the analytical description in Table 3 bis was designed precisely to give a clear picture of the structure of the firms without revealing individual details.

The values of the L indexes are given for each of the seven variables, and for comparative purposes the

$$\underline{\text{minimum}} \quad (L_{\underline{n^*_m}}) \qquad \text{and} \qquad \underline{\text{maximum}} \quad (L_{\underline{\underline{n^*_h}}})$$

are also indicated.

This table, therefore, highlights the complete series of Linda curves from n* = 2 to n* = entire sample.

5. Table 4 summarizes by reference to the L_s index the trends in the various aspects of the structure of the large firms, constituting the sample. This reveals the trend in the indexes between 1968 and 1973, calculated simultaneously on the basis of all the variables used.

As regards the columns in this table, the following should be noted:

The $\underline{n^*_m}$ indicate the number of firms corresponding to the minimum value of the L index within the sample (n*) selected, while $L_{\underline{n^*_m}}$ is the value of the relevant L index. The arithmetic mean of the L indexes from L_2 to $L_{\underline{n^*_m}}$ inclusive, gives the L_s index, which expresses the degree of equilibrium and of concentration between the first n^*_m firms in the industry.

(1) See R. Linda, Le systeme des indices d'equilibre et son application concrete a la siderurgie des Etats Unis, in "Rivista di Politica Economica, Roma, Mai 1968.
C. Marfels, A New Look at the Structure of Oligopoly in "Zeitschrift für die gesamte Staatswissenschaft", 1974, J.C.B. Mohr (Paul Siebech), Tübingen, pages 249/270.

The texts of tables 1 to 4 are in French. The translation of the individual variables is as follows:

Turnover = Chiffre d'affaires
Persons employed = Effectifs
Wages and salaries = Masse salariale

CONCENTRATION INDUSTRIELLE

TABLEAU NO 1

EVOLUTION DES DONNEES GLOBALES : TOTAL DU SECTEUR ET ECHANTILLON

1968 - 1973

PAYS : DANEMARK
INSTITUT : AARHUS SCHOOL OF BUSINESS
SECTEUR : PHARMACEUTIQUE (N.I.C.E. 313.1)
ENTREPRISES-U.A.E.

VARIABLE : 01 CHIFFRE D'AFFAIRES (en Millions D.kr)

ANNEE	TOTAL N	TOTAL VALEUR (T)	TOTAL 1968=100	ECHANTILLON N	ECHANTILLON VALEUR (E)	ECHANTILLON 1968=100	E/T %
1968	24	4.278	100	15	4.140	100	96.77
1969	25	4.948	115	15	4.780	115	96.69
1970	23	5.730	133	15	5.380	129	93.89
1971	29	8.620	201	15	8.190	197	95.01
1972	27	9.730	227	15	9.250	223	95.07
1973	27	11.709	273	15	11.220	271	95.90

VARIABLE : 02 EFFECTIF

ANNEE	TOTAL N	TOTAL VALEUR (T)	TOTAL 1968=100	ECHANTILLON N	ECHANTILLON VALEUR (E)	ECHANTILLON 1968=100	E/T %
1968	24	3.126	100	15	2.977	100	95.23
1969	25	3.556	113	15	3.365	113	94.63
1970	23	3.339	106	15	3.100	104	93.02
1971	29	5.284	169	15	5.035	169	95.25
1972	27	5.672	181	15	5.431	182	95.75
1973	27	6.020	192	15	5.779	194	96.00

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CONCENTRATION INDUSTRIELLE

EVOLUTION DES DONNEES GLOBALES : TOTAL DU SECTEUR ET ECHANTILLON

TABLEAU NO 1

1968 - 1973

PAGE 2

PAYS : DANEMARK
INSTITUT : AARHUS SCHOOL OF BUSINESS
SECTEUR : PHARMACEUTIQUE (N.I.C.E. 313.1)
ENTREPRISES U.A.E.

VARIABLE : 03 - MASSE SALARIALE (en 100.000 D.kr.)

	TOTAL				ECHANTILLON				
ANNEE	N	VALEUR (T)	1968=100	N	VALEUR (E)	1968=100	E/T %
1968	24	1.048	100	15	.990	100	94.47
1969	25	1.175	112	15	1.110	112	94.23
1970	28	1.300	124	15	1.210	122	93.08
1971	29	2.542	242	15	2.450	247	96.33
1972	27	3.012	287	15	2.860	288	94.93
1973	27	3.572	340	15	3.410	344	95.46

IV/A-5 EVOLUTION DE LA CONCENTRATION TABLEAU NO. 2

TOTAL DU SECTEUR

PAYS : DANEMARK PAGE 1

INSTITUT : AARHUS SCHOOL OF BUSINESS

SECTEUR : PHARMACEUTIQUE (N.I.C.E. 313.1)

ENTREPRISES-U.A.E.

VARIABLES : 01 CHIFFRE D'AFFAIRES 02 EFFECTIF 03 MASSE SALARIALE
04 BENEFICE NET 05 CASH FLOW 06 INVESTIS BRUTS
07 CAPITAUX PROPRES 08 EXPORT. 09 IMPORT. 10

VARIABLE	ANNEE	N	M	V	G	H	E
01	1968	24	.178	1.43943	.66556	127.99825	-102.94749
02	1968	24	.130	1.46458	.65539	131.04157	-103.89268
03	1968	24	.044	1.36330	.63136	119.10728	-106.35072
01	1969	25	.198	1.48964	.68000	128.76159	-102.69328
02	1969	25	.142	1.53939	.66013	134.78859	-104.43520
03	1969	25	.047	1.41799	.64014	120.42799	-106.96297
01	1970	28	.205	1.56781	.67907	123.50112	-107.10422
02	1970	28	.119	1.57802	.66304	124.64839	-108.72078
03	1970	28	.046	1.48869	.65824	114.86391	-109.63007
01	1971	29	.297	1.75307	.71846	140.45736	-102.93741
02	1971	29	.182	1.96055	.73411	166.99937	-99.19025
03	1971	29	.088	2.20841	.75591	202.65735	-94.06857

IV/A-3 EVOLUTION DE LA CONCENTRATION

TABLEAU NO 2

TOTAL DU SECTEUR

PAYS : DANEMARK PAGE 2

INSTITUT : AARHUS SCHOOL OF BUSINESS

SECTEUR : PHARMACEUTIQUE (N.I.C.E. 313.1)

ENTREPRISES-U.A.E.

VARIABLES : 01 CHIFFRE D'AFFAIRES 02 EFFECTIF 03 MASSE SALARIALE
04 BENEFICE NET 05 CASH FLOW 06 INVESTIS.-BRUTS
07 CAPITAUX PROPRES 08 EXPORT. 09 IMPORT. 10

VARIABLE	ANNEE 1972					ANNEE 1973				
	N	M	V	G	H	E	N	M	V	G	H	E
01	27	.360	1.65286	.69613	138.22012	-103.20521	27	.433	1.72591	.71225	147.10644	-100.83009
02	27	.210	1.80181	.71772	157.27817	-99.45007	27	.223	1.79171	.71910	155.93415	-99.42001
03	27	.112	1.98047	.71477	182.30575	-97.82942	27	.132	1.91961	.71262	175.51454	-98.82344

IV/A-3 — EVOLUTION DE LA CONCENTRATION

TABLEAU NO 3

INDICES LINDA (L) ET RATIOS DE CONCENTRATION (CR) — 1968 = 1973

PAYS : DANEMARK
INSTITUT : AARHUS SCHOOL OF BUSINESS
SECTEUR : PHARMACEUTIQUE (N.I.C.E. 313.1)
ENTREPRISES-U.A.E.

VARIABLE : 01 CHIFFRE D'AFFAIRES

ANNEE	L ET CR	INDICES L ET CR RELATIFS A N = 4	8	10	12	20	30	40	N	COURBES L ECHANTILLON N	1ER MAXIMUM L N*H<	N* H<	2EM MAXIMUM L N*H	N* H<	MINIMUM L N*H
1968	L	.36044	.36749	.40152	.42527	.00000	.00000	.00000	24	15	.45597	2	.51786	2	.51786	4	.36044
	CR	66.39	86.49	90.93	93.74	.00	.00	.00			96.77						
1969	L	.35032	.36789	.44718	.44443	.00000	.00000	.00000	25	15	.47084	2	.51546	2	.51546	5	.34108
	CR	66.49	87.31	90.95	95.78	.00	.00	.00			96.60						
1970	L	.37743	.43842	.45560	.45014	.00000	.00000	.00000	28	15	.43812	2	.57075	2	.57075	5	.36168
	CR	64.92	83.60	87.61	90.75	.00	.00	.00			93.89						
1971	L	.49062	.44269	.48358	.51325	.00000	.00000	.00000	29	15	.55225	2	.83571	2	.83571	6	.40382
	CR	66.24	86.66	90.26	92.58	.00	.00	.00			95.01						
1972	L	.49619	.42655	.47653	.51166	.00000	.00000	.00000	27	15	.52671	2	.81250	2	.81250	6	.39331
	CR	65.47	86.43	90.13	92.39	.00	.00	.00			95.07						
1973	L	.55221	.43258	.50829	.54535	.00000	.00000	.00000	27	15	.57159	2	.83250	2	.83250	6	.40728
	CR	66.32	87.86	91.28	93.42	.00	.00	.00			95.90						

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EVOLUTION DE LA CONCENTRATION

TABLEAU NO 3

INDICES LINDA (L) ET RATIOS DE CONCENTRATION (CR)

1968 - 1973

PAYS : DANEMARK

INSTITUT : AARHUS SCHOOL OF BUSINESS

SECTEUR : PHARMACEUTIQUE (N.I.C.E. 313.1)

ENTREPRISES-U.A.E.

PAGE 2

VARIABLE : 02 EFFECTIF

ANNEE	L ET CR	INDICES L ET CR RELATIFS A N* = 4	8	10	12	20	30	40	N	COURBES L: ECHANTILLON N*	L N*	1ER MAXIMUM N*	H<	L N*H<	2EM MAXIMUM N*	H	L N*H	MINIMUM N*	M	L N*M
1968	L	.46660	.44697	.46857	.45564	.00000	.00000	.00000	24	15	.40358	2		.69091	2		.69091	7		.36301
	CR	63.88	85.64	89.16	92.19	.00	.00	.00			95.23									
1969	L	.51470	.47139	.48398	.44135	.00000	.00000	.00000	25	15	.45131	2		.83333	2		.83333	7		.36534
	CR	63.75	84.56	88.08	91.39	.00	.00	.00			94.63									
1970	L	.49712	.45257	.45573	.42416	.00000	.00000	.00000	28	15	.39642	2		.76852	2		.76852	14		.38153
	CR	61.70	81.91	85.68	88.98	.00	.00	.00			93.02									
1971	L	.66645	.49364	.58906	.58102	.00000	.00000	.00000	29	15	.56698	2		.97222	2		.97222	6		.49340
	CR	68.66	87.43	90.18	92.45	.00	.00	.00			95.25									
1972	L	.62782	.44655	.57138	.57690	.00000	.00000	.00000	27	15	.57561	2		.81905	2		.81905	8		.44655
	CR	67.70	88.29	90.94	93.11	.00	.00	.00			95.75									
1973	L	.61048	.43343	.55585	.56602	.00000	.00000	.00000	27	15	.58076	2		.82409	2		.82409	8		.43343
	CR	67.49	88.50	91.25	93.42	.00	.00	.00			96.00									

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E V O L U T I O N D E L A C O N C E N T R A T I O N

TABLEAU NO 3

INDICES LINDA (L) ET RATIOS DE CONCENTRATION (CR)

1968 - 1973

PAYS : DANEMARK
INSTITUT : AARHUS SCHOOL OF BUSINESS
SECTEUR : PHARMACEUTIQUE (N.I.C.E. 313.1)
ENTREPRISES-U.A.E.

PAGE 3

VARIABLE : 03 MASSE SALARIALE

ANNEE	L ET CR %	INDICES L ET CR RELATIFS A N* = 4	8	10	12	20	30	40	N	ECHANTILLON N*	COURBE-S L 1ER MAXIMUM L N*	N* H<	1ER MAXIMUM L N*H<	2EM MAXIMUM N* H	2EM MAXIMUM L N*H	MINIMUM N* H	MINIMUM L N*H
1968	L	.39722	.35935	.40422	.43870	.00000	.00000	.00000	24	15	.43954	2	.71875	2	.71875	5	.30617
	CR	60.11	84.92	88.74	91.60	.00	.00	.00			94.47						
1969	L	.42157	.39824	.44210	.40600	.00000	.00000	.00000	25	15	.42016	2	.75000	2	.75000	5	.32390
	CR	60.27	84.04	87.44	90.83	.00	.00	.00			94.23						
1970	L	.42013	.34950	.40851	.39981	.00000	.00000	.00000	26	15	.43078	2	.76516	2	.76316	5	.32246
	CR	55.45	83.08	86.92	90.00	.00	.00	.00			93.08						
1971	L	.91596	.51756	.59303	.58167	.00000	.00000	.00000	29	15	.64560	2	1.50000	2	1.50000	8	.51756
	CR	63.84	88.51	91.66	94.02	.00	.00	.00			96.38						
1972	L	.79172	.47056	.60160	.61132	.00000	.00000	.00000	27	15	.57697	2	1.40000	2	1.40000	8	.47056
	CR	67.07	87.65	90.31	92.30	.00	.00	.00			94.95						
1973	L	.73991	.43075	.51916	.54262	.00000	.00000	.00000	27	15	.50806	2	1.39130	2	1.39130	8	.43075
	CR	65.51	87.63	90.71	92.95	.00	.00	.00			95.46						

CONCENTRATION INDUSTRIELLE

TABLEAU NO 3BIS

TABLEAU STRUCTUREL DES COURBES LINDA

PAYS : DANEMARK — PAGE 1

INSTITUT : AARHUS SCHOOL OF BUSINESS

SECTEUR : PHARMACEUTIQUE (N.I.C.E. 313.1)

ENTREPRISES=U.A.E. — ANNEE : 1968

N	VARIABLE 01 CHIFFRE D'AFFAIRES	VARIABLE 02 EFFECTIF	VARIABLE 03 MASSE SALARIALE
2	.51786	.69091	.71875
3	.43361	.55759	.54464
4	.30044	.46660	.39722
5	.36205	.37487	.30617
6	.41328	.39257	.32653
7	.39473	.36501	.32594
8	.36749	.44697	.35935
9	.38053	.47549	.40256
10	.40152	.46857	.40422
11	.42678	.44773	.39013
12	.42527	.45564	.43870
13	.41237	.44491	.45295
14	.43012	.45354	.45054
15	.45597	.46358	.43954

CONCENTRATION INDUSTRIELLE

TABLEAU STRUCTUREL DES COURBES LINDA

TABLEAU NO 3BIS

PAYS : DANEMARK

INSTITUT : AARHUS SCHOOL OF BUSINESS

SECTEUR : PHARMACEUTIQUE (N.I.C.E. 313.1)

ENTREPRISES-U.A.E.

ANNEE : 1969

N°	VARIABLE 01 CHIFFRE D'AFFAIRES	02 EFFECTIF	03 MASSE SALARIALE
2	.51546	.83333	.75000
3	.43873	.62145	.57878
4	.35032	.51470	.42157
5	.34108	.41141	.52390
6	.39181	.41798	.33328
7	.38942	.38534	.34648
8	.36789	.47139	.38824
9	.39782	.48624	.43838
10	.44718	.48398	.44210
11	.45473	.46395	.42766
12	.44443	.44135	.40600
13	.44201	.42016	.38203
14	.46750	.44663	.41214
15	.47084	.45131	.42016

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CONCENTRATION INDUSTRIELLE

TABLEAU NO 3BIS

TABLEAU STRUCTUREL DES COURBES LINDA

PAYS : DANEMARK

PAGE 3

INSTITUT : AARHUS SCHOOL OF BUSINESS

SECTEUR : PHARMACEUTIQUE (N.I.C.E. 313.1)

ENTREPRISES-U.A.E.

ANNEE : 1970

N°	VARIABLE 01 CHIFFRE D'AFFAIRES	02 EFFECTIF	03 MASSE SALARIALE						
2	,57075	,76852	,76316						
3	,46172	,59023	,57864						
4	,37743	,49712	,42013						
5	,36168	,39590	,32246						
6	,39861	,40657	,32403						
7	,40757	,39539	,32763						
8	,43842	,45257	,34950						
9	,42622	,46347	,37060						
10	,45360	,45573	,40851						
11	,44819	,44557	,41141						
12	,43014	,42416	,39981						
13	,43093	,39935	,38202						
14	,43252	,38153	,41871						
15	,43812	,39642	,43078						

TABLEAU STRUCTUREL DES COURBES LINDA

PAYS : DANEMARK
INSTITUT : AARHUS SCHOOL OF BUSINESS
SECTEUR : PHARMACEUTIQUE (N.I.C.E. 313.1)
ENTREPRISES-U.A.E.

ANNEE : 1971

N°	VARIABLE 01 CHIFFRE D'AFFAIRES	02 EFFECTIF	03 MASSE SALARIALE
2	,83571	,97222	1,50000
3	,58780	,80381	1,03924
4	,49062	,66045	,91596
5	,41834	,58393	,71701
6	,40382	,49340	,57075
7	,44236	,51354	,54019
8	,44269	,49364	,51756
9	,46358	,55308	,53760
10	,46358	,52906	,59303
11	,51493	,59685	,59802
12	,51325	,53102	,58167
13	,51003	,55550	,55604
14	,52102	,53005	,57075
15	,55225	,56698	,64560

TABLEAU NO 3BIS

TABLEAU STRUCTUREL DES COURBES LINDA

PAYS : DANEMARK — PAGE 5

INSTITUT : AARHUS SCHOOL OF BUSINESS

SECTEUR : PHARMACEUTIQUE (N.I.C.E. 313.1)

ENTREPRISES-U.A.E. — ANNEE : 1972

N°	VARIABLE 01 CHIFFRE D'AFFAIRES	02 EFFECTIF	03 MASSE SALARIALE
2	.81250	.81905	1.40000
3	.56742	.71563	1.00140
4	.49619	.62782	.79172
5	.41936	.51734	.63560
6	.39331	.45568	.52114
7	.43244	.47160	.48760
8	.42655	.44655	.47056
9	.43844	.51743	.52206
10	.47853	.57138	.60160
11	.51155	.58229	.62002
12	.51166	.57690	.61152
13	.49745	.55727	.53994
14	.49795	.53178	.56293
15	.52671	.57561	.57697

IV/A-3 — CONCENTRATION INDUSTRIELLE — TABLEAU NO 3815

TABLEAU STRUCTUREL DES COURBES LINDA

PAYS : DANEMARK — PAGE 6

INSTITUT : AARHUS SCHOOL OF BUSINESS

SECTEUR : PHARMACEUTIQUE (N.I.C.E. 313.1)

ENTREPRISES=U.A.E. — ANNEE : 1973

N	VARIABLE 01 CHIFFRE D'AFFAIRES	02 EFFECTIF	03 MASSE SALARIALE
2	,83250	,82409	1,39130
3	,64373	,71879	1,02185
4	,55221	,61048	,73991
5	,44671	,49624	,56369
6	,40728	,45475	,48610
7	,44010	,46423	,46588
8	,43238	,43343	,43075
9	,45360	,49943	,48785
10	,50829	,55583	,51916
11	,53675	,57287	,54655
12	,54535	,56002	,54262
13	,53436	,54638	,52532
14	,52468	,53035	,53350
15	,57139	,56076	,56006

IV/A-3 — CONCENTRATION INDUSTRIELLE — TABLEAU NO 4

TABLEAU RECAPITULATIF DES INDICES L

PAYS : DANEMARK — PAGE 1
INSTITUT : AARHUS SCHOOL OF BUSINESS
SECTEUR : PHARMACEUTIQUE (N.I.C.E. 313.1)
ENTREPRISES U.A.E.

VARIABLES	ANNEE 1968 INDICES N	1968 INDICES LN*M	1968 INDICES LS	1969 INDICES N	1969 INDICES LN*M	1969 INDICES LS	1970 INDICES N	1970 INDICES LN*M	1970 INDICES LS	1971 INDICES N	1971 INDICES LN*M	1971 INDICES LS	1972 INDICES N	1972 INDICES LN*M	1972 INDICES LS
	N*M			N*M			N*M			N*M			N*M		
01 CHIFFRE D'AFFAIRES	4	.30044	.43730	5	.34108	.41152	5	.36166	.44290	6	.40382	.54726	6	.39331	.54176
02 EFFECTIF	7	.30501	.47426	7	.38534	.53070	14	.38155	.46739	6	.49340	.70396	8	.44655	.57909
03 MASSE SALARIALE	5	.30617	.49170	5	.32390	.51856	5	.32240	.52110	8	.51756	.83582	8	.47056	.75829

IV/A-3 — CONCENTRATION INDUSTRIELLE — TABLEAU NO 4

TABLEAU RECAPITULATIF DES INDICES L

PAYS : DANEMARK — PAGE 2
INSTITUT : AARHUS SCHOOL OF BUSINESS
SECTEUR : PHARMACEUTIQUE (N.I.C.E. 313.1)
ENTREPRISES-U.A.E.

VARIABLES	ANNEE 1973 INDICES N	LN*N	LS	ANNEE 0 INDICES N	LN*N	LS	INDICES N	LN*N	LS	INDICES N	LN*N	LS	INDICES N	LN*N	LS
01 CHIFFRE D'AFFAIRES	6	-.40723	.57649												
02 EFFECTIF	6	-.43343	.57172												
03 MASSE SALARIALE	6	-.43075	.72850												