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UNILEVER AND ECONOMIC POWER :
A STUDY OF THE MARKET FOR MARGARINE
IN THE UNITED KINGDOM

by

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CONTAINS

PULLOUTS

ABSTRACT OF THESIS

This analysis of the margarine industry in the presence of Unilever, identifies and examines the economic issues of structure, behaviour and performance, against a background of policy issues related to international trade, concentration and nutrition. The major divisions of the thesis are (i) the political and international trade issues (ii) propaganda and advertising (iii) the nutrition problem (iv) margarine demand (v) the degree of monopoly in the margarine industry (vi) Government White Papers and multinational corporate activity.

An attempt is made, both by descriptive and empirical treatment of the subject matter, to demonstrate the danger inherent in the oligopolistic manipulation of consumer demand and public opinion by propaganda and advertising, and to consider the evidence of resource wastage.

Empirical work, mainly by using techniques of multivariate regression analysis, tests issues in the nutrition problem and also estimates aggregate demand functions for margarine as well as estimating the change in performance due to changing structure and performance.

Attention is also paid to the influence of oligopolistic price adjustment in the macroeconomic problem of inflation. The main thrust lies in the direction of considering adjustment problems in time series data. In demand estimation it is shown by allowing for quality variation and by allowing the influence of advertising to build up over time, that whilst aggregate demand for margarine appears to remain uninfluenced by advertising expenditure, substantially higher values are obtained than are usual for own price elasticity. In relation to the performance issue, the results indicate a more rapid adjustment to changes in the aggregate advertising variable than are usually obtained. Results are also reported which suggest that price adjustment to cost changes are rapid, and this is attributed to the structure of margarine production.

(CONTINUED OVERLEAF)

Apart from technical issues the main conclusions are that the nutrition controversy is being influenced unduly by propaganda and that independently of this, resource wastage by the margarine oligopoly would be reduced by an increase in competition, and by the control of advertising. Again it is suggested gains, in relation to the problem of UK self sufficiency and in relation to the problem of inflation, could be expected following an increase in competition. The benefits of the control of costs as well as prices are considered as an alternative policy measure.

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UNILEVER AND ECONOMIC POWER :
A STUDY OF THE MARKET FOR MARGARINE IN THE UK

Introduction - The ground plan of the thesis

This research is mainly concerned with an economic analysis of Unilever's position in the UK margarine industry. Whilst this is not the only industry classified by product in which concentration and behaviour may be studied, or in which in legal terms Unilever occupies a position of monopoly in UK markets, margarine production attracts special attention owing to the presence of a unique combination of side conditions all of which are relevant to the issue of market power.

These side conditions may be summarised as follows. Dominated by Unilever the industry provides an important source of revenue to the media through its advertising expenditure. Its product is a near perfect substitute for butter and is a constant threat to the UK butter import. The latter, which receives Government support in the UK, is of considerable economic and political importance, particularly with respect to negotiations arising within the framework of the Common Agricultural Policy. Margarine is a strategic food stuff and recognising that the UK is a deficit area in respect to its fats requirements, it could be argued that because the balance of requirements over the total fats supply from Commonwealth and Continental European sources is at present made good by USA soy bean exports, the UK is currently in a situation of over-dependence on the USA soy bean surplus.

These issues already difficult become more confused when the growing conviction of the medical authorities, that animal fats are associated with an increase in the mortality rate within industrialised nations

from coronary heart disease, is admitted into the discussion. The resultant is a complex of economic, nutritional and political problems that interact in their influence on policy with respect to the fats market in the UK.

In historical terms prior to 1969 the consumer market was dominated by brands of margarine produced by Van den Berghs, a subsidiary company of the multi-national corporation Unilever. Following the trading up which accompanied the introduction in 1969 of luxury-soft margarines into the UK market, whilst there has been a reduction in the market shares reported for 'Unilever' brands, there has been an increase in the aggregate share for soft margarines packed in tubs, together with an increase in the aggregate share of Distributors' Own Brands. What is not clear is whether this change has altered the structure of production and whether entry has taken place on the side of production.

In some respects the exploitation of the product innovation initiated by Unilever in the UK market and identified as soft margarine by distributors who form part of large retail groups, such as Sainsburys etc., may signify a return to the situation at the time of World War I. At this time Maypole Dairies was the dominant producer and retailer of margarine in the UK, who by 1913 accounted for fifty per cent of output, and whose market strength was one factor in the agreement of 1908 between the two Dutch concerns Jurgens and Van den Berghs, who were also independently interested in shop companies, to share profits. From Lever's viewpoint with the cessation of wartime rationing when butter became plentiful in the post war period losses were being incurred on Planter Margarine, with which Lever, with Government support, entered the margarine market in 1914. The development of the massive Unilever combine in the interwar years during the post war depression, largely represents an attempt to stabilise the UK margarine trade by coming to an understanding between the principal UK competitors. The

outcome of this understanding was the formation on September 2nd, 1929 of Unilever from Lever Brothers and the Margarine Union.

In the movement towards combination we can recognise the following factors. The first is the problem of fluctuation in vegetable oil prices, and that of reducing losses on stocks. The second is the problem of exploiting the results of scientific progress as technical innovation. Thirdly we recognise the influence of the price of natural animal fats such as butter and lard which lay outside the control of margarine producers. Fourthly there is the emergence of the class of professional managers and the accompanying changes in company organisation. Fifthly and finally there is the developing involvement of Governments in the organisation of industries and of markets during the current century.

Post World War II market statistics for the margarine trade suggest that prices do not reflect downward movements in raw material costs and that advertising expenditure is high. If it is assumed that advertising is an important barrier to entry which raises the level of minimum efficient scale we are in a situation that advertising has a significant impact on the market power of the Unilever enterprise. In terms of competition policy this suggests that attention should be directed towards advertising as one part of a policy directed towards controlling prices in the yellow fat industry. The emergence of Distributors' Own Brands we suggest represents a challenge to the position of the established seller and is one outcome of the ideological opposition to the virtual control of the margarine trade implicit in the existence of the large aggregate of capital under Lever control. The emergence of the nutritional issue is a bonus to the margarine interest which appears to have led to a high price policy rather than a pricing policy of relating the price to replacement costs.

Our objective is to consider aspects of Unilever conduct, particularly

with respect to the influence of advertising in market demand, and the movement of price cost margins since 1960 i.e. for the decade prior to the introduction of soft margarine and subsequently. We are also interested in the multinational aspects of Unilever activity in relation to margarine, and the nutrition issue. To this end one objective is to construct an oligopoly model of price cost margins in margarine, another is to consider the policy implications of our analysis. In addition we are interested in the macroeconomic implications of pricing policies in the margarine industry, and the possible contribution these could have to inflation.

The discussion is planned to proceed as follows.

In Chapter 1 we consider the interaction between Government Policy, Yellow Fats and Unilever. To this end the UK position prior to the Treaty of Accession to the EEC will be discussed in relation to margarine, in relation to domestic farm policy and in relation to the UK butter import. In doing so the formation of the Unilever combine will be briefly mentioned. The UK position following the Treaty of Accession will then be introduced, and we shall attempt to pick up the problem of the attitude towards New Zealand butter, the butter mountain, and the UK consumer subsidy for butter. The position of Unilever will be considered before turning to some aspects of edible oil technology and margarine. Finally we shall consider the economic aspects of official regulation.

Chapter 2 deals with Advertising, Propaganda, and Margarine in a descriptive fashion, and serves to set the picture for the general problems to be faced in attempting to estimate the influence of advertising on the aggregate demand for margarine. As has already been mentioned Unilever advertising of margarine has been an important source of revenue for the media. We intend to mention some features of the interaction between the press and Unilever, and also some

aspects of propaganda by broadcasting. The claim by Unilever that advertising generates distribution economies will be contrasted with the opposing point of view that advertising represents wasteful competition. We will also consider some features of the movement over time in the advertising expenditure to sales ratio over the period 1960 to 1974. Features of trading-up will be discussed and some attempt will be made to consider the level of advertising in absolute and relative terms in comparison to other products in which Unilever is known to have an important interest.

It appears that Unilever takes a particular stand on what consumers will accept, and uses advertising to form consumers' demand. This suggests a point of considerable importance in relation to nutrition. Therefore the final feature of the fats market and policy that we shall discuss in Chapter 3 relates to the nutrition issue. One possible effect of increasing health propaganda is that growing public awareness of the health issue may influence consumer preferences, this together with cost reducing behaviour by the margarine producers may well lead to an almost complete substitution of hard margarine and butter by soft margarine. The basis for the anti-butter campaign and its likely outcome will be discussed in some detail in Chapter 3. We shall attempt to outline the basic arguments in the nutrition issue, and also attempt to investigate the proposition that the calorie intake in human diet is related to mortality from coronary heart disease and also attempt to investigate empirically the consequences of essential fatty acid deficiency. We shall consider UK and international time series and cross section data.

Chapters 4 and 5 in turn deal with The Demand for Margarine, and The Degree of Monopoly in the Margarine Industry. It is convenient to establish a base for the consideration of the operation of monopoly power upon the Lerner Index, which suggests as a static rule of optimal

behaviour that in profit maximising conditions that the price cost margin is set equal to the inverse of the modulus ^{of} own-price elasticity of demand. If marginal cost is positive under these conditions than marginal revenue must also be positive. For this to occur own-price elasticity of demand has to be elastic i.e. greater than unity in absolute value. As many estimates report a value for own-price elasticity which is lower than unity in respect of the market demand for margarine this suggests at first sight a serious obstacle to the use of price cost margins in the manner suggested by Lerner. We shall attempt to show that variation in the estimating procedures generate own-price elasticities which are greater than unity in absolute value.

The analysis is planned to proceed along the following lines. By restricting the data to UK experience an attempt will be made in Chapter 4 to estimate a market demand function for margarine using conventional multivariate regression analysis. The demand model will be based on an attempt to allow for the influence of substitutes in the consumption of margarine, together with the usual determinants in demand of own-price and real income. By experimenting with various adjustment mechanisms and lag structures it is intended to estimate the influence of advertising in terms of a stock variable, as opposed to using current expenditure as a measure of advertising.

In addition the problem of allowing for quality variation, and the effect of quality changes in the margarine demand function will be explored. This becomes a matter of urgency, in view of the recent innovation of soft luxury margarine. The opportunity will be taken to introduce further aspects of technology and the change in margarine specification will be discussed in relation to quality. Finally the problem of adjusting current advertising expenditures as an explanatory variable in the demand function will receive particular attention. It is intended to test obvious variations in the regression analysis

such as a ratio approach, and Two Stage Least Squares (TSLS) estimation, together with the use of a value measure, as opposed to a volume measure of consumption, as the dependent variable. This may be relevant to the trading-up phenomenon. The possibility that demand own-price elasticity changes over time will also be considered.

Demand estimation, together with the derived parameters, leads naturally to the development of dynamic analogues of the Lerner approach to monopoly power in Chapter 5; that is to the development and consideration of an adjustment model of oligopoly behaviour that will attempt to relate price cost margins to industry price elasticity of demand, and the changes in concentration. Apart from a dynamic approach to price cost margin adjustment, the problem of the price adjustment process in relation to inflation will also be considered.

In Chapter 6, with which we conclude this thesis, we attempt to draw together the implications of our analysis with respect to competition policy. In doing so we shall introduce some aspects of Unilever's recent merger activity, and discuss the role of Unilever's activity as a multinational enterprise from the Unilever viewpoint, and from the viewpoint of its interaction with Government Policy.

CHAPTER 1

GOVERNMENT POLICY, YELLOW FATS AND UNILEVER

The impression we obtain from reading the literature on food control in wartime¹ is that the UK population is both better fed and more equally fed either when the nation is at war, or when the Government organises food production.

During World War I serious consideration was given to the question of whether the State should assume permanent control of food production. For example the control of milk wholesaling and its utilisation in factories creates a perennial problem.² This problem emerged in 1930 when the question of saving farmers from low prices led to the earliest of the Government's schemes to regulate the marketing of agricultural products - the 1932 Milk Marketing Scheme. With regard to the general question of food control Beveridge in 1928³ argued British food control in war is founded on general consent, in essence the sacrifice of private liberty obtains a consensus on the understanding that all are treated fairly, traders in particular can "take their margins and be free of their worst responsibilities." In considering the merits of private enterprise in peace time Beveridge points out,⁴ words added are in parenthesis:

"..... the merit of private enterprise depends on competition under conditions of abundance, and that even if the latter can be secured for the ever growing populations of the world, the former cannot be guaranteed; private traders were forced into war-time combinations which may easily be continued or revived in peace; these combinations may dictate prices and margins to suit the weakest and yield excessive profits for the strongest. They can argue (i.e. the lobby for state control) further, that with so many foods subject to unavoidable and unforeseeable harvest fluctuations, producers and consumers alike would be better suited by the comparative stability of prices that would be guaranteed under control than by the rapid rises and falls, the speculation, the undeserved gains and the devastating losses involved in the reign of free competition."

and later:

"But the powers of combination to raise prices are in nearly every case closely limited by the possibilities of substitution, and with food the range of substitution is wide. No single food is indispensable in the sense that the amount of it now eaten could not be reduced without serious harm."

Governments may intervene or take steps to regulate markets for reasons which are associated with the non-existence of countervailing power. Thus they may be concerned with the problem of the appropriate support measures to be adopted in defence of low income groups, or strategic products in international trade, and the interaction between these and policy measures which are aimed at maintaining efficiency in pricing and resource allocation, and in defence of the balance of payments. Nearly always in public policy problems governments face a dilemma in choosing between alternative strategies.

In the yellow fat market the most obvious illustration of this situation arises in the case when a government yielding to the influence of the dairy interest, discourages the consumption of margarine in support of farm incomes and as one consequence raises the cost of household budgets.⁵ In treating margarine as a cheap imitation of butter, based on low priced edible oils, some governments discriminate against margarine by legal restrictions, such as:⁶

- i) the compulsory cube shape as in Belgium and France;
- ii) limiting flavour as in France and Switzerland, in this connection Unilever claims as one of the results of Unilever research into the sensation of taste, that butters from many parts of the world have been analysed, and in consequence the ability to match their differing flavours has been developed. It is claimed that this ability has made 'Rama' in Germany the biggest selling margarine in the world (Unilever Annual Report 1973- supplement);
- iii) the compulsory and objectionable orange colour imposed in Canada;
- iv) compulsory production quotas as in Australia, and the various butter subsidies.

In protecting the consumer and attempting to stabilise the cost of living the thrust of the above policies go into reverse and an important case of this is illustrated by Norwegian policy.⁷ Here the government has subsidised and encouraged margarine consumption, ostensibly as part of a socialist cheap food policy; this policy supports the Norwegian margarine interest and also provides an outlet for fish oil which is a product of the economically important Norwegian fishing industry. This relationship is underlined by the fact that the utilisation of fish oil in Norwegian margarine increased from about 25 per cent in 1958 to about 75 per cent in 1966.

The UK position - prior to the treaty of Accession to the EEC, 1972

To establish the background for the supply of fats we now discuss the position with regard to (1) margarine, (2) domestic farm policy, and (3) the butter import into the UK. A breakdown of the commodities utilised and their outlets in the UK market for yellow fats is shown in Table 1 overleaf.

1. Margarine

As part of the government's cheap food policy and war time strategy the UK supported the entry of Unilever into the margarine trade. In 1927 two Dutch concerns, Anton Jurgens and Van den Berghs, who were the main suppliers in the British market merged to form the Margarine Union in the UK. Jurgens was established in the UK by 1914, up to which time the only important British producer was the Maypole Dairy Co. Lever entered production in 1914 forming with the government's support the Planters Margarine Co. The expansion in trade encouraged Jurgens to make acquisitions, and eventually the Maypole Dairy Co was absorbed in 1924. In 1929 The Margarine Union and Lever merged to establish Lever as the largest margarine producer in the UK. For the better part of the 20th century one firm, Unilever, has been strongly integrated in vegetable oil production and seed crushing. This has provided a link between two high concentration trades, in which Unilever is not

only the largest concern in raw material production, but is also the principal producer - namely soap and margarine.⁸

Table 1 : Commodity sources and outlets in the 1970 Yellow Fat market in the UK

<u>Domestic Butter</u>		'000 TONS
Milk supply (mill galls)	2646	
less retail sales	<u>1641</u>	
into manufacturing	1005	
<u>less other dairy products</u>	<u>680</u>	
Butter production (mill galls)	<u>325</u>	
Estimated butter production (5,158 galls/ton)		63
<u>Foreign Butter</u>		
Australia	66	
New Zealand	156	
Denmark	83	
Others (balance)	<u>94</u>	
Total import	<u>399</u>	<u>399</u>
<u>Total Butter supply</u>		462
<u>Edible oil import</u>		
Lard	18	
other animal fats	5	
fish oil	124	
groundnut	10	
soy bean	47	
Palin	29	
other vegetable oils	<u>40</u>	
	273	
aqueous phase	<u>60</u>	
Estimated to give fat content of 82%	<u>333</u>	<u>333</u>
Total yellow fat supply (estimated)		<u>795</u>

Source : Dairy Facts and Figures; MMB; 1971: Vegetable oils and oil seeds; CEC

By the time of the second world war the oil and fats industry (separated from the dairy fats industry) was notable for its level of sophistication in technical processes and a high degree of vertical integration. This is shown most fully in the two halves of the Unilever combine (i.e. Unilever Ltd in the UK and its Dutch counter part Unilever NV in the Netherlands). Unilever is of comparatively recent origin and owes its existence more to personal factors than anything else. Combination in itself is not surprising, there are good technological reasons for

economic concentration in the constituent processes, what is surprising is that Unilever has emerged as the winner.

Briefly the history of the oil and fat trade is bound up with the development of an urban industrialised society. Both soap and candle production were restricted by excise duties up to about 1850, which was some 35-40 years before William Lever commenced soap production at Warrington in 1885. Technical advance and growth in the trade was stimulated by the rise in living standards, and the increase in dirty work associated with industrialisation, together with the repeal of the 'tax on light' and the 'tax on cleanliness'; reforms which were actively sought by the trade around the mid-nineteenth century.

Lever's success in entering soap production lay in the direction of commercial innovation by advertising proprietary brands of household soap instead of maintaining quality differentials. In addition he enticed Edward Wainright, Crossfield's soap boiler, into his employment, and it is doubtful if 'Sunlight' soap would have succeeded otherwise.⁹

Crossfield was prominent among British soap boilers for developing expertise in chemical research and technology between 1896-1911 and notably they obtained exclusive rights for the Normann patent for the hydrogenation process and the Henkel patent for Persil. We note in passing trade names such as Lux and Lifebuoy are about twice as old as Unilever itself. The shift from soap and candles to chemicals was associated with growing competition from Lever. Crossfield formed links with Brunner Mond (later the alkali division of ICI) of which Joseph Crossfield was the first chairman, and were actively engaged in the ammonia process for soda production.

Whilst Lever was (and, as Unilever, still is) the leading UK advertiser (16.7 £ million in 1970) Crossfield were supreme on the technical side. Consequent to the rise in raw material prices, over the period 1896-1914 Crossfield's search for cheaper raw materials led to an extension of its

activities in oil extraction and refining, for use in soap and in the production of vegetable butter, which led to their pioneering the large scale replacement of animal fats by vegetable oils in margarine production and for other edible purposes. Crossfields were the first company to bring the hydrogenation process to commercial use in 1909, which allowed liquid and cheaper oils to replace naturally hard fats such as tallow. By 1903 Crossfields produced 'Verberene' in two forms (hard and soft) mainly from coconut oil. It is noteworthy that Kayser (dismissed from Crossfields about 1908) went to the USA and sold his technical knowledge to Proctor Gamble.¹⁰ Nevertheless the remaining technical problems of hydrogenation were resolved by T. P. Hilditch and others. (Hilditch left industry to take a chair at Liverpool University in 1925).

Agreement for the German Patent rights in hydrogenation was reached with Anton Jurgens in 1911, and with Proctor and Gamble in the USA. Jurgens later commented that Crossfields were mistaken not to exploit the process internationally, and to take out world wide patent rights. There was a great deal of piracy and evasion of the Nordmann patent which led to a law suit which Crossfields lost. A point to which we return later. Clearly at this time Van de Berghs and Lever could not be expected to acquiesce in a position of such commercial advantage.

Following the abandonment in 1906 of the 'Soap Trust', largely due to the attack by Northcliffe through Associated Newspapers,¹¹ Lever proceeded with piece-meal conquest absorbing one firm after another. Lever fearing that Crossfields preferential terms for alkali supply and their chemical interests would enable them to act regardless of making a profit on soap commenced to buy salt deposits. His intention seemed obvious to Brunner Mond who in defence of their market proceeded to buy Crossfields and Gossages. Crossfields, after the abortive 'Soap Trust', felt amalgamation with Brunner Mond was infinitely preferable to becoming subservient to Port Sunlight.

Despite Crossfield opposition Lever finally took Crossfields and Gossages from Brunner Mond (negotiations being finalised in October 1919) following the failure of Crossfields (with Jurgens support) to protect the Normann patent from infringement (the Testrup case 1915).¹² Failure to break the Normann patent at this stage would have left Lever paying royalties to Crossfields, and the history of the margarine industry could have been differently written.

Crossfields main outlet for hydrogenated oil was the English Margarine Co, which was taken over by Jurgens in the 1920's. The main UK margarine supply was in the hands of Jurgens and Vanden Berghs (two Dutch concerns), the only English producer being The Maypole Dairy Co acquired by Jurgens in 1924. Lever's entered margarine production by acquiring, with government support, The Planters Margarine Co in 1914, the main plant came into production at Bromborough, near Port Sunlight, by the time of the Armistice. However, Lever was never the leader in margarine production. The two Dutch concerns merged to form the Margarine Union in 1927, and coinciding with the world depression and the need for cost reducing rationalization of manufacturing and selling, in 1929 Unilever and its associated companies merged with The Margarine Union, which established Unilever as the monopoly producer in the UK.

2. Domestic Farm Policy

With respect to its domestic farm policy the UK supports farm incomes by maintaining a milk distribution system based on a system of producer Marketing Boards,¹³ by which the price of milk in all its uses is controlled by means of official costing systems and in which the Marketing Boards act as a discriminating monopoly on behalf of the dairy farmers.

In the UK milk manufacture is based wholly on the supply of farm milk, and the milk supply goes forward into various products of the dairy industry. These are butter, cheese, condensed, evaporated and condensed whole milk, and by-products such as skim milk and casein. Skim milk

and pasteurised whole milk may be used in margarine manufacture and may make up 5-15 per cent of the final margarine blend.¹⁴ Butter may be used as one component in margarine.¹⁵ The volume of milk used in manufacturing fluctuates widely, and the variation is higher in England as compared to other parts of the UK, and is higher in Great Britain as compared to other members of the EEC.¹⁶ In England and Wales the marketing system is operated by a system of price rebates, milk for butter manufacturing is sold at the lowest price below that of the fresh milk price¹⁷ and is therefore the first product to yield up extra supplies for the fresh milk market. Some butter plant is operated only for a few weeks in May and June. Fig 1 below compares the UK production of butter with the output of fresh milk entering manufacturing - milk surplus to the fresh milk demand.

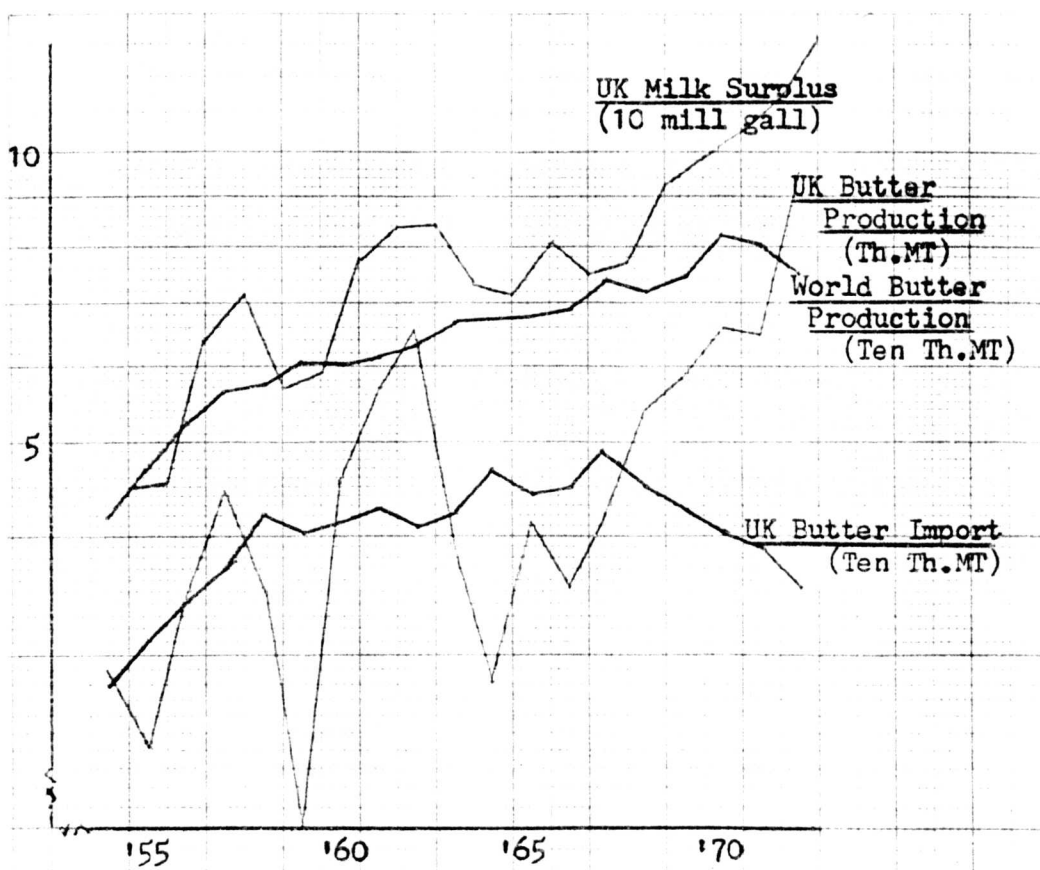


Fig 1: UK butter imports and World butter exports, together with UK milk surplus and UK butter production

World exports and UK imports are measured in units of 10,000 metric tons annually: UK production 1,000 metric tons, and surplus in units of 10 million gallons annually.

Source Table 2, page 47

The supply of fresh milk for manufacturing dairy products is subject to such extreme variation during the year because the liquid market absorbs a high proportion of the total output. In other parts of the EEC approximately 75% of milk output is assigned to manufacturing.

In the major producing countries butter manufacturing is controlled by producer cooperatives. In the UK independent organisations take the major share of production, a situation which has emerged because the marketing boards are obliged to purchase all milk of a specified quality, and therefore it is unnecessary for producers to provide their own outlet. The boards are responsible for manufacturing on a large scale, but this is more associated with the acquisition of existing enterprise as a result of financial failure rather than as a result of direct entry. Where direct entry has occurred it has been associated with the need to provide adequate manufacturing generally or in response to a need for adequate depoting facilities in certain areas.

In the UK a recent NBPI inquiry¹⁸ suggests that butter manufacture in the UK is mainly controlled by the marketing boards, Unigate and Northern Dairies, and by the consumer Cooperatives. There is some evidence that butter blending is a failing activity.¹⁹

The importance of the domestic supply in relation to butter imports has risen since 1954 when it represented nearly 10 per cent of total supply. By 1972 this had increased to a figure of 20 per cent.²⁰ Of the total import some 20 per cent is received packed, either bearing the exporters brand, generally of some producers cooperative such as 'Anchor' from the New Zealand Dairy Board²¹, or the importers brand name. Earlier the exporting countries, such as New Zealand and Australia, operated through independent agents. Recently producers started to import through their own agents, for example the New Zealand Dairy Board previously trading through A. J. Mills & Co now operate through their own concern - Empire Dairies. There is evidence of integration in

the marketing activity.

Contraction of the UK butter enterprise in terms of milk production, milk manufacturing, butter packing and blending, importing, distribution and warehousing, would create problems of structural unemployment for the government, and have considerable effects in international terms. If health policy requires butter production to be reduced a satisfactory solution to the resulting effects of structural unemployment has to be found.

3. The Butter Import into the UK

The major part of the domestic supply of butter in the UK is obtained from imports. The UK butter market is the biggest single import market in the world: in 1965 it purchased 65 per cent of world exports, in 1970, by which time world exports had risen by some 30 per cent, the UK market absorbed 48 per cent of world exports.²⁰

For the best part of this century the UK market has provided the world with its largest single import for butter, which traditionally has been a free market built up with commonwealth and European connections. There have in the past been few tariff or quota restrictions, and it has achieved considerable importance in promoting international comparative advantage and division of labour. The market has been exploited by traditional suppliers and by other countries dumping surplus butter in order to stabilise their domestic price levels. This led in the past to wide fluctuations in the wholesale price for butter on the London market, and in order to introduce more stable conditions into the import market a quota system was introduced in April 1962 which restricted exporting countries to basic quotas in each year. There was considerable movement in this system of basic quotas; for instance whilst the New Zealand share and The Danish share remained stable in relative terms, at about 40 per cent and 20 per cent respectively, trade with the Irish Republic grew from 4 per cent to 8 per cent of

total authorisations between the quota years 1965-6 to 1971-72.²²

Following the introduction of quotas into the UK import market, considerably less variation occurred in London wholesale prices, however the general effect of the movement in edible oils prices on butter prices should not be ignored.

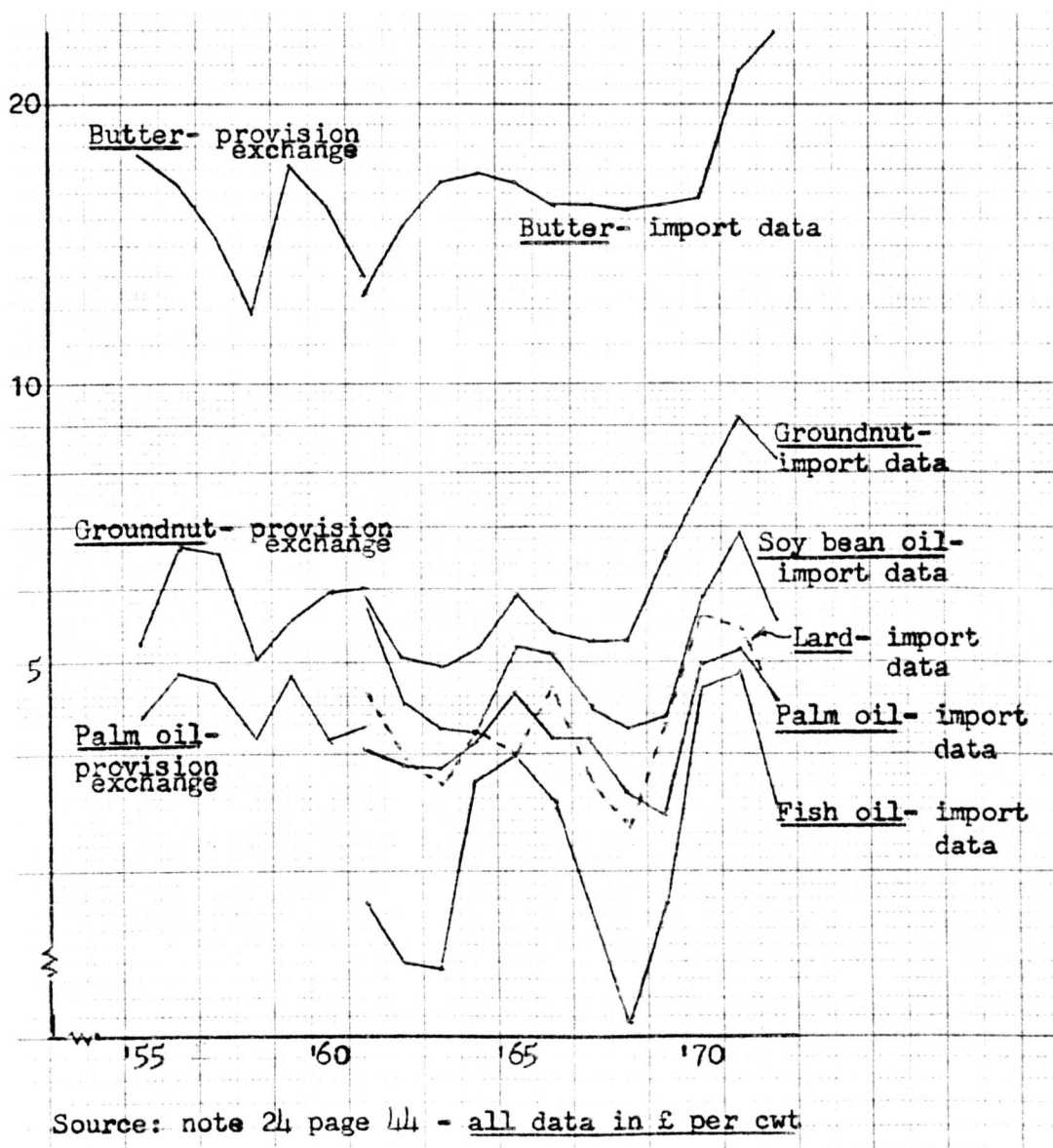


Fig 2 : Annual average of monthly prices for selected vegetable oils, butter and lard (London provision exchange prices up to 1961; from and including 1961 figures are derived by calculating the annual average of the unit values of monthly imports of each commodity given in the UK overseas trade accounts).

The quota system for butter was introduced in April 1962, the act of accession for UK entry into the enlarged EEC was signed 22 January 1973.

Graphs for the interwar period suggest that edible oil prices were related to price fluctuations in whale oil, casual inspection of Fig 2 suggests that fish oils now play a similar role in the edible oil trade.

The UK position - following the treaty of accession

At each round of pricing negotiations the UK, together with Italy, seeks to freeze prices in order to combat inflation, and in its domestic affairs makes some effort to alter the impact of the CAP on UK food prices. In 1968 the Italians complained that because they did not produce a butter surplus, they were not only required to buy it at prices well in excess of world prices, but they were also compelled to make a vast financial contribution to permit France, and the Netherlands to sell the butter they produce (on the world market at a price below cost).

The French take a strong view in that they believe the CAP is fundamental to the community, and that it should ensure that consumers should give priority to community farm products. The Germans feel that in the EEC agriculture is massively protected, and that there are grave dangers in running down foreign imports in view of the importance of the EEC as a large trading bloc.

In 1967-8 the EEC produced 17 per cent more butter than it required each year. The surplus amounted to approximately 233 metric tons annually, and was about equivalent to 54 per cent of the 1968 UK import of butter. If the enlarged community had included Denmark, the UK, Ireland and Norway in 1968 the production rate of butter would have been about 10 per cent short of the enlarged community requirement.²³

The wider problem of the benefit-cost of entry into the EEC is not an issue here. However, in terms of the yellow fat market the relevant national issues were that Denmark, which lost a significant part of its traditional trade with Germany on the formation of the EEC, was keen to recover this market, but not at the loss of its UK market. Entry without the UK would have presented difficulties because of the valuable UK market in pig meats and butter. The same is true of the Irish Republic. For the French the total import authorisation under the UK quota system

was 10 thousand metric tons in 1965-6, and 7 thousand metric tons in 1971-2.²² In the year 1967-8 the French annual butter surplus was approximately 177 thousand metric tons. For the Netherlands, which was not listed in the UK quota, for the same year the butter surplus was 75 thousand metric tons. For Italy which produced only 68 per cent of its needs, the requirement in 1968 was 31 thousand metric tons from its partners. On these figures entry of the UK into an enlarged community could provide a potential benefit to the six member EEC.

Producer price levels in the EEC for butter are higher than the world market price. The EEC butter price in 1967-68 was £39 per cwt as compared to £10 per cwt for the world price²³ UK imports in 1968 were purchased at an average price of £15.4 per cwt.²⁴ Absorbing the butter surplus from France and the Netherlands in 1967-8 would have raised the UK import bill by 65 per cent in respect of butter (approximately £m 88).²⁵ If in addition UK butter output had been sold at the EEC price, then the 1968 consumption level in the UK could only have been maintained at 20 lbs per head if expenditure on butter had increased by about 75 per cent.²⁶

It is now proposed to deal with the following issues in turn:

- (i) the attitude towards New Zealand, (ii) the butter mountain, and
- (iii) the UK consumer subsidy.

1. The attitude towards New Zealand (NZ)

In 1965 NZ butter accounted for 4.5 per cent of world output, 28 per cent of the world export trade, and 37 per cent of the UK butter import. It exported 77 per cent of its output of butter, and the UK market took 89 per cent of the NZ export.¹⁹

The CAP was adopted by the UK on 1 February, 1973. In the previous November the butter intervention price was fixed at the equivalent of £19.84 per cwt with a compensatory payment of £23.91 per cwt on

exports to the UK from the six,²⁸ and the same sum to be levied on UK exports to the six. In December 1972 the UK government claimed that this agreement would allow NZ to maintain her UK market.²⁹

In the transitional period following the treaty of accession the NZ import was to be reduced in equal stages by a total reduction of 20 per cent to a minimum quota of 136,000 tons of butter by 1977, at a guaranteed price set at the average for NZ prices in the UK market for the years 1969-1972.³⁰ There was concern at the time that the same effort did not appear to have been expanded by the UK government, in protecting the Australian position in the UK butter market.³¹

At the time of renegotiation which led to the UK referendum in 1975, considerable time was spent in obtaining agreement to the continuing access of NZ dairy products to the UK market, beyond the original five year period of transition given in protocol 18 of the accession treaty. The NZ government sought a firm commitment in respect of the UK demand.

At a meeting in Dublin in March, 1974 a statement of intent to reach agreement to allow continued access of NZ butter to the UK market after 1977 was published. In doing so the community noted that NZ and the EEC together were the major producers of dairy products in the world, and the community would pursue cooperation between the community institutions and the NZ authorities, with the objective of promoting in their mutual interest an orderly arrangement of world markets with the possibility of leading to an effective world agreement.³²

The effect of the NZ drought in not allowing the NZ dairy interest to achieve its UK import quota of 160,000 tons in 1974 was noted. The fact that imports were reduced to 130,000 tons in that year was not used as grounds to reduce the quota. In Brussels on March 12, 1974 the NZ minister of trade claimed that NZ could provide the UK with butter more cheaply than any other country, provided the community

import levies were reduced to allow for production and freight cost increases. In the following November the community ministers agreed to reduce the community levy on UK imports of NZ dairy products, to allow NZ farmers to meet increases in costs.

2. The Butter Mountain

By 1968 the EEC stockpile of surplus had reached 150,000 tons. The community's high level of self sufficiency in dairy products left no room for any attempt to control the situation by the introduction of physical quotas in order to limit imports in times of over-production of butter. The entry of the UK with a continued right of entry by NZ to the UK market has improved the EEC ability to control imports into the community. NZ has learned to produce butter under a quota system, firstly, under the earlier UK system of 1962, introduced to regulate prices, and secondly, under the treaty of accession, which required NZ imports to be reduced at an agreed rate during the period of transition.

Substantial exports could turn over-production of butter to advantage were it not for the fact that the EEC market support system means that community butter is overpriced by world standards, for example by a factor of 3.2 in terms of 1973/4 average prices. Exports are subsidised, a policy which is expensive, and undesirable because of its disturbing effects on world trade.

UK dairy policy has been based on the acceptance of cheap butter from overseas, it is obvious that the long distance transport of liquid milk is not economic so that in contrast to EEC policy the UK has concentrated on the regulation of the fresh milk market. That there has not emerged the same problem of wastage, as is implicit in the accumulation of skim milk and butter surpluses, is due to the operations of the Milk Marketing Boards (MMB) which tend to limit the quantity produced and control the price for farm milk in relation to tis

various uses. In its present monopoly position the MMB could be subject to objections by members of the community in respect of the community cartel and anti-trust policy.³³

The problem of surplus butter had reached serious proportions by 1968 (150,000 tons equivalent to 11 per cent of annual EEC production). The usefulness of increasing farm support and export subsidies came under criticism. According to Dr Mansholt, the Agricultural Commissioner at the time the surplus would reach 750,000 tons by 1972 unless some action was taken.³⁴ The French were successful at this time in getting a margarine tax imposed (until May 1969) in order to finance dairy policy (estimated yield \$87,000,000), a suggestion revived in July, 1976. By 1969 three directives were authorised:

1. grants were to be authorised for the use of milk for raising calves;
2. the commission was empowered to dispose of stocks;
3. the use of skim milk to raise pigs and poultry was recommended on a trial basis.

The last might have unforeseen implications for the P/S* ratios of domestic pigs and chicken (see Chapter 3).

Adverse weather conditions gave some relief to the situation, but by April, 1973 the problem once again became urgent and the sale of 200,000 tons to Russia was negotiated at a loss of £m125 to the community. This reduced the current butter surplus stock by one half.³⁵ In the same year members were authorised to sell surplus butter at reduced prices to selected categories of persons in receipt of social security benefits. This was taken advantage of in Ireland, the UK and West Germany. The UK scheme (May, 1973) was intended to benefit 5 million persons to the extent that each would receive one pound per month at a reduction of 10p per pound.³⁶ The scheme, 'the butter token scheme' operated from July, 1973 to December 1974 when it was abandoned because the administrative cost was found to be disproportionate to the benefits.³⁷

*P/S ratio = polyunsaturated/saturated acid ratio in adipose tissues

The Mansholt Plan proposed a withdrawal of 5m workers from agriculture, a general increase in the size of farm units, and a withdrawal of land from agricultural production to be used subsequently for afforestation and recreation. It has been suggested that the adoption of a community regional policy and the support of farm incomes by transfer payments would prove less costly than the present measures of market support and export subsidies.

In January, 1973 provisions were made for premiums to be paid to encourage dairy farmers to change to beef production, this would also help to reduce the beef shortage that existed at that time. By April in the following year measures had to be introduced to reduce beef stocks, and to prevent the build up of a beef mountain similar to the butter mountain.

3. The UK Consumer Subsidy

As part of the April, 1973 agricultural price negotiations the community agreed to answer to the UK and Italian requests for prices to be frozen as a counter measure to the problem of inflation, and despite French requests for price increases, to reduce the butter intervention price and the costs of support to the benefit of the consumer, half of the costs to be borne by the community agricultural fund and half by individual nations. Despite the relief provided by the EEC scheme, the March 1974 budget in the UK stated that together with efforts to alter the impact of the CAP on UK food prices, and appreciating the difficulties of reaching voluntary agreement on incomes, that food subsidies would be introduced, including butter. Initially operating at a level of 5½p per pound (costing £m33 in 1974-5) these reached 17-19p per half pound pack in 1976. These are due to be phased out.

Unilever and subsidies

In the UK economy the housewife benefits from having a supply of margarine available in a fairly wide variety, and at a reasonably constant price;

this at times of high butter prices enables cost of living increases to be offset by a substitution of butter by margarine. The available evidence suggests that although the price of butter has a strong effect on the consumption of margarine, the influence of the price of margarine on the consumption of butter is small, and in addition the strong organisation of margarine production in the UK appears to prevent manufacturers trying to restrict a fall in sales by means of competitive price reductions. In 1959 J. A. C. Brown made the following comment:³⁸

"It is notable that the present writer has been unable to trace any significant influence on the demand for margarine of its own price; a finding that many have reported before for other countries and other times. In the period of the analysis (1953-1958) the price of margarine has moved very little by comparison with that of butter, as manufacturers apparently prefer to meet falling demand with decreased production and perhaps increased advertising rather than decreased prices."

Brown claimed that the effects of the substitution was concentrated in the higher qualities, which suffered most when butter prices fell. This apparently had altered by 1974, as illustrated from the following comment by Unilever (1974 Annual Report):

"World market prices for oils and fats were higher than ever, the average price in Europe being more than double that of 1973. All other cost rises were also higher than in previous years particularly in Europe. With stricter prices controls in most countries, it has become increasingly difficult to recover cost increases in selling prices. The effect has been a continuous pressure on profit margins, especially for margarine.

The fall in demand for margarine was particularly marked in the UK where the retail price of butter has been subsidised for most of the year. However, sales of our health margarines in countries where they are well established - notably the Netherlands, Belgium and Germany - were less affected than sales of our other brands and increased in volume as well as in value.

Outside Europe sales and profits generally were held back by the strong rise in oils and fats prices, by shortages of oils and fats in several countries, and by difficulty in raising selling prices in line with costs."

In its 1973 annual report Unilever called the CAP subsidy of an over-production of butter "unfortunate".

The fact that the Unilever group has learned to live with declining butter prices in spite of its complaints about the effects of the CAP and the UK butter subsidy, suggests that it does not cling too strongly to an established proportional share of the yellow fats market. Whilst its sales volume is high enough to maintain a satisfactory utilisation of its manufacturing capacity there will be a strong incentive to recover the fixed costs of its highly capitalised plant by a process of trading up in respect of its product lines.

It is now convenient to introduce the problem of edible oil technology into the discussion.

Edible oil technology and margarine

Whilst margarine is a substitute for butter, it is more adaptable than butter with regard to its physical characteristics, its nutritional properties and to its economic value. Adaption in these terms can be accomplished by adjusting the composition of the fatty phase of the margarine emulsion, and at the same time this may involve altering the chemical structure of the constituent glycerides that are present in nature in the various fats of different genetic origin.

Thus the materials used in the fat phase may be blended and/or have their chemical structure altered by hydrogenation and/or interesterification for any or all of the following reasons:

- i) to modify the melting point and adapt the plasticity of the final blend to meet a wide range of requirements in domestic use and in food manufacture;
- ii) to take account of developments in the field of nutrition, chiefly in the direction of increasing the level of PuFA* in the final product;
- iii) to maintain price competitiveness as the relative prices of raw materials fluctuate in response to changes in world supply

From about 1960 the ability to selectively hydrogenate soya bean oil in

*PuFA = polyunsaturated fatty acid

order to retain the linoleic acid content was developed with the introduction of copper catalysts to replace the nickel catalysts upon which the traditional hydrogenation process was based. The new copper catalyst shows high selectivity in the removal of triple-unsaturated linolenic acid and gives very little double bond migration. It does not affect oleic acid and leaves the linoleic acid largely undisturbed. Soya bean oil treated in this way is liquid at room temperatures, contains a high proportion of natural cis-cis-lineoleic acid, and keeps well. This provides an inexpensive way of increasing the linoleic acid content of margarine, as the soya bean oil based product is cheaper than margarine based on sunflower seed oil which does not need to be hydrogenated. The vegetable oils containing the highest proportion of linoleic acid are in descending order of poly-unsaturation, sunflower seed 65 per cent, soya bean 50 per cent, cotton seed 45 per cent. Whilst the total utilisation of these oils by the fats industry rose over the three years 1967-1969, following this time soya bean oil almost entirely replaced the other two.

Very soft margarines rich in unsaturated oils may contain hydrogenated products. For example: liquid sunflower oil 88 per cent, palm kernel oil hydrogenated 6 per cent, palm oil hydrogenated 6 per cent is one quoted formula. These margarines represent a trading up of the product and require packing in tubs. By 1973 it was noted that soft margarines had captured 65 per cent of the volume, and 70 per cent of the value of margarine sales in the UK. This was a reversal of the trend noted two years earlier. In 1970 it was noted that the development of soft margarines appeared to be leading to some recovery in the margarine sales, a position which was falling away by 1973-4. Literature produced by the 'Flora' information service has some relevance at this point. The following quotations are taken from a booklet "Eating for a healthy heart":

i) Saturated fats

(tend to raise cholesterol levels in the blood).

The hard fats, usually solid at room temperature and of animal origin e.g. lard, butter, suet, hard margarine, whole fat cheese, meat fat and egg yolk.

ii) Polyunsaturated fats

(tend to lower cholesterol levels in the blood).

The soft fats, usually liquid or semi solid at room temperature, and of plant origin. e.g. sunflower oil, Flora* margarine.

*Only Flora margarine guarantees over 50 per cent poly-unsaturated fats of total fat content.

In Britain, a high proportion of the fats we normally eat are saturated. The following section explains how simple it is to reduce fats and to substitute polyunsaturated fats in order to reduce blood cholesterol levels.

(Page 5 Flora booklet.)

iii) Cholesterol-reducing diet -

"The fat switch"

Changing the balance of fats in your diet is not at all difficult, nor does it mean a drastic change in the kinds of food that you eat. Think of it as the "fat switch" - a simple kind of change from one kind of fat to another. By cutting down on saturated animal fats and substituting where possible poly-unsaturated vegetable fats, you reduce your blood cholesterol level.

There is a good deal of evidence that the "fat switch" will reduce your chances of developing coronary heart disease.

(Page 7 Flora booklet.)

Each product in the fat trade is part of the larger supply of edible fats and oils, and to an extent of protein animal feedstuffs. The large volume of world trade in these commodities emphasises

the influence of total supply and demand; for example it has been pointed out that Russian sunflower seed oil supply could replace a substantial part of the demand for United States soya bean oil, however in the event of an acute shortage of total supply as occurred when in 1970 when both groundnut and sunflower seed oil were short, the gap in total requirement was made good by the USA government allowing the CCC soya bean stock to be reduced by nearly 30 per cent.

In 1971 less than 3 per cent of the margarine consumed in the UK could have contained up to 50 per cent of sunflower seed oil, in the same year soya bean oil provided 20 per cent of the fat phase in all margarine, and clearly over the last half of the decade there has occurred a movement towards margarines with a higher content of PUFA at the same time as there has been a reduction in the content of saturated fatty acids derived from the hydrogenated whale oil input. There is a trend towards the use of fish oils which are known to contain in some cases fairly high proportions of PUFA, this may tend to reproduce the Norwegian situation to an unknown extent, and this merits some attention.

Experimental diet studies suggest the adipose tissue fairly well reflects the fatty acid composition of the diet and that changes take place fairly continuously to settle down after some 3-4 years, it would be useful to obtain experimental evidence of how far changes in the composition of margarines has affected IHD* figures over the decade 1960-1970.

A further process which should be mentioned because it can be used to alter the chemical structure of fat molecules is that of interesterification. This consists of modifying the position of constituent fatty acids in relation to the carbon elements in the glycerol component of the glyceride molecule. Generally glycerides which are fully saturated are solid; semi-solid glycerides are obtained when a mixture of say tristearin and triolein are mixed in equal proportions and are heated together to a moderate temperature in the presence of a catalyst. For

*Ischaemic Heart Disease

example cottonseed oil, and hydrogenated soya bean oil can be interesterified together with hydrogenated sunflower seed oil to provide the fatty phase for margarine. The use of a catalyst, such as sodium alcoholate or stannous hydroxide provides a product containing mixed glycerides in which the fatty acids are mixed at random over the glycerol molecule. The extent of utilisation of the process is not known, it has been reported to be used in the UK and in the Netherlands particularly in the rearrangement of lard to produce shortenings, and cotton stearin is reported to be used in the USA and in the Netherlands, particularly in the rearrangement of lard to produce shortenings, and cotton stearin is used after interestification in the USA for margarine.

In the past Unilever has proved to be highly versatile in terms of its management objectives and has continuously turned its resources to new uses once investment in established activities has proved to look unattractive. This is seen to be particularly important in the run down in the UK oil processing enterprise since the 1939 European war.

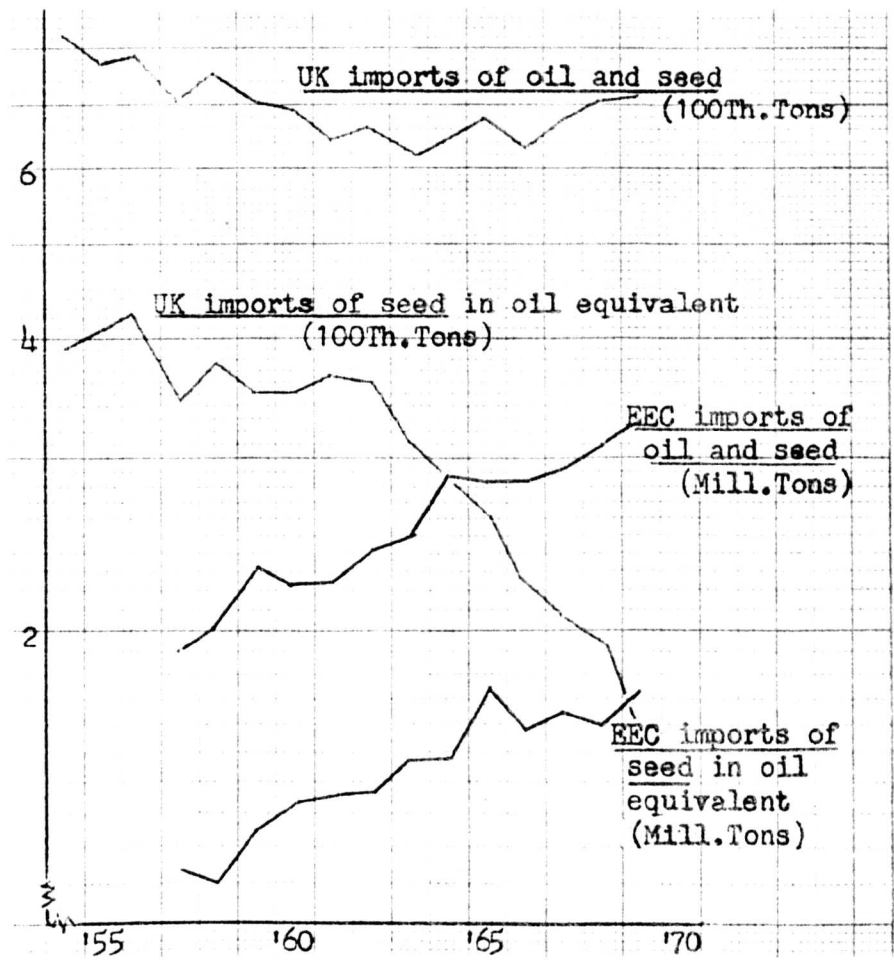


Fig 3 EEC and UK oil and oilseed imports (seed in oil equivalent)
Source: Trade Year Book FAO

The EEC statistics do not reveal the re-export to the UK as finished oils, there are two additional factors of importance:

- i) the location of the soy bean solvent extraction process on the continent by Unilever,
- ii) the post war increase in processing in the country of origin.

Unilever's main plantation interest is in the production of palm oil, and its interest in the processing of soya bean lies not only in its use in margarine, but also for the production of high protein materials, mainly in animal vegetable feedstuffs. Payment for these products represents sales revenue for Unilever overseas which can be appropriated to finance investment in the country of origin. This may be a satisfactory outcome when it represents a cheap form of economic aid to a developing country, but must be subject to some concern when it represents the run-down of an industry such as the seed crushing trade in the UK, which Unilever acquired by accident, and which was earlier a flourishing part of the total UK enterprise fundamental to the fatty acid enterprise and the soap industry, and at one time provided the basis for the media used in paint manufacture.

As part of a general attempt to solve the problems of the failure of the whale oil supply and the shortage and relatively high price of ground nut oil Unilever recently announced increased in its palm oil output. With regard to its plantations, Unilever maintains that these are not a captive source of raw material, and claims that their output, no more than about 4 per cent of Unilever's total requirement, is sold in the world market.³⁹

Each vegetable oil is part of the supply of edible fats and oils, and to an extent of protein animal feedstuffs. The large volume of world trade in these commodities shows that total supply and demand must be considered: for example the position of Russian sunflower seed oil could be important,⁴⁰ the importance of rape, mustard and other seed oils

of the Cruciferae may grow as these can be cultivated in Europe, the problem here is the content of a monounsaturated fatty acid - erucic acid, however both are used as edible oils, and have a low content of saturated fatty acids.

Within each commodity pricing serves to ration the supply of small harvests to leave some end year surplus, and bargain prices for large crops brings new users into the market. For most of the large crops a government price support exists. When government support establishes a large reserve of a commodity, government policy may become the major determinant of trade. In general a strong demand for the world fat and edible oil output renders government intervention policy fairly unimportant. However, in the event of an acute shortage of total supply, as occurred in 1970, when both groundnut and sunflower oil were in low supply as West European demand expanded, a growth in soy bean oil production was insufficient to close the gap, and the shortfall in world production was made good by drawing on the USA soy . bean stock.⁴¹

The effect of intervention may take other forms. In the USA under the authority of public law 480, soy bean oil and other oils have been disposed of with the help of long term credits, and given away as emergency relief to foreign countries hit by famine. A source of difficulty lies in the joint production of meal and oil which can lead to imbalance of supplies.

Other countries declaring support prices are the Argentine, Brazil and the EEC, which may make compensatory levies on commodities subsidised in other countries. Elsewhere support pricing may be operated through statutory marketing boards, which purchase harvests at fixed prices, to be sold on world markets. When world prices fall below production costs payments may be arranged between importing countries and producing countries. Despite official intervention price fluctuations are a feature of the trade.

There are a wide range of official and trade publications dealing with the vegetable oil and oilseed trade which give a general indication of the competitive nature of the trade in edible fats. As opposed to butter imports in the UK which are based on spot trading, there are future trading facilities available on the London commodity exchange.⁴² These were established in 1967. There is currently a terminal market in soya and palm oil. Apart from the specialist facilities provided by the London Produce Clearing House, location of the trading market in common with other terminal markets, enables specialist brokers skilled in the techniques of futures markets to switch their operations according to the relative activity of the markets. Owing to the effect of government support policy in the USA, and the disquiet following the salad oil scandal of 1963⁴³ UK importers found problems in operating in American futures markets. This led to the formation of the London Oil Market Terminal Association. After an initial spurt the importance of the turnover in each contract has declined, the market not being able to overcome the lack of interest shown by the largest users of these oils (soya bean, sunflower seed and coconut) e.g. H.J. Heinz, Proctor & Gamble, and Unilever. It has been pointed out that the large size of industrial enterprises in the oil using industries works against the success of futures markets.⁴⁴

One general difficulty with government intervention was illustrated in June, 1973 when the USA imposed a temporary ban on the export of soya beans, which led to indignation in the common market as this commodity is the main source of animal feed protein.

Recently the margarine manufacturers lobby pressured the government to permit the full impact of the CAP butter price to take effect on the UK market in order to avoid unemployment in the UK margarine industry.⁴⁵

The political strength of the farming community throughout the world is enormous. In the enlarged EEC the effects of this power is most obvious

in France and Ireland. It is not inconceivable that the French could enforce a margarine levy to finance the necessary research and development implicit in the Australian Academy suggestion that ways should be found to raise the P/S ratio of dairy product and ruminant meats. Approximately 25 per cent of the margarine usage in the UK is for food manufacture, and it is likely the convenience food trade, in which Unilever has an interest would have to bear a share of any margarine tax.

Anton Jurgens originally was a butter importer into the UK. Unilever recently entered the dairy products industry,⁴⁶ which implies entering direct competition with the MMB, Unigate, the CWS and various foreign export comparatives such as the NZ, Danish and Irish dairy boards.

The economic aspects of official regulation

The foregoing suggests that there are two aspects of regulation that are relevant. These are the regulation of industrial structure, and the regulation of prices.

In respect of structure the advantages of large scale organisation are generally considered from the viewpoint of the individual firm,⁴⁷ however it is generally believed in official circles that they are in part passed onto the consumer as the benefits of quality, choice and higher living standards:

"Our company is big, This makes low cost, large scale manufacturing and distribution possible ..."
Unilever⁴⁸

Further some degree of market power is considered to be a major source of technological and marketing innovation.⁴⁹ Unilever claims all these.

In addition to the dynamic considerations, in terms of partial equilibrium analysis this implies that the gains from regulation aimed at enforcing competition may be small,⁵⁰ and that the difference between competition and monopoly prices may disadvantage competition when internal scale economies are present.⁵¹

Apart from attempts to control oligopoly, official regulation itself may provide another source of non-competitive prices and output in large scale markets. For example, where because of some support scheme the domestic market may be isolated from the world supply and demand situation by price and output regulation.⁵²

The static model of perfect competition has been used as the criterion of evaluation of the structure and the working of a market,⁵³ and some effort has been applied to the task of analysing the connection between market imperfections and the performance of a market. Whilst regulation is widely used to reinforce competition, it is clear that progress does not stem from a hierarchy of rules and controls, and the problem is not regulation as such, but how to improve the efficiency of allocation of resources.⁵⁴

The static model is equally favoured in criticising stabilisation policy, when opposition is raised to its restrictive features which it is felt would be better aimed at smoothing random fluctuations particularly in the market for primary commodities.⁵⁵ Regulation of prices is considered to produce a better performance in some imperfect markets as an alternative to reducing market power.⁵⁶

Policies that aim at stabilising primary agricultural markets interact with other policy objectives that pressurise conglomerates and large single industry organisations to ensure that discretionary behaviour, and the intervention of alternative objectives, all lead firms to maximise efficiency, and accept a pattern of resource allocation that does not frustrate national objectives.

In the edible fats market although the degree of regulation applied at each stage of production, from the primary resource inputs to the finished article for consumption, differs widely between the various raw materials and finished products, because of the ease of substitution

between the raw materials on the side of production, and between the finished products on the side of consumption, and additionally because of the existence and complexity of the joint markets for finished goods it is difficult to define a narrow market for the purposes of isolated study. Illustrated by flow diagram below - Fig 4.

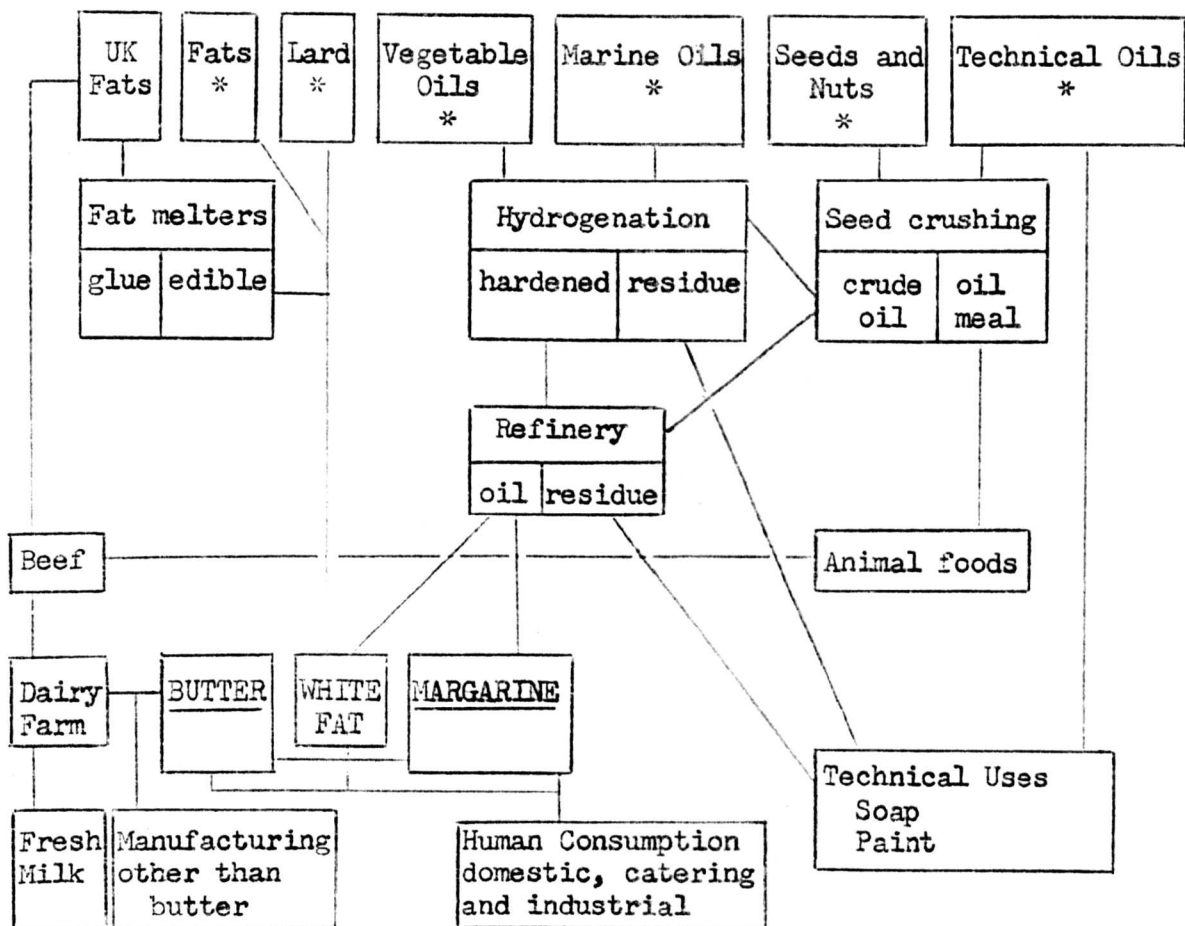


Fig 4: Commodity flows in the UK market for fats and oils

(Butter-plus-margarine are frequently referred to as yellow fats)

The flow diagram is adapted from Hammond, R.J; History of the Second World War - Food Vol III Studies in Administration and Control;

HMSO & Longmans, Green and Co; 1962; Fig IV page 434

* indicates mainly foreign source

Vegetable oils may be subdivided into:

- i. soft oils - groundnut, soy bean
- ii. hard oils - palm oil
- iii. nut oils - palm kernel, coconut

The main focus of attention in this research is on one section of the total market for fats in the UK - namely the margarine industry. In structural terms whilst the contribution by the margarine industry to the total value of UK output is relatively low, the contribution by the industry to total UK expenditure on advertising is disproportionately high. It is noted that Unilever is the monopoly producer of margarine in the UK and is the highest spender on advertising through its various brands. It is noteworthy also that Unilever is a major source of advertising in the UK in general.

In the United Kingdom the position of Unilever invites close scrutiny. This is considered necessary for two reasons: margarine is only one of the product groups in which Unilever has a near monopoly; and because operating economies are not likely to be independent of other product groups based on vegetable oil processing in which Unilever is prominent. This is much the usual position to be faced with data relating to multi-product enterprise.

Domination may be suspect for the following general reasons: because unsatisfactory forms of competition emerge, for example promotional expenditure on brand-name identification may be excessive and simply increase price contrary to government policy; because the cost advantage claimed for large scale operation may be illusory; because communications come increasingly difficult as size increases; and because the sheer size of inflexible commitments of finance severely limit the opportunities for the reduction of scale or exit as prices come under pressure from external sources.

In defence of Unilever it may be said that its presence in the United Kingdom fats market acts as a restraint on butter prices, whether the source ^{of} price increases is butter shortage, or due to the European Community Common Agricultural Policy.

Accepting that under Article 39 of the Treaty of Rome that the present support of the butter market will continue, and given the policy of reasonable food prices to the consumer, whether under common market rules, or as an extension of previous government policy in the United Kingdom, some support may be required if the margarine industry is to be able to survive the present pressure on margins, for public health objectives as well as to provide an upper limit to butter price, which under free trade would be determined by margarine prices. In addition to considering under what conditions it may become necessary to manipulate structure and behaviour in the margarine industry in the public interest, it is also necessary to consider how far the present monopoly is avoidable, and how far it leads to inefficient pricing and resource misallocation.

Ignoring the more general criticisms of the community agricultural policy we are interested in the proposition that the butter subsidy (or alternative a low butter price) is a defence against the Unilever margarine monopoly, on the supposition that the margarine industry's performance will not be improved by public policy measures to manipulate structure and behaviour in the public interest.

The apparent failure of the margarine industry to reduce prices in the past when butter is in surplus supply, might be due to the difficulty of absorbing rises in the general level of input costs. Certainly some attention has to be paid to the comment that at a time when governments are insisting that cost increases are contained it is inconsistent that the government should introduce a subsidy on butter putting the margin on margarine under particular strain; it may be of particular significance that Unilever is entering the dairy products market, and consideration has to be given to the question of whether policy makers should intervene to outlaw this potential source of monopolisation in the dairy manufacturing industry. It is intended to examine a particular aspect of behaviour that is contained in the suggestion that the margarine

industry may meet competition from butter prices by increased expenditure on advertising, or by reducing output, but not by reducing price. Even if butter price increases due to the full effect of target prices being passed onto the British consumer, it is not likely that the margarine monopoly will receive the full benefit as it is possible that the increased burden of taxation will lead to the Community restraining the import of oilseeds and products of oilseeds.

The failure to abstain from advertising despite the strong potential for collusion suggests that the main objective for advertising is to influence aggregate demand and innovation rather than market share. The apparent failure to undertake price competition may be serious.

The activity of a dominant producer in any trade or product causes concern particularly when it is possible that relative size is so great that there are effective barriers to entry by new competitors, or where the economies of scale are being taken out by factors of production. As a result of amalgamations within the industry, and as a result of extensive vertical integration with the seed crushing and oil pressing trade, that have taken place in the United Kingdom, and on a world wide basis, the international enterprise Unilever has emerged in the United Kingdom and in the Netherlands as the principal producer of refined vegetable oils and of margarine. Unilever's position in the seed crushing trade, and in margarine production is suspect because of the high advertising and research expenditure which may in part block entry into areas in which it is active, and at the same time prevent the operation of a pricing policy which would distribute the benefit of low cost production in the form of lower consumer prices.

It may be that scale economies are such that the margarine sector of the fats market is unavoidably monopolistic, and from second best considerations an increase in competition need not increase welfare. Of the possible solutions such as price controls in the monopolised sector or

allowing monopoly to grow in the sector not already monopolised, or other solutions, for example enforced improvements in productive efficiency or the elimination of non-competitive behaviour such as advertising, the last is selected for particular attention.

Notes and references cited - Government policy, yellow fats and Unilever

N.B. References are cited in full on the first occasion only

1. Beveridge (1928); Beveridge, W. H.; British Food Control; Oxford University Press; London.
2. Beveridge (1928); page 265.
3. Beveridge (1928); page 342.
4. Beveridge (1928); pages 342-3.
5. Gale-Johnson (1973); this is pointed out to be particularly true in the case of the USA and Canada in Gale-Johnson, D.; World agriculture in disarray; Fontana; 1973; pages 148-151.

for example see page 148:

"Efforts to 'protect' butter have resulted, especially in the US and Canada, in the near elimination of butter from the home dinner table and its replacement by margarine. Consumers have been unwilling, and understandably so, to pay up to three times as much for butter as for a reasonably satisfactory substitute. In essence, in many countries a high price for butter is simply protecting it right out of existence. Monopoly controls, such as the requirements to mix butter-fat with vegetable oils in the production of margarine-butter mixes may maintain a demand for butter-fat at high prices, but this can hardly be more than a holding action. Eventually the present price policies for butter will simply destroy the product. And who will have gained? Certainly not the farmers."

later, page 149:

"The US vigorously defends the sanctity of its borders against the importation of more than a negligible amount of manufactured dairy products. Its internal price is approximately double the world market price. Yet the US utilises export subsidies and PL480 shipments to dispose of significant quantities of dried milk, butter and condensed and evaporated products As a result the US has had to obtain a GATT waiver for its import quotas on manufactured dairy products."

6. Unilever annual report (1973); supplement page 1.
Jamieson (1943); Jamieson, G. S.; Vegetable fats and oils; Reinhold; 1943; 2nd edn; page 238 gives an early example of the problem of butter substitutes in reporting the compulsory use of 5-10 per cent of sesame oil in Austria, Germany and Belgium as an addition to all butter substitutes to facilitate their detection when used to adulterate or simulate butter.
7. Van Stuyvenberg (1969); Van Stuyvenberg, J. H.; Aspects of Government Intervention in Margarine, Ed J. H. Van Stuyvenberg; Liverpool University Press; 1969; page 317.

8. The margarine monopoly

The main texts that we have consulted with respect to the Unilever monopoly, and the technical aspects of margarine production are as follows:

Wilson (1954); Wilson, Charles; History of Unilever; Cassell; 1954 (2 vols)

Wilson (1968); Wilson, Charles; Unilever 1945-1965; Cassell; 1968

Van Stuyvenberg (1960); Van Stuyvenberg, J. H. (ed); Margarine; An economic, social and scientific history 1869-1969; Liverpool University Press; 1969

Evely-Little (1960); Evely, R. & Little, I. M. D.; Concentration in British Industry; Cambridge University Press; 1960; page 121.

Unilever (1973); Unilever in Today's Society; Unilever; 1973

Musson (1965); Musson, A. E.; Enterprise in Soap and Chemicals; Manchester University Press; 1965 (mainly the History of Crossfields)

Edwards (1962); Edwards, H. R.; Competition and Monopoly in the British Soap Industry; Oxford; 1962

Murray (1955); Murray, K. A. H.; The History of the Second World-War - Agriculture; HMSO and Longmans; 1955

Hammond (1962); Hammond, R. J.; The History of the Second World-War - Food; 3 vols; HMSO and Longmans; 1962

Mathias (1967); Mathias, P.; Retailing Revolution; Longmans; 1967 (mainly the History of Allied Suppliers i.e. Home & Colonial Stores)

Hancock (1965); Hancock, W. K.; Survey of British Commonwealth Affairs; Vol II Problems of Economic Policy 1918-1939 Parts 1 and 2 Royal Institute of International Affairs; Oxford University Press; 1964

Smith (1940); Smith, C.; Britain's Food Supplies - in peace and war; G. Routledge; London; 1940 (A survey prepared for the Fabian Society)

9. Musson (1965); page 67

"Lever got not only him but also his brother and three sons, by paying higher wages, and the Wainwrights, as Professor Wilson has pointed out, 'pretty well monopolised the knowledge of practical soap-making of Lever Brothers'."

Edwards (1962); page 143

10. Musson (1965); page 166

11. Musson (1965); pages 226-227

Wilson (1954); pages 79-88 (volume 1)

12. Musson (1965); pages 250-252

Wilson (1954); pages 130-132 (volume 1)

13. For example see the Thorold committee report; The remuneration of milk distributors in the UK; HMSO Cmnd 1597, 1962; page 2

14. Feron (1969); Feron, R.; Technology and Production - in Margarine (ed J. H. Van Stuyvenberg) see note 8 above; pages 95-96
15. Tousley (1969); Tousley, R. D.; Marketing in Margarine (ed J. H. Van Stuyvenberg); page 238 - for example 10 per cent in Summer County
16. NBPI Report No 140; Pay and conditions of workers in the milk industry; HMSO Cmnd 4267, 1970; para 14
17. Producers price received for milk by utilisation in the UK (pence per gallon):

	in butter	as fresh milk
1964-1965	7.9	15.6
1969-1970	6.9	16.4

Source: Dairy Facts and Figures (MMB)

18. NPBI Report No 140; op.cit; paragraphs 21-26
19. Butter production in the production census MLH 215 (1968):

Butter	Quantity (000 cwt)	Value (£000)	Enterprises (No)	Entries (No)
1958 i = 90				
Unblended	924	19,193	41	70
Blended	2,344	31,042	17	27
1963 i = 86				
Unblended	1,435	23,378	39	89
Blended	1,652	27,514	17	26
1968 i = 86				
Butter	3,401	54,144	44	91

i = index of specialisation e.g. (total sales of butter/total sales of all products)

20. see table 2 - appendix to these notes
21. Also 'Lurpak', Danish creamery board; 'Kerrygold', Ireland; 'Kangaroo', Australia. Together with UK products 'St Ivel' and 'Country Life' these are the principal UK advertisers of butter
22. Dairy facts and figures; MMB; 1965 page 167; 1971 page 135
23. Agricultural situation in the community; annually EEC, Brussels
24. Monthly imports measured by quantity and value have been obtained from the UK overseas trade accounts for the following commodities: fish oil, ground nut oil, palm oil and soya bean oil, together with butter and lard. These have been recorded for the years 1961-1972 inclusive. The average of monthly prices (calculated as the ratio of imports by value to imports by volume) is given below:

24. (continued)

	fish oil	ground nut oil	palm oil	soya bean oil	butter	lard
(all calculated as £ per cwt)						
1961	2.83	5.84	4.03	5.80	12.53	4.64
1962	2.40	5.09	3.89	4.51	14.50	3.97
1963	2.35	4.91	3.88	4.27	16.30	3.77
1964	3.71	5.31	4.15	4.20	16.95	4.26
1965	3.93	5.92	4.66	5.11	16.66	4.92
1966	3.60	5.40	4.18	5.10	15.59	4.64
1967	2.69	5.29	4.15	4.47	15.56	3.75
1968	2.09	5.25	3.64	4.26	15.35	3.38
1969	2.77	6.59	3.31	4.34	15.46	4.13
1970	4.78	7.62	4.94	5.88	15.81	5.61
1971	4.84	9.17	5.15	6.95	21.98	5.48
1972	3.40	8.30	4.50	5.56	23.90	4.45

the above figures differ from the commodity exchange price quotations but follow wholesale price movements fairly well, it is felt that they represent price movements better so far as UK manufacturing is concerned, and the problem of quotations being in different currencies and at different rates of exchange is also avoided.

25. EEC statistics (Agricultural situation in the community - annually) gave the following figures for butter in 1967-68:

	self sufficiency (percentages)	production (000 tons)	surplus (derived fig) (000 tons)
France	131	581	137
Netherlands	293	117	77
Italy	68	69	-32 (deficit)
		<u>Balance</u>	182

in 1968 assuming the French authorisation under the UK quota system was 10,000 tons; there was no authorisation for the Netherlands at this time:

as the EEC producer butter price in 1968 (7sld per lb) was £39.65 per cwt this was 2.6 times the average UK import price.

The total UK import in 1968 was 446,000 tons, net imports were 444,100 thousand tons and home production was 51,200 thousand tons
 ("Dairy Facts and Figures" MMB 1971)

recosting the UK import bill proceeds as follows,

	net imports (£307 per ton)	444,000 tons	value	£ 136,308,000
<u>deduct</u>	EEC surplus (£793 " ")	182,000 "	"	£ 144,326,000
	balance (£307 " ")	262,000 "	"	£ 80,434,000
	UK net imports if the EEC surplus absorbed in 1968 at CAP price			£ 224,760,000

26. actual import bill £m 136 absorbing surplus £m 224
- | | | | |
|-----------------|--------|-----------------|--------|
| UK production | | | |
| at £307 per ton | £m 15 | at £793 per ton | £m 40 |
| | <hr/> | | <hr/> |
| | £m 151 | | £m 264 |
| | <hr/> | | <hr/> |
27. UN growth of world industry - commodities production data UN 1961-1970
total world production of butter was 5,539,738 metric tons,
for NZ 249,537 metric tons.
- Trade Year Book FAO 1965-1970 gives total world exports of butter
as 684,016 metric tons, for NZ 192,177 metric tons.
- Dairy Facts and Figures MMB 1965 gave butter quota authorisations
for NZ as 168,000 tons out of a total authorisation of
458,000 tons.
28. at 84.34 ua per 100kg and 101.6 ua for the export subsidy
29. The UK and the european communities; HMSO Cmnd 4715, 1971
30. Parliamentary statement Geoffrey Rippon; June 24, 1971
31. Australian prime minister's statement in Canberra July, 1971;
Aust. news and information service
32. Statement issued by the european heads of government; Dublin
March 10-11, 1975
33. Art 85(1) of the EEC treaty
34. EEC statement; Brussels, March 11, 1968
35. EEC statement; Brussels, April 9, 1973
36. Paid out of the common agricultural fund until December 31, 1973
37. Barbara Castle, commons answer December 19, 1975
38. Brown (1959); Brown, J. A. C.; Seasonality and elasticity of the
demand for food in Great Britain since derationing;
Jnl of Agricultural Economics; June 1959; page 235
39. Unilever Annual Report (1974); page 22
40. Tweles (1969); Tweles, R. J.; The commodity futures trading guide;
McGraw Hill; 1969; page 195
41. CEC (1972); Vegetable oils and oilseeds; CEC; Vol 20 1972; page 1
42. Grainger (1969); Grainger, C. W. J. (ed); Trading in commodities;
Woodhead; pages 45, 110
- Tweles (1969); pages 191-2
43. Rees (1972); Rees, G. L.; Britain's Commodity Markets; Paul Elek
Books; 1972; page 317
44. Rees (1972); page 319

45. Trade and Industry ; 25.2.75; page 515

Mr Churchill (MP for Stretford) in Parliament 20 February 1975 asked if representation had been received from margarine manufacturers regarding the effect of butter subsidies. The ministerial reply indicated that the Margarine and Shortening Manufacturers Association had made representations on several occasions about the effect of butter subsidies on the market for other products and in general employment prospects in other industries. It was undertaken to consider position sympathetically when deciding whether or not to offset by subsidy increases in butter price arising from recent reviews of EEC farm prices

46. Unilever Annual Reports

47. Edwards-Townsend (1967); Edwards, R. S. & Townsend, H.; Business Enterprise; Macmillian; 1967; page 183

48. Unilever in today's society; Unilever; 1973; page 9

49. Schumpeter (1942); Schumpeter, J. A.; 'Capitalism, socialism and democracy'; Harper; 1942; pages 88, 103

50. Harberger (1954); Harberger, A. C.; Monopoly and resource allocation; AER; 1954; page 77-87

Schwartzman (1960); Schwartzman, D.; The burden of monopoly; Jnl Pol Economy; 1960; pages 627-630

51. Brennan (1970); Brennan, M. J.; Theory of economic statics; Prentice Hall; 1970; page 292

52. Geer (1971); Geer, T.; An oligopoly - the coffee economy and stabilisation schemes; Dunellan; 1971; pages 4-5

53. Edwards (1962); for example see page 7

54. Cairncross (1971); Cairncross, A.; Essays in economic management; Allen & Unwin; 1971; page 22

55. United Nations conference, Stabilisation of international commodity markets; Geneva; March 1964; page 34

56. Scherer (1970); Scherer, F. M.; Industrial market structure and economic performance; Rand McNally; 1970; page 415

Table 2 : UK butter imports as a share of world trade, together the relative shares and production data for the major suppliers : for the post war period of Free Trade up to the Accession to the Common Market (1954-1972) (Thousand Metric Tons)

	1954	1956	1958	1960	1962	1964	1966	1968	1970	1972
World trade	417	521	577	605	631	723	692	724	827	751
UK imports as a %	285 (68)	359 (68)	429 (74)	414 (68)	413 (65)	471 (65)	462 (67)	453 (62)	406 (49)	356 (47)
% UK imports obtained from:										
Denmark	36	25	22	24	24	19	22	23	20	20
N Zealand	43	44	40	36	38	38	37	40	38	33
Australia	10	21	11	14	18	16	17	12	16	8
Balance	11	10	27	26	20	27	24	25	26	39
Butter production										
UK	28	34	36	45	65	28	35	54	65	95
Australia	162	212	179	201	200	206	222	199	215	191
Denmark	181	165	159	166	167	156	160	160	131	135
N Zealand	188	206	222	214	214	235	259	247	237	231
UK milk surplus (million galls)	453	672	575	784	780	758	809	943	1081	

Source:

World imports and UK share calculated from Trade Year Books (FAO) UK import shares from Overseas Trade Accounts formerly Trade and Navigation accounts.
 Production data from Mon. Bull Ag Econ Statistic (FAO) 1971-72 figures from average monthly production data.

UK milk surplus (= sold for manufacturing purposes) from Dairy Facts and Figures (MMB) 1965 and 1973.

CHAPTER 2

ADVERTISING, PROPAGANDA AND MARGARINE

We now attempt to discuss the problem of margarine advertising in a descriptive fashion with the objective of establishing a general background for our empirical work later. In this we shall mention some features of the interaction between the press, Government policy and Unilever activity. Firstly, we give some statistics as part of the general background.

In 1958 the total TV and press advertising for the four Van den Bergh brands (market share 70 per cent) accounted for 63 per cent of total margarine advertising expenditure, by 1965 this had risen to about 83 per cent, and by 1976 Van den Bergh advertising accounted for 90 per cent of advertising expenditure on the media (market share 60 per cent).

In 1970 media expenditure was higher than margarine media expenditure in only four categories of food products in the MEAL digest; cereals, chocolate confectionery, sauces-pickles-salad cream, and finally tea. At this time Census return for Order III in the production census indicated that margarine (MLH 229.1) returned the second smallest value of output for food drink and tobacco.

Assuming that the selection of a medium for advertising reflects the purpose in hand e.g. simple messages will be suitable for TV whereas a complex message will be offered in a written argument, we have examined the proportion of total annual margarine media advertising expenditure spent on TV. Over the period 1960-74 the proportion rose from 62 per cent in 1960 to 90 per cent in 1967, the proportions then fell from 1968 to 1971 i.e. with the introduction of soft margarine, with a sharp increase to 95 per cent in 1972 when a wider variety of soft margarines became available (e.g. Kraft Soft, Kraft Carousel, Kraft Golden Corn (Oct 1973); WHICH magazine list fourteen varieties in February 1973).

We have not examined Unilever share of advertising over the whole period of analysis, however in 1972-3 Van den Berghs share of total margarine advertising dropped from about 80 per cent to about 70 per cent.

Total advertising expenditure in money terms moved from just under 1.5 £million in 1960 to slightly more than 4.8 £million in 1973, in 1973 a sharp reducing occurred to about 2.75 £ million, but by 1976 the annual expenditure regained the figure of slightly more than 4.8 £ million.

Advertising expenditures show much wider fluctuations than consumption data for margarine. Quarterly variations from 1960 through 1974 are quite pronounced. Although there are some differences, the lowest expenditures occur most frequently in the third quarter of the year both for TV and press appropriations, but the patterns do not match, and are inconsistent. The highest quarterly expenditure in press advertising appears in the second or fourth quarter, but the highest TV quarterly expenditures in the first, second or fourth quarter.

In dealing with the various issues in this chapter we have relied considerably on the War Histories of the two World Wars, the accounts of the economic histories of Crosfields and Unilever mentioned in our references, Government reports and a typescript of a radio programme kindly supplied by the BBC. In addition we have used some confidential information supplied by the industry. Whilst we have relied on reports of events from these sources, the interpretation and the juxtaposition of events in the argument remain our own responsibility.

We commence with the problem of independent press influence, turn to trading-up and advertising, and following a section on the advertising to sales ratio finally mention the problem of public opinion.

The Soap Trust

Published work dealing with the various branches of the Fats trade

appear to suggest that technological leadership is not enough to ensure survival in the long-term, as cost reducing innovations in raw material processing are invariably overtaken by increased selling costs. As was general in industrial organisation the combination movement to control prices and maintain profits was noticeable in the chemical trade, and in the oils and fats trade with which it was strongly linked, throughout the thirty years prior to 1920.

The 'Soap Trust' to which we referred previously (page 13) is of relevance in considering some features of the interaction between the press and Unilever. The scheme was introduced by Lever in July 1906, and the following comment is taken from Musson,¹ words added are underlined:

"Profits were becoming harder to achieve, now that the competitive advantage of his earlier commercial innovations had dwindled and other firms were emerging in what he Lever called 'frenzied advertising' and 'frenzied competition'. (This was rich, coming from the originator of such schemes!) Crosfield's, as we have seen, were spending very large sums on selling and were more than holding their own in the competitive struggle. At the same time, the market for soap was no longer spreading so rapidly as in the later nineteenth century since real wages were tending to fall, so that competition was becoming keener. Undoubtedly, economies could be achieved by a combine, in both marketing and manufacture, and these, as Lever pointed out, could result in cheaper soap for consumers. But were these his basic motives? Was he not, rather, aiming to extinguish competition, build up his own empire, and increase profits?"

Wilson presents rather a different picture of Lever's intentions, which he suggests were aimed at obtaining scale economies in manufacture, and also through combined buying of raw materials and centralised research.² The major economies that Lever foresaw lay in the direction of reductions in advertising appropriations and in selling costs. It appears Lever anticipated the probable savings in advertising would generate one third of the actual economies he anticipated from the combination.³

Influenced by the anti-trust propaganda current in the USA at the time, and no doubt influenced also by their discovery of Lever's objective, which was to lessen costly competitive advertising, the Northcliffe

Press attacked Lever and the Soap Trust. The outcome was a sharp reduction in sales by the associated firms, and an undignified withdrawal by the member firms of the working agreement. Whilst Lever emerged with substantial damages for libel, his reputation, built on advertising in newspapers, was seriously weakened, and he became convinced that the opportunities for amalgamation had disappeared for some time to come.⁴

We note that in conflict with a major assumption of the Monopolies Commission 60 years after the Soap Trust, Unilever argued that the use of advertising is a cheap method of selling as it economises on other intermediate selling expenses.

Whilst we have already noted that the entry of Lever into margarine production had been facilitated by Government support during the World War I, it is equally true that Unilever benefitted from Government policy with regard to strategic foodstuffs during the World War II. We now turn to the discussion of some features of food control, and the influence of advertising during 1938 to 1945.

Oils and fats control in World War II

At the outset of the emergency control of oils and fats which were predominantly imported was placed in the hands of the Oils and Fats Division of the Ministry of Food. The importance of Unilever was exceptional in foodstuffs control. With regard to food, bodies such as the Wheat Commission and the Milk Marketing Board were already in existence, the only exception was in oils and fats, for which as it turned out Unilever provided the staff of a 'shadow' control body. The position, unique in British experience, was that the industry was too complex to be run by any other than experts, and that these were mainly provided by Unilever.⁵ The eleven member executive comprised one civil servant (incidentally the lowest paid), one who ran his own business, and nine members came from large firms, and these included

seven who worked for Unilever.⁶ How far the composition of the executive depended on Unilever's intransigence is unknown. The account in the official war histories certainly does not draw any such conclusion, and indeed comments favourably on the Divisions performance. It appears this performance to some extent was due to the allegiance the Unilever men had to their original firms, rather than to the combine, and interestingly enough this is confirmed by the fact that the Unilever men were divided in their attitude towards the retention of brands and towards rationing.⁷ However, whatever its merits, we feel that on the basis of the reported events that the Government may well have bought the cooperation of Unilever during World War II. We attempt to deal with this point under two headings : the first concerns the Whale oil supply in the UK, the second concerns the problem of rationing and pooling in respect of the margarine supply in the UK during wartime.

1. Hydrogenation capacity and the Whale oil supply

Lever Bros and Unilever were involved in the policy of the acquisition of security food stocks,⁸ by which the Government agreed to bear the extra cost of acquiring and maintaining additional stocks of Whale oil. This was in February 1938. Earlier the chairman of Unilever informed Sir Thomas Inskip,⁹ Minister for the Coordination of Defence at the time:

"(He) told me that there is not more three weeks stocks of fats in Germany at any given time, and from conversations he has had in Germany, he regards any possibility of war in these circumstances as wholly remote."

Before the agreement to maintain a minimum stock at Bromborough was formalised, the Government made secret purchases through an independent agent. The initial purchases were revealed to the trade through the Whale Oil Sellers Pool, and this led to protests to the Government by Unilever, resulting on the abandonment of the stopgap scheme, and Unilever being offered and accepting a share of the Government's remaining purchases.¹⁰

The second Whale oil purchase, which took place in the Spring of 1939, reveals yet another aspect of Unilever activity, we have underlined part of the original:¹¹

"..... when news reached London that the German buyers, who by agreement with Unilever had a prior claim on supplies of Norwegian oil, had failed to agree with the Norwegians on price, the Department saw an opportunity to corner the world supply, and thus not only add a valuable asset to our own food reserve but deprive Germany of it at one and the same time. Unilever and the other users of Whale oil agreed to share in the purchases which were made anonymously through a leading broker

By early 1939, in view of the likely foreign exchange difficulties with the lard import from the USA, it was considered expedient to double the existing UK capacity for the hydrogenation of Whale oil. The hydrogenation and storage of the UK Whale oil supply was mainly sited at this time in Holland, and was under Unilever control. Processing costs were stated to be lower in Holland, and the hardened oil was processed into margarine at Purfleet on the Thames Estuary, and at Brombrough next to Port Sunlight on the Mersey. At Bromborough some hardening capacity was available. The two plants accounted for nearly 60 per cent of the total UK margarine capacity at the time. In Summer 1939, Unilever agreed to build extensions to the Brombrough hardening plant on Government account;¹² and a new Government plant was built at Dowlais near Merthyr Tydfil in Wales, by Unilever, who also designed and staffed the operation. Unilever at the time made it clear that the plant would have no commercial value after the war, whilst the extension it had recommended at Purfleet, which did not receive Government approval, would have had a commercial value to Unilever.

2. Rationing and the Pooling of Margarine

The problems faced in the control and rationing of margarine in both World Wars provide interesting examples of the interaction between oligopolistic industry and the Government. In World War II the media used its propaganda influence in a manner which was no doubt associated

with the loss of advertising revenue that would follow if branded goods were withdrawn. An early attempt to ration fats was abandoned in November 1939 largely as a result of the opposition by the press to rationing and pooling.¹³ Private concern was recorded in official circles at the time with regard to the general wisdom of Government's yielding to newspaper clamour and propoganda, and the harm to the public interest that might follow.¹⁴

The German invasion of Denmark and Norway on 9 April 1940, and of Holland, Belgium and Luxembourg on 10 May, effectively cut off the european supply of butter and hardened Whale oil to the UK. In May the margarine and cooking fat trade was approached with a view to the introduction of rationing; with the exception of Unilever the scheme was accepted by the trade. The Unilever objection was withdrawn following the collapse of France on the 21 June.¹⁵

The pooling scheme met with considerable difficulty as Unilever were concerned with the problem of 'adequate' margins, and sought compensation for their loss of goodwill in respect of Stork margarine, in which considerable sums of money had been invested in advertising between 1933 and 1938.¹⁶ The Treasury was concerned that profits should not be raised as a result of the emergency conditions, and the increased output required in wartime. The Treasury view was that profits should be limited to 'ten per cent of capital employed' and that payments should 'be in respect of current services rendered'. Although the issue is confused it would seem fair to say the result of the Government's distribution arrangements that emerged with Unilever's consent, was that two grades of margarine were distributed on the Government's behalf, and it seems that substantially higher profits were earned than the ten per cent target sought by the Treasury:

"..... a higher profit was made on the more expensive grades, and although it was used to subsidise the cheapest grade, the industry as a whole, and a fortiori Unilever, made very handsome profits." ¹⁶

Elsewhere Hammond¹⁷ notes, and words added are in parenthesis:

"The subsequent history of the two grades (the dearer subsidising the cheaper) forms an instructive comment on the whole policy of cheap food for the poor under war-time conditions. As the war went on the so-called 'special' margarine selling at nine pence a pound, almost completely supplanted in public favour the 'standard' selling at five pence, although the difference in quality was by no means commensurate with the difference in price, and the food value of the grades, once it had been decided to add vitamins to all margarine, identical."

Although average composition data for margarine is available in respect of World War I margarine,¹⁸ we have failed to trace the approximate composition of the two grades produced under the Marcom plan during World War II. The quality control scheme of World War I does not seem to have been repeated, and one must remain sceptical about the real difference in quality. In some respects, and in view of the current thinking on hardened fats, it is not unreasonable to conclude margarine in the 'Whale oil era' was a positive danger to health. The unsaturated fatty acid Linoleic acid, needed by the body as the starting point for the biosynthesis of Arachidonic acid, could well have been removed by the hydrogenation of vegetable oils, and in any case is not present in Whale oil. The specific role of Arachidonic acid, which was not identified until 1964, is that it is the starting point for the production of Prostaglandins in the body. The latter are known to be capable of certain physiological effects such as the lowering of blood pressure in the arteries. Arachidonic acid, incidentally, is known to be present in meat, butter and eggs, but is absent in vegetable oils and hydrogenated oils. On the issue of the difference between grades of margarine we quote from Hammond:¹⁹

"The difference between margarines has always been aesthetic (if one may be permitted the term in this context) rather than substantial. Quality rests not in ingredients, but in the care and in the 'know-how' in manufacturing and marketing."

We conclude by noting that in February 1973 the Consumers' Association stated in their report on butter and margarine in WHICH magazine, that

consumer panel tests could not differentiate Stork from Flora margarine, whereas most people could tell Stork from butter. We have been unable to trace any other test reports on the perception of quality difference by consumer test panels.

We now turn to the trading-up issue.

Trading-up and Advertising

National Food Survey cross section estimates of income elasticities of expenditure, and of demand for margarine, fell between 1955 and 1969. It has been noted that expenditure on margarine was reduced more in respect of quantity, than in respect of expenditure. This is taken to suggest some trading-up is taking place by consumers.

Advertising may be invested in margarine brands with the intention of creating an introduction to the market, albeit with a new product innovation, such as the soft brands of margarine, hopefully with the realisation of a potential effect in relation to manufacturing costs in the long-run, to gain a cost reduction through an increased certainty in forward planning. This is probably the case with the introduction of soft margarine by Unilever in the UK from 1968-1969 onwards.

Another and quite different purpose may be to arrest a decline in the total share of margarine in the yellow fats market.

Although to an extent influenced by new product introduction, and by the matching of consumer needs with a product that spreads more easily than butter at low temperatures, particularly when taken from a refrigerator, the reported effects of advertising in the latter half of the 1950's was to halt the decline in annual margarine sales. Unilever's output of edible fats apparently remained at around 377 thousand tons annually subsequent to the Government's withdrawal of edible fat control in 1955. During the next ten years, although the volume of sales

remained fairly constant, the value of sales was reported to have risen by some 50 per cent in money terms. The figure given by Wilson,²⁰ of 377 thousand tons relating to margarine and compound fats, suggest that Unilever's share of the margarine and compound production in the UK increased as follows over the ten years following the decontrol of fats:

Table 3 : Unilever share of margarine and compound fat production in 1955, 1960 and 1965

Year	Unilever share calculated as the ratio of 377 divided by total UK production in thousand tons per annum
1955	0.73
1960	0.77
1965	0.84

Wilson²⁰ reports that the combined output of the Unilever factories at Bromborough and Purfleet accounted for 20 per cent of UK butter and margarine market before the World War II, and by 1966 this had risen by 5 per cent. We estimate the combined market for butter and margarine in the UK to be of the order of 844 thousand tons in 1966, which suggests Unilever margarine output to be 211 thousand tons, which is some 56 per cent of Unilever's total fat output.

The constant figure 'subject to temporary ups and downs' given for Unilever's total fat output in the UK in the ten years following de-rationing, points to the conclusion that in arresting the decline in its share of yellow fat demand Unilever was also successful in increasing its share of fat demand based on vegetable oil products. Whilst the product was being improved during this period by using a technology that slowed down the process of deterioration,²¹ and cost improvements were being obtained by the use of processes that allowed the use of a wider range of vegetable oils, Unilever's marketing techniques were sufficiently well organised to allow the benefits of large scale

organisation to be captured in its own interests.

The margarine industry has done a great deal since 1955 to improve the image of margarine and to combat the image of butter as the superior product. However in terms of positive advertising, in the sense that margarine is superior rather than 'as good as' butter, Unilever was not the leader. Through a trading-up process in terms of improving the margarine emulsion an effort has been made to match the consumer's preference for a better quality product whose purchase can be financed by rising consumer prosperity, by improving the brand image, by offering a wider choice, and inevitably by price increases. Although the latter are constrained by the threat of cheap imports of butter in relation to EEC prices, one could also suggest that the relatively low price of margarine may well be part of some limit pricing strategy being operated by the industry.

In general consumers are reported to have been willing to trade-up their margarine purchases. It is noticeable that in the UK the medium quality brand leader Stork has been promoted as a quality product since its introduction to the market, and has always received vigorous advertising support. It must always be remembered Stork achieved the position of brand leadership before World War II, and to some extent this has made the general process of trading-up more difficult. Fig 5, page 59, presents the data of National Food Survey estimates of the domestic consumption of margarine measured in money units of expenditure, and in physical units of quantity for the period 1960 to 1976. This data suggests that trading-up occurred from 1969 onwards, when a sharp increase took place in the value of money expenditure at current prices. The dramatic effect of a sudden and short lived increase in butter price can be observed in 1972. We include in the diagram a graph of margarine expenditure in real terms, estimated from National Food Survey data, but expressed in different units to the money expenditure graph

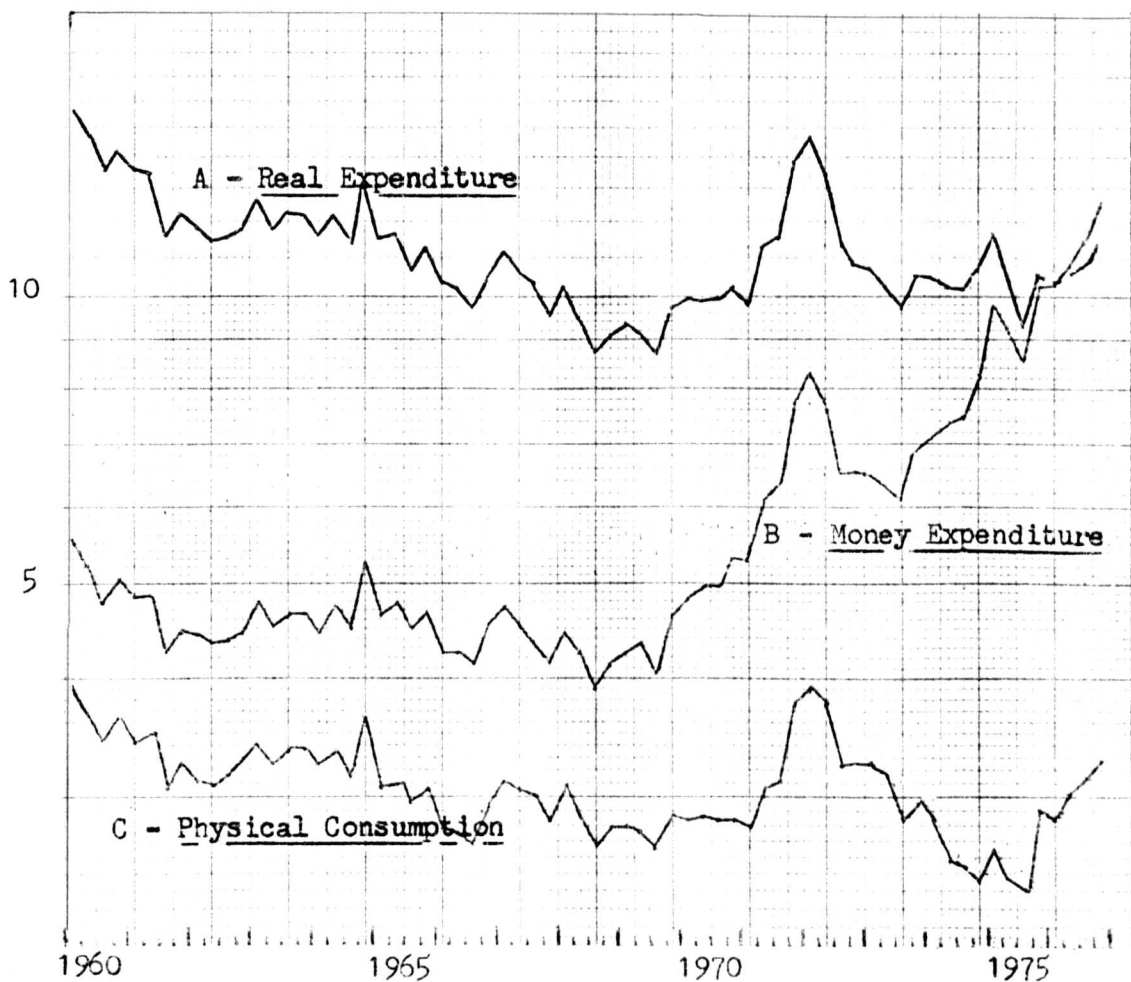


Fig 5: Domestic consumption of margarine in the UK, measured by value and volume (1960 - 1976)

Source: NFS data for expenditure and quantity in relation to margarine weekly consumption, Annual Abstract for Mid-Year Population

Graph A is a plot of real expenditure (deflator General Price index) for the whole population measured as £'000 each Quarter

Graph B is a plot of per capita weekly expenditure measured as old pence per week

Graph C is a plot of per capita weekly consumption measured as ounces per week

in order to separate the two lines vertically. The almost finger print likeness between the profiles of consumption measured in physical units and consumption measured as real expenditure, would appear to suggest that in real terms trading-up has not taken place.

We have also attempted to estimate the change in market shares by grade.

What we did was to classify Van den Berghs products as follows:

Grade I as Flora, Blue Band, Summer County, and we included all soft varieties after 1969,

Grade II as Stork,

Grade III as Echo,

and proceed to estimate the percentage share each grade had in the market for Van den Berghs margarines. The results are presented below.

Table 4 : Market share by grade for Van den Berghs margarines

Year	1967	1968	1969	1970	1972	1973	1974	1975
Grade I	32	40	42	43	50	63	64	61
Grade II	58	49	42	44	39	27	25	28
Grade III	10	11	15	12	11	10	11	11

Source: EIU Retail Business various issues; British Market Research Target Group Index. Brand shares are estimated from annual data in each case.

The results appear to suggest some replacement of medium grade Stork by Grade I and soft varieties of margarine, and we note Soft Stork falls into the Grade I category in our estimates. This appears to fall in line with the assertion that soft grades are replacing tablet margarines, and in this sense the consumer is trading-up. This movement in table margarines is not matched by a shift from Grade III to Grade II in our calculations.

We have received information, from a confidential source in the industry, that in 1968 the Tub sector of the market represented about 5 per cent

of the volume, and that subsequently this has risen to as much as 75 per cent of volume. We note also that Distributors Own Brands, which have emerged with the introduction of soft margarine in the Tub sector, are now classified in TGI estimates of brand shares: for example in 1975 trade estimates, reported in Retail Business by EIU, state, that the category 'own label' now has 16 per cent share of the margarine market. Van den Berghs must be well aware of the marketing problems faced by producers of National Brands, and it is tempting to examine the industry in terms of Bain's theory of oligopoly. If Van den Berghs and Kraft, the main free enterprise suppliers who do not appear to have substantial tied outlets for their product, follow the dictates of the Sylos postulate they will presumably commence to replace their tablet output by butter equivalent grades in tubs, and price in the medium grade product range. This we suggest they have commenced to do in real terms.

One disturbing feature of the situation is the origin of the margarine packed as Distributors' Own Brand. If 'know-how' in the emulsification of the vegetable oil used in margarine blending is fundamental to quality and consumer preference, it is difficult to imagine any source other than Van den Bergh, Kraft or co-operative societies. Production Census and Business Monitor Reports reveal nothing that suggests that the entry of DOB's has been accomplished by the creation of additional capacity. Two other questions exist of fundamental importance. The first is the intentions of Proctor Gamble who were known to be test marketing 'Golden Harvest' margarine in July 1959, and who must always be a potential entrant. The second is the position of Unilever in relation to its previous shop interests e.g. Home and Colonial etc.

The advertising to sales ratio

The absolute level of advertising necessary to maintain a national brand is an unknown. Intuitively we could anticipate that the generation of

consumer loyalty, which is implicit in new product marketing, and the maintenance of consumer loyalty, over a wide geographical area and throughout a range of socio-economic classes of consumer, presents a severe strain on firms' resources and creates problems of loyalty within a multi-product enterprise. At this point we are abstracting from the issue of whether advertising should be treated as a current expense, or as capital investment, which is a problem relevant to Government price control:²² this issue will be recovered in part within our treatment of advertising as one of the explanatory variables to be used in estimating a demand function for margarine in Chapter 4.

In respect of Unilever policy in this matter, it is claimed control by Unilever House is limited to the approval of appointments to higher management, and to approval of capital expenditure.²³ During the course of making our enquiries to executives at various points in the Unilever enterprise in the UK, we have gained a distinct impression that great care is taken to maintain good relations with colleagues in other parts of the total operation, and that in addition there is a considerable degree of autonomy with respect to operating decisions within the marketing and production functions. At times we gained an impression that there exists a degree of outright ignorance in respect of decisions being made elsewhere by sister and by subsidiary companies, even in the absence of geographical separation when subsidiaries shared common accommodation. The existence of parochialism is implicit in the following quotation from a Unilever publication:

"our company is big this makes low cost, large-scale buying, manufacturing and distribution possible, but communications are more difficult."

In discussing the problems faced by Unilever in the post-war period,²⁴ Wilson emphasises the reorganisation that took place in 1966 of the previous national structure into a structure based on industrial products in which co-ordinators were appointed for six product groups,

the idea being that the co-ordinator assumed responsibility for the formulation of policies that would support product growth anywhere in the world where opportunity occurred. Basically he argues the most important aspect of Unilever's management problems lie in the direction of good communications.²⁵ The thrust of the Wilson text is towards centralisation of policy making and strategy. In general one could regard the claim in the Frozen Foodstuffs report with an open mind. Following Edwards we would argue that the level of advertising expenditure will be higher (*ceteris paribus*) the more susceptible the consumer is to brand image, and the shorter the period of replacement. In general brand advertising would have as its objective the support of brand shares in the market. Collectively margarine advertising, particularly in respect of the butter quality brands, will attempt to mitigate the effect of butter advertising on aggregate shares in the yellow fat market. Any variation in product design, such as the soft margarine innovation can be expected to initiate a sudden increase of competitive advertising, which will tend to raise expenditure on advertising above the level necessary to maintain brand share as well as aggregate margarine share in the yellow fats market.

In relation to the above we made the following calculations.

Zero order correlation coefficients were estimated from quarterly data of advertising expenditures²⁶ deflated by Advertising Association indexes of advertising rates,²⁷ for the period 1960 to 1974, first to last quarters, the period being restricted as 1974 was the last year for which advertising expenditure was disaggregated into press and TV expenditure. The results are as follows:

Table 5 : Zero order correlation coefficients for deflated quarterly advertising expenditures for 1960 through 1974

Variables	Coefficient
Total margarine advertising - total butter advertising	0.55
Margarine TV advertising - butter TV advertising	0.55
Margarine press advertising - butter press advertising	0.28
Total margarine advertising - butter price	0.40

Ignoring at this point the interaction between margarine advertising and margarine consumption, and noting that in general TV advertising accounted for the major portion of advertising budgets, and also that margarine advertising expenditure is greater than for butter, the above results support the idea that margarine advertising in aggregate is a defence against butter advertising. There however seems to be no good a priori reason for the positive result for margarine advertising and butter price.

In respect of brand advertising for nationally distributed products we turn to monopolies commission reports, and our own estimates for advertising to sales ratios. Considering three groups of products in which Unilever through its subsidiaries supplies at least one quarter of the UK market - i e household detergents, frozen foodstuffs, and margarine, the appropriate ratios are given as follows:

Table 6 : Advertising to sales ratios for household detergents, frozen foodstuffs and margarine for selected years

Product	Company	Year	Advertising to sales ratio(%)
Frozen Foods	Birds Eye	1964	3.2
		1974	2.1
Both adjusted for discounts in Monopolies and Mergers report on Frozen Food Stuffs paragraph 233.			

continued overleaf

Household Detergents	Lever Brothers	1965	11.0
	Proctor Gamble	1965	10.0
Calculated on retail prices			
Margarine	Van den Berghs	1969	6.8
			VdB accounted for 87% of total advertising of margarine
	Van den Berghs	1973	7.6
			VdB accounted for 71% of total advertising of margarine

The frequency of purchase factor in advertising would seem to be confirmed on the basis of this evidence, in that frozen foods are reported to have lower advertising to sales ratio. The unexpected reverse order of detergents to margarine might be explained by the fact that both Proctor Gamble and Unilever controlled over one third of the market at the time, and the market was dominated by these two major suppliers of approximately equal financial strength. The apparent increase in Van den Berghs advertising to sales ratio between 1969 and 1973 might be causally related to the decrease in Van den Berghs brands share in the total margarine market occurring over a period when soft margarines have been introduced, and where a growth in distributors own brands has taken place.

We now turn to the question of media influence other than by advertising.

The media influence independent of Advertising

We have already mentioned the influence of the press in relation to the Soap Trust, and in relation to the introduction of rationing at the outset of World War II.

It is not possible to attempt to record the incidence, or to attempt to evaluate the impact of propaganda that has direct or indirect influence on consumer behaviour. This is an area of considerable difficulty, and

we only propose to examine in brief two illustrations of the relation between the press and broadcasting and public opinion. These are all relevant to points we mention elsewhere, and also serve to illustrate the kaleidoscopic nature of the problems faced in respect to the fats market.

1. Agro-power and the world soy bean supply

In the general area of political decisions by those who control food and raw material supplies, the enormous influence in relation to the world supply of grain and the international requirements for soy bean wielded by the Government departments of the USA has received attention recently in the use of 'Agro-power' by USA Departments of State. In view of the political realities, the theoretical issues of economics might well be thought to pale into insignificance when it is accepted that food and fuel supplies have become recently the principal weapons in international relations. This has been the general thrust of commentary in current affairs programmes on television and elsewhere.

2. The presentation of lengthy argument in the media

The selection of a medium for advertising is mainly affected by consideration of the objective in hand, and whilst particular publications in the press medium is also governed by comparing costs per thousand, an idea that 'products spread straight from a fridge' is most suited to television, whilst the performance of various products in different recipes, is most suitable for a colour advertisement in some weekly magazine, which gives the opportunity to specify the recipe in question. Other aspects of propaganda however require different treatment, for example the problem of Coronary Heart disease has appeared to merit considerable attention from the media in the past year or so.

The general approach appears to be to call a press conference: we mention two recent events of this nature, the first obvious candidate is the burst

of publicity following the Royal College of Physicians report on the Prevention of Coronary Heart Disease published on 7 April 1976. This led immediately to a press conference organised by 'the manufacturer of a well known brand of poly-unsaturated margarine', at which Dr Robert Lefever, a London G P and apparently also a medical journalist was retained by the sponsor of the press conference. In a subsequent BBC radio programme,²⁸ which dealt with the subject of medical journalism, reference was made to the possibility that the purpose of the press conference to which we have referred above was to sell more margarine, and the radio programme examined the problem of ethical behaviour and medical journalism.

In February 1977 a press conference called by The Butter Information Council presented Fred Kummerow, a US biochemist who is also an adviser to the US American Heart Association. This was reported in the Daily Mail, under the headline "Take heart butter may be best", by John Stevenson (Medical Correspondent), we quote in part:

"People should not be stampeded into changing their diets through fear campaigns which are part of marketing in America today and possibly could be in Britain in the future".

The Daily Mail's headline following the Lefever press conference was:

"The heart disease peril of fatty food and smoking"

whilst that of the Daily Express read:

"The Killer Cow"

This received specific discussion²² in the BBC radio programme to which we referred above. Professor A. G. Shaper (Chairman of the Committee responsible for the RCP report) at one point stated:

"Believe it or not we really aren't in the entertainment business and it does worry us when we see information that we've passed on to medical journalists, sometimes being mis-used because of entertainment value or scare value. I think the "Killer Cow" one is a good example. I think that we discussed in a very serious and general way the problems of general doubt in relation to heart disease and then for what are essentially good foods in a nutritional sense to be labelled as killer foods, I think it's frightening and unnecessary."

The indications are that the hoped for impact of the nutrition issue,

in relationship to polyunsaturated margarine, will be to shift the aggregate demand curve for yellow fats in favour of margarine, and in addition it will encourage **Unilever etc** to lobby the Government to gain support for the anti-butter campaign in public health policy. We turn next to the problem of health policy and nutrition, in relation to margarine and butter.

Notes and References cited - Advertising, Propaganda and Margarine

N.B. References are cited in full on the first occasion only

See Note 8 Chapter 1 page 42 for the main texts used.

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5. Hammond (1962); page 441 (Vol III)
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7. Hammond (1962); page 445 (Vol III)
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11. Hammond (1951); page 28
12. Hammond (1962); page 440
13. Hammond (1951); pages 113-120
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18. For a general account see Lloyd (1924); Lloyd, E. M. H.; History of the World War - Experiments in State Control; Oxford; London
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The Monopolies Commission; Chlordiazepoxide and Diazepam; HMSO 197; 1973; paragraph 141
23. Monopolies and Mergers Commission; Frozen Foodstuffs; HMSO HC 674; 1976 paragraph 72
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CHAPTER 3

HEALTH POLICY AND FATS

Introduction and definitions

Various forms of heart disease have received increasing attention in industrialised societies of the ~~western~~/european type since World War II regarding the role of nutrition in causation and treatment.^{1,2,3}

The controversial nature of the causation, the diagnosis and the risk factors associated with heart disease, and the difficulties of its measurement is made evident by reading part of the literature references given in the official reports and elsewhere.^{1,2,3} We make no claim to an informed opinion upon which we may presume to judge the merits or demerits of the literature articles, texts and working party reports we have sampled. We are sensitive to the criticism that our sample is wrong, but we have no means of judging which part should be neglected.

One disturbing feature of the problem is the conclusion by Robb-Smith⁴ that the incidence of degenerative heart disease has not increased in England and Wales over the last fifty years. He attributes the increase in mortality rates within this group (notably ischaemic heart disease) to changes in nomenclature and usage, and argues in addition that the increased prevalence of degenerative heart disease reflects the survival of an increasing population of specific age groups prone to these diseases. This conclusion is supported by at least seven other authorities that he quotes in support of his view.⁵ The DHSS report states "the evidence about death rate from a disease is likely to be more reliable than about its incidence"⁶, but apart from quoting Robb-Smith in its bibliography, maintains the view that dietary habits have a causal relationship to IHD.

Changes in nutrition came under suspicion as foods became increasingly processed and sophisticated once it appeared that, in spite of the advances in medical science which had reduced the risk of infectious diseases

generally certain chronic diseases of a degenerative nature such as heart disease and cancer were increasing. Table 7 below illustrates this point.

Table 7 : Death rates for 45-64 year-olds in GB for three years :
rates per 100,000

	1951	1966	1970
Males : all causes	1,529	1,430	1,400
Females : all causes	902	748	749
of which (male & female)			
Heart disease	317	348	361
Cancer	302	333	339

Source : CSO/COI (1972); The United Kingdom in Figures; HMSO London

N.B. the mortality rate expresses the number of deaths attributable to specific causes in one age group in relation to the living population of the same age range; expressed as an incidence rate per 100,000 living.

By chronic disease we imply that the problem has a scope as great as the total population. Despite the fact that the chronic disease, popularly called coronary heart disease (CHD), affects men more than women, each member of the population is at risk, and to the extent that the risk can be modified, the key to control lies to a great extent with the individual.⁸

The term risk factor with regard to CHD is used by the medical authorities in the knowledge that some risk factors may not be causal, and that the disease is thought to be of a multifactoral nature.⁹ However the view is strongly held, that whilst some factors which are considered important in relation to this disease are not modifiable, eg age, sex and genetic characteristics, other factors are modifiable, eg smoking cigarettes, diet and the level of physical activity. These may be used to identify the need for remedial action, and because they are modifiable by the individual, constitute a possible basis for intervention.¹⁰

The most recent official report in the UK, which is a joint working party report of the Royal College of Physicians of London and the British Cardiac Society (RCP (1976))³, in identifying modifiable risk factors has wide implications for national food policy and health education.¹¹ For the purpose of this research we are also interested in the effect of recommending a reduction in the consumption of butter and an increase in the consumption of soft margarine,^{12, 13} and whether this should be done in the absence of public measures to control the margarine industry in the UK.

From the view point of nutrition and CHD, the health propaganda from the margarine industry¹⁴ and the various international bodies which we have read directly, and indirectly, stresses the advantage of a low-calorie low-cholesterol low-saturated fat diet, in general to counteract obesity and to reduce some of the modifiable risk factors with respect to CHD.

The major criticism of diet in the UK and elsewhere is that the calorie intake may be too high, there are dangers in the over-consumption of ruminant meats and dairy products, that the cholesterol and sucrose content may be too high, that there may be a serious deficiency of essential fatty acids (EFA), and that will be a reduction in CHD risk if hard fats are replaced by EFA.^{1, 2, 3, 15}

By EFA we broadly mean polyunsaturated fatty acids (PuFA) of the linolenic classes of fatty acids.¹³ In terms of their chemical structure all edible oils and fats are mixed esters of saturated, monounsaturated and polyunsaturated fatty acids with glycerol. By hard fats we generally imply saturated or monounsaturated fatty acids, and in addition hydrogenated oils such as are used in margarine production and compound cooking fats. More will be said concerning EFA in the discussion under the heading 'Summary of the basic arguments concerning the nutrition issue' which appears directly after this section. The chemical composition of selected fats and oils is given in a footnote.¹⁷

The ratio of dietary PuFA to monounsaturated and saturated fatty acids is generally abbreviated to the P/S ratio.¹⁸

Because of the conflicting evidence in relation to nutrition and CHD revealed in time series and cross section data in international and UK regional statistics, and because of the economic and political consequences of the fat-switch¹⁹ we intend to test the major criticisms of the UK diet on the basis of the hypothesis that -

"margarine and shortenings made with less hardening of fats would be important factors in thus decreasing some very serious diseases of civilisation"

Sinclair (1956)²⁰

The programme of empirical work in relation to the nutrition issue

The following hypotheses will be tested

1. that the calorie content is too high by -
 - 1.1 comparing descriptively the food energy gap between consumption and estimated daily need, for fourteen west European nations, with their IHD mortality - i.e. a cross section analysis for 1972
 - 1.2 considering descriptively the movement of food energy intake over time for the UK population in relation to IHD mortality reported by the DHSS
 - 1.3 a regression analysis of fat consumption in the UK for 1955-72.
2. that the EFA deficiency is serious by -
 - 2.1 comparing descriptively the proportion of food energy derived from fats between various European countries - again a cross section in 1972
 - 2.2 carrying out a regression analysis of a cross section sample of fat consumption data for nineteen OECD countries in 1972 data.

Summary of the basic arguments in the nutrition issue

Dietary deficiencies and fats

Allan Berg²¹ refers to the fortification of food stuffs as one of the most attractive alternatives open to governments who accept responsibility for nutritional betterment, and in this respect the use of margarine as a carrier of vitamins A and D is already well established in the UK.

In 1940 the Ministry of Food introduced one of the government's early welfare measures by prescribing that all margarine in retail consumption was to be fortified by Vitamins A and D to a given standard. This practice, established in war time, has continued to the present day. Taylor²², and others²⁴ emphasise the role of margarine as a vehicle for fat soluble vitamins, such as A, D, E and K.

Vitamin E is stated to function as an antioxidant which is thought to protect PUFA from oxidation, both in oils and in the human body. It is present in butter, cheese and wholemeal bread. Arachidonic acid, also important in deficiency problems, is also contained in meat, butter and eggs, but is absent in vegetable oils and hydrogenated oils. (page 55 above).

Apart from functioning as vitamin carriers which may be fortified, it is apparent that some fats may have an independent deficiency role.

Sinclair-Hollingsworth point out that as early as 1928 it was suggested that fats contained a new Vitamin F.²⁷ The so-called Vitamin F referred to the EFA's - linoleic, linolenic and arachidonic acids.²⁸ This term was dropped in 19

Burr-Burr in 1929²⁹ reported that rats fed on a fat free diet under laboratory conditions developed a range of physiological abnormalities, which were shown to be due to the absence of fatty acids from the animals diet, in their summary, which we quote in part, they argued:

"A new deficiency disease in the rat has been produced by careful exclusion of fats from the diet This disease is readily prevented or cured by the addition of two per cent of fatty acids to the diet the non-saponifiable fraction of fats and glycerol are ineffective for the curing of the disease."

We note that Burr-Burr used a specific brand of lard in their experiments, and later that Schneider in 1940³⁰ successfully used butter-fat as a source of EFA to cure fat deficiency in rats.

Subsequently the terminology EFA has been used in the literature, and it was established that the active principle was the PuFA-linoleic acid. This acid apparently cannot be synthesised in animal metabolism, and serves as a precursor for arachidonic acid. Linoleic acid is known to be present in unhydrogenated vegetable oils, vegetables, fruits and cereals. Sinclair-Hollingsworth emphasise that leaves contain about 64 per cent linolenic acid.

Sinclair-Hollingsworth state that linoleic acid cannot fulfil all the functions of EFA and that probably both classes of EFA are needed in the body.¹⁶

Burr-Burr in 1929 made the point that the animal may not be able to synthesise the EFA it requires.³¹ A point made by Kummerow, who regards fatty acids which can be synthesised by animals from non-fat precursors as non-essential fatty acids (non-EFA).³²

The view is taken in veterinary science that PuFA are hydrogenated in the rumen of grazing animals, and that if the P/S ratio of ruminant animals is to be increased, it may be necessary to coat EFA's in such a way that they reach the abomasum with an unchanged chemical structure.

Animal diet and EFA

Burr-Burr quote an early paper by Ellis-Isbell³³ which supports the view that the animals diet has a marked effect on the distribution of fatty acids in lard. Kummerow reported that the level of dietary fat did not

influence the total fat compositions of chickens if adequate protein was consumed³⁴ - a point to be taken up later under the heading of cholesterol in the diet.

Sinclair-Hollingsworth suggest that animal diet changes may affect the non-EFA content in that free range chicken are relatively high in PuFA, whereas pigs fed on carbohydrate tend to be low in EFA.³⁵

The Australian Academy of Science (AAS) claims that the P/S ratio of meat and dairy products can be readily altered by changing the diet of the animal,³⁶ to this end the AAS made a firm recommendation that attempts should be made to raise the P/S ratio of cattle and dairy products, as one of the preventive measures in respect of CHD.³⁷

Another point in relation to the question of EFA deficiency has been developed by Crawford³⁸ in investigating the P/S ratios in free-living as compared to domestic animals. Crawford was concerned with the problem of whether the low balance of PuFA to monounsaturated and saturated fatty acids in the human diet may be related to arterial disease, and quotes several authors who support the view that EFA deficiency has a role in atherosclerosis.

By atherosclerosis we imply a condition in which atheroma is wide spread in the body. This is a disease in which plaques of fatty substance are formed along the walls of blood vessels causing narrowing, and a tendency towards thrombosis. Coronary thromboses or Ischaemic Heart Disease (IHD) is not the same as atherosclerosis, but almost invariably accompanies it.⁴ In IHD there appears to be an alteration of plasma that causes platelets to aggregate. We use CHD synonymously with IHD.³⁹

Physicians agree that cholesterol is related to the occurrence of atheroma, and whilst it is thought saturated fats are associated with an increase in serum cholesterol, it is claimed that significant proportions

of PuFA will decrease serum cholesterol.⁴⁰

This is the implication of dietary recommendations made in various working party reports, which appear to be more concerned with EFA deficiency in the presence of excessive fat intake, rather than with fat deficiency as such.

Leaving the question of cholesterol until later we will return to Crawford's work.

In comparing the P/S ratios of the free-living and domestic species he investigated, he argues:³⁸

"The fact that the free-living animals from a diverse woodland habitat had greater proportions of polyunsaturated fatty acids in muscle tissue (30%) compared with the same species in parkland (10%) or what is predominately grassland, and the fact that wild species in captivity fed on hay had low proportions of polyunsaturated fatty acids similar to that of the domestic species, suggests that the primary reason for the difference is dietary and is likely to be related to the use of oil-rich vegetation - such as seeds, nuts, leaves and woody material as compared with soft grasses of the domestic context. We do not know if the rumen treats oil-rich vegetation in the same way as it does the water-rich grasses."

Crawford's paper supports the following general conclusions. Butcher's meat as sold in the UK shows a massive deposition of fat as compared to wild species, and domestic cattle have only about two per cent of fatty acids in the PuFA group. The low proportions of PuFA in the dairy products, ruminant meats, and hydrogenated compound fats and margarines used in western communities, has been accepted as normal for some time. The idea that diet controls the fatty acid composition of human tissues is supported by the difference he reports between the PuFA content of the milk of Japanese mothers (20-25%), and that of mothers in the USA (8-11%); and also by the fatty acid analysis of human tissue reported in dietary trials.⁶¹

Crawford appears to think the balance of fatty acids may be important, and the difference in the P/F ratios between free-living and domestic

cattle and dairy products consumed in the human diet is associated with the dependence of western farming on water-rich vegetation.

Crawford gives P/S ratios of about 50 per cent for natural vegetation, 33 per cent for free living cattle and 2 per cent in domestic bovinds. He also emphasises the wider variety of fatty acids in the free-living species.

The effect of domestication on cattle are of obvious biological importance. The domestic pig has a higher proportion of PuFA (8 per cent), as did the chicken (17 per cent), which may be attributable to the effect of fish meal in the animal rations.

Crawford does not discuss the effect of soy bean meal on the fatty acid composition of cattle.

Cholesterol in the diet

The syntheses of cholesterol in the body has been reported to be several times that of the dietary intake.⁴¹ Man has been estimated to synthesise about 12 gms of cholesterol daily in his own body (e.g. about 15 times the amount available in one pound of butter⁴², or about 24 times the daily intake in the UK)⁴¹

There is evidence that an intake of dietary cholesterol can suppress the biosynthesis of cholesterol, but it is also suggested that there is considerable variation in the mechanism of this feed back process from individual to individual, and from race to race.⁴¹

The transport and deposition of cholesterol is subject to a wide variety of control mechanisms which are still unknown in detail, and which if defective lead to a number of physiological abnormalities.

Fasting is thought to inhibit cholesterol synthesis, whilst high fat diets are thought to accelerate the process. Kummerow, working with chickens, reported that high fat diets raised serum cholesterol values

only when the level of protein was inadequate.⁴²

Ganong⁴³ points out that non-absorbable plant sterols, such as those found in soy beans, reduce the absorption of cholesterol, probably by competing for esterification with fatty acids which function to facilitate the absorption of cholesterol in the body through emulsification and esterification. Kummerow suggests that the cholesterol esters of EFA may be more easily cleared from the serum than saturated acid esters.⁴⁴

Sinclair-Hollingsworth quote⁴⁵ the following relationship from a paper by Hegsted et al, as one of the many equations relating dietary fatty acid to changes in plasma cholesterol:

$$\Delta \text{Chol} = 2.16\Delta S - 1.65\Delta P + 6.77\Delta C - 0.5$$

where

- chol = serum cholesterol in mg/litre
- S,P = change in total calories Per day as saturated and PuFA
- C = dietary cholesterol in dg

Sinclair-Hollingsworth, discussing the basis for the dietary changes designed to lower serum cholesterol level apparently recommended by the American Heart Association, emphasise the need to decrease the non-EFA and the excessive calories (e.g. from sugar) that may be transformed into non-EFA in the body.⁴⁶ Thus an increase in dietary cholesterol increases the daily requirement of EFA, and of complex carbohydrate as dietary fibre.

It would seem that the above is the thrust of the various dietary recommendations by official bodies that we have seen directly, or indirectly: e.g. the American,⁴⁶ the Australian,² the UK Department of Health (DHSS) and the RCP.³

Regarding sucrose in a role of reservation to the DHSS report Yudkin concludes that the report exaggerates the possible role of dietary fat in causing IHD, and minimises the possible role of sucrose. He also emphasises that IHD may be related to hormonal causes, and points out

the relative immunity of pre-menopausal women to IHD.⁴⁷

To conclude on a final note of controversy we note two factors of risk which are not modifiable as behaviour patterns, and climatic factors.

Behaviour patterns

At one point behaviour patterns are discussed in the RCP report which points out that "competitive drive" appears to be a potential risk factor which has been considered in the USA, Australia, the Netherlands and Sweden. However taking the view that behaviour patterns cannot be effectively modified this hypothesis does not appear to constitute a satisfactory basis for intervention.⁴⁸

Climatic factors

Before turning to the empirical work that follows under the heading - data review - it is worthwhile drawing attention to the possibility that there may be an association between IHD and climatic factors. Ignoring Switzerland, the further south that the population lives appears to lower IHD in the countries quoted in Table 8 page 84.

The following is drawn entirely from a paper by Roberts and Lloyd,⁴⁹ who note that IHD mortality rates for fifty local authority areas in South Wales and fifty-eight country boroughs in England and Wales are closely associated with average annual rainfall. These authors quote a paper by Hart who apparently considered the distribution in South Wales of blood-pressure, serum-cholesterol, body-weight for height, smoking habits, physical activity based on occupation, and migration, and concluded that none of these had a distribution analogous to that of IHD mortality. They also quote an American authority (Dudley et al)⁵⁰ who studied the role of thirty-five environmental factors, in the geographical variations in IHD mortality, over a three-year period in one hundred and sixteen cities in the USA, and concluded that climatic differences were the

most important of the factors. In conclusion it would be pointed out that Roberts-Lloyd were attacking the soft-water hypothesis of CHD.

We can find no mention of environmental factors in the above sense in the RCP report.³ Water hardness is mentioned, but in an inconclusive fashion, i.e. it does not appear to be taken as a modifiable risk factor beyond the recommendation (which is not a very strong one) that public drinking waters ought not to be softened unless there is an overwhelming reason for doing so.⁵¹

The Roberts-Lloyd paper was picked up from the DHSS report.⁶⁴ The only recognition we have found in this report is a minor suggestion at the end of a brief statement on water hardness - that information on the relationship between IHD and hardness of water supply, and other environmental factors, should be acquired on a larger scale, and in more detail.⁶⁵

There is a considerable literature concerning the problem of dietary fibre and the effect of sucrose. A general discussion of the anti-sucrose pro-fibre school is to be found in The Physiological Effects of Food Carbohydrates published by the American Chemical Society as ACS Symposium Series No 15, American Chemical Society Washington, 1975.

The general thrust of the ACS symposium is that there is good evidence for high correlations between heart disease and sucrose consumption, as well as between heart disease and total fat consumption. Against this high negative correlation is reported between complex carbohydrate (dietary fibre) and heart disease.

Data Review

1. The food energy (calories) in European and U K diets

1.1 A cross section of fourteen countries in 1972

Helen Farnsworth⁵², in calculating the daily per capita food energy requirements for fourteen West European nations (see Table 2), used four determinants as follows:

- i) the influence of environmental temperature,
- ii) national differences in body size,
- iii) level of physical activity,
- iv) age and sex difference in the population.

Her figures showed the energy needs were broadly similar (range 2355-2545 dK). N.B. dK = daily calories.

Daily calorie intakes per person are published by the OECD⁵³ together with estimates of the daily consumption figures based on total food disappearance (Production and imports - exports and net stock changes) on a yearly basis. These figures are subject to error, but allow reasonable comparisons to be made of levels of consumption. The OECD have estimated calorie, protein and fat contents of a wide range of foodstuffs and also present an analysis of the energy input in terms of animal vs vegetable food stuffs for each reporting nation.

The data reveals excessive food consumption in all cases and we have calculated a figure for the energy gap in absolute and ratio terms. The range in the OECD data is much wider than the Farnsworth estimates predict.

As can be seen in Table 8 figures for IHD mortality rates have been added.

Table 8 : Estimated calorie needs and consumption and IHD mortality rates for fourteen West European countries in 1972

NB in ascending order of estimated daily calorie requirements per capita

Country	Total calories		Energy Gap		IHD (A83)
	Estimated Needs	Actual Consumption	Absolute difference	%	
(1)	(2)	(3)	(4)	(5)	(6)
U K	2355	3141	786	33	314.4*
Spain	2365	2640	275	12	62.9
Portugal	2365	3224	859	36	91.0
France	2385	3207	822	34	87.5
Italy	2385	3260	875	37	136.6
Switzerland	2400	3226	826	34	108.4
Sweden	2435	2796	361	15	364.1
W Germany	2475	3235	760	31	190.8
Belgium	2490	3344	854	34	236.4*
Ireland	2500	3395	895	36	283.5
Austria	2500	3324	824	33	255.9
Netherlands	2530	3208	678	27	190.2
Denmark	2530	3240	710	28	317.1
Norway	2545	2985	440	17	264.3

Source : Column 2 : Farnsworth;⁵² op cit; table 1

Column 3 : Food Consumption Statistics; OECD; Paris; 1975

Column 4 : Column 3 - Column 2

Column 5 : $(\text{Column 4} \times 100) \div \text{Column 3}$

Column 6 : Who Annual Statistics; Who; Geneva; Vol 1; 1975
(per 100,000 population)

* Estimated as the weighted average of the regional figures.

These were obtained from World Health Organisation (WHO) Annual Statistics for 1972, which classifies IHD on terms of the A list of the International Classification of diseases (ICD) as A83 i e categories 410-414 of the ICD (8th Revision). Thus we have used the classification adopted by the DHSS (1974)³⁹ in discussing the relation between diet and IHD mortality rate (mr).

The derived data of Table 8 (cols 4 and 5) suggest there is no obvious relationship between an excessive intake of food energy and IHD mr.

Seven countries of the sample of fourteen countries have an absolute energy gap greater than that of the UK but return a lower IHD mr. Four countries with a similar ratio energy gap (933-34%) return lower IHD mr's.

Sweden with the second lowest energy gap returns the highest IHD mr.

We note the low IHD mr for France. Robb-Smith⁵⁴ notes

"..... the low mortality rate attributed to IHD in France is more likely to be a consequence of certification habits than an indication that there is some racial or dietary factor which renders the French relatively immune to this disease."

1.2 Time series results in the U K

The DHSS (1974) report¹ provides data for the UK on page 26 of the report covering the period 1909 to 1971.

Comparing the figures for energy consumption based on food consumption level estimates (CLE) and National Food Survey Estimates (NFS) with the data for IHD, reveals that whilst daily food energy remained fairly constant between 1950 and 1971 (average 3128 calories per day per person: range 3030-3190) there was an increase in IHD mr (eg males 55-64 in England and Wales from 566 to 708).

The DHSS report however does point out that, over the period of enquiry 1950-1970, the composition of the diet altered so that it appears that the relative energy intake from fats rose both in CLE and NFS estimates.

This point we now examine.

1.3 Regression analysis of the fat consumption in the UK 1955-71

Fat consumption data were calculated for the UK and compared to the IHD mortality rates for England and Wales. For the present purpose we ignored the regional differences in the UK IHD mr's, as the trends appeared to be similar on visual inspection (see Fig 6 page 87).

CLE data was obtained for Butter and margarine calculated from Monthly Digest averages for production and stock changes, which were adjusted for foreign trade movements from the Overseas Trade Accounts. Product weights were used.

Additional figures for the totals of PUFA vegetable oils utilised in UK margarine and compound fat manufacture were obtained from the Commonwealth Secretariat - (Annual publication) - Vegetable oils and oilseeds - these were summed as the total of soy bean oil, cotton seed oil, rape seed oil, and sunflower seed oil utilised for compound fat and margarine production.

Mid-year population data were obtained from the Annual Abstract.

The series for butter, margarine, and polyunsaturated vegetable oils were deflated by population to obtain data for lbs per head per annum.

Total calories of the food moving into consumption in the UK and the per centage of total energy obtained from fats were

obtained from the DHSS (1974) report page 26 . The values of percentage energy consumed for our CLE's were calculated separately. The analysis was from 1955-1971 i e 17 years.

Twelve regressions were run on the Warwick B6700 computer, using the Harvard TSP programme and the results are tabulated in Table 9. The independent variable was IHD mr for males aged 55-64 years old. The age specific death rate was chosen as this applied to males, for which the incidence is more serious in the last decade of normal working life, in an attempt to avoid the effect of changes in the age - sex structure of the living population.⁵⁵

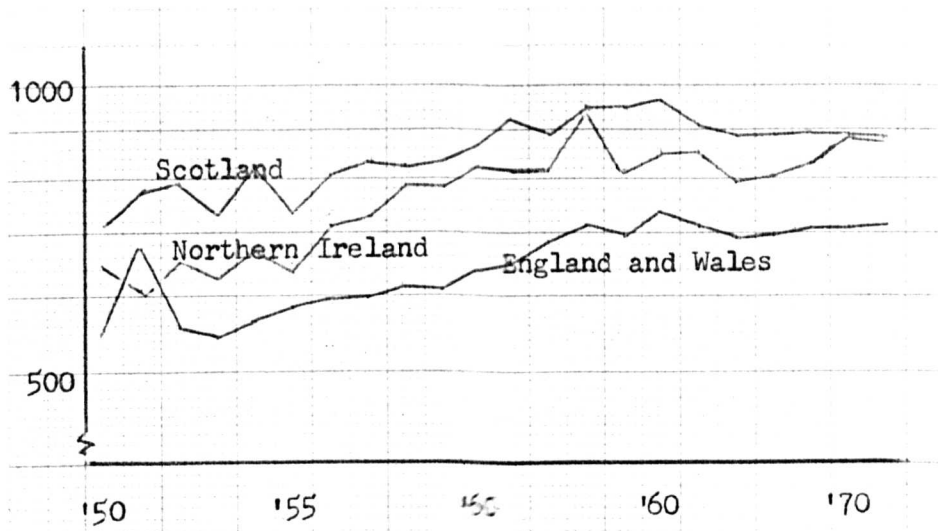


Fig 6 : UK mortality rates for males aged 55-64 from IHD, by region (1950-1971)

Source : Diet and CHD; DHSS; HMSO; London; 1974; Table 1; page 25.

mr's are measured as no. per 100,000 of the age group.
ICD 7th revision 420 - 422 (1951-1967)
ICD 8th revision 410 - 414 (1968 onwards)

Table 9 : Regression results for IHD mortality rates for males aged 55-64 years in the UK - (1955-71)

IHD MALES AGED 55-64 YEARS				
INDEPENDENT VARIABLES	COEFFICIENT	t-statistic	R ²	dW
1 Constant term	-1077.64	-3.72	0.71	0.81
% Food Energy (FATS)	42.77	6.02		
2 Constant term	578.68	26.41	0.55	0.44
% Food Energy (veg oils)	122.31	4.25		
3 Constant term	348.41	4.81	0.74	0.75
% Food Energy (veg oils)	84.88	3.37		
% Food Energy (Butter)	46.93	3.27		
4 Constant term	1213.47	4.37	0.75	1.06
% Food Energy (Butter)	-18.78	-0.65		
% Food Energy (Margarine)	-106.48	-3.44		
5 Constant term	287.93	3.15	0.53	0.65
% Food Energy (Butter)	68.91	4.15		
6 Constant term	1148.78	5.10	0.76	0.88
Butter consumption	-4.35	-0.61		
Margarine consumption	-28.54	-4.01		
FIRST DIFFERENCE : IHD MALES AGED 55-64 YEARS				
7 Constant term	9.07	2.15	0.04	2.10
FD% Food Energy (Fats)	-7.25	-0.72		
8 Constant term	7.33	1.76	0.01	2.10
FD% Food Energy (veg oils)	11.84	0.45		
9 Constant term	6.96	1.56	0.02	2.12
FD% Food Energy (veg oils)	13.77	0.49		
FD% Food Energy (Butter)	3.81	0.31		
10 Constant term	6.91	1.78	0.16	2.19
FD% Food Energy (Butter)	-10.98	-0.79		
FD% Food Energy (Margarine)	-26.05	-1.58		
11 Constant term	7.77	1.92	0.003	2.23
FD% Food energy (Butter)	2.46	0.21		
12 Constant term	6.55	1.61	0.10	2.11
FD Butter consumption	-1.86	-0.40		
FD Margarine consumption	-6.66	-1.11		

In calculating relative food energy data we assumed 884 calories per 100 gms fat from all sources (OECD; Food Consumption Statistics; 1975; page XX).
 % Food Energy in each case means (Fat calories per day x 100) ÷ total calories per day. In our estimates we assumed one ounce of butter contains 23.4 grams

of Fat (Manual of Nutrition, MAAT, 1970, Appendix A), and that margarine contains 85% of Fat (Ratio used in OECD Food Consumption Statistics to convert margarine to fat equivalent).

All data related to annual consumption, and the initial data input was in Units of 100,000 tons per annum disappearance which was consequently reduced to pounds per person per annum, and eventually to consumption per day for deriving the energy inputs.

The regression trials are limited to OLS estimations in which it is assumed that non-fat explanatory variables are not correlated with the independent variables used in the regressions in Table 9, and therefore the omission of relevant explanatory variables will not lead to biased estimation of the regression coefficients.⁵⁶

On the basis of the discussion of the nutrition literature it could be expected that the sign of the coefficient of the variable 'vegetable oils' would be negative. The fact that it is positive in trials 2, 3, 8 and 9 suggests that despite the benefit of PUFA fats in margarine, which has the expected negative sign to its coefficient in trials 4, 5, 10 and 12, much of the benefit may be undone by the processing of PuFA in cooking fats.

The negative coefficient for butter in trials 4 and 6, where the coefficients are not significantly different from zero is surprising in view of the positive and significant coefficient in trials 3 and 5.

The first-difference results alters the Durbin-Watson statistic obtained in the trials on original variables, in which the hypothesis of random disturbances is rejected in favour of positive autocorrelation in all the trials, except 4 and 6 where the test is inconclusive.⁵⁸

However in the second group of trials 7 to 12 whereas the signs of the coefficient remain undisturbed none of the variables remain significant. This may be due to the omission of relevant non-fat explanatory variables.

In order to briefly consider the regional problem implicit in IHD mr's⁴⁹ additional data was obtained which is now treated descriptively.

The results summarised in Table 10 below give food consumption data as weekly ounces per person of selected foodstuffs measured in product weight units derived from NFS data. One absolute figure is given for

1973, and in addition a ratio figure which treats consumption in 1968 as a base is also given for each product listed.

The products listed below should generally raise IHD mr except for products suspected to be EFA rich ie pork, margarine (noting that by 1973 "soft margarines" were well established - in 1973 they represented 65 per cent of the volume and 75 per cent of the value of sales), and vegetable oils.⁵⁸

Finally standardised mortality rates (Smr's) are included from the Registrars General statistical review, which gives the ratio between mr's for 1973 per 100,000 live population, and its equivalent in 1968.

Table 10: Smr's and dietary changes for four sub-groups in Great Britain between 1968 and 1973

Sub group		non EFA products		EFA Rich products			Smr's
		Ruminant meat	Butter	Pork	Margarine	Veg oils	
S East ¹	1973	11.15	5.48	3.59	2.31	0.80	-
	1968 = 100	78	87	120	109	160	91
Rural	1973	11.00	4.68	3.11	3.62	1.17	-
	1968 = 100	80	75	122	98	418	103
Wales ²	1973	10.39	7.04	2.95	2.64	0.75	-
	1968 = 100	75	89	140	128	153	120
Scotland	1973	10.81	4.88	1.13	3.00	0.83	-
	1968 = 100	92	96	108	87	184	122

Sources : Household Food Consumption and Expenditure; HMSO; London, Registrars - general statistical review ; HMSO; London.

Note : The standard regions are not always equivalent eg

(1) includes East Anglia in the Smr column

(2) Wales I and Wales II in the consumption data and Wales I only in the SMR column.

The results are disappointing except for the South East.

In terms of the nutritional objective of raising the P/S ratio by reducing the intake of ruminant meat and raising the margarine butter ratio the Welsh and Scottish results are poor. Both regions start with a relatively high IHD mr in U K terms, the Welsh being traditionally an area of high butter consumption and the Scottish region being traditionally an area of high margarine consumption.

In qualitative terms all regions have reduced the weekly, per capita intake of non-EFA food stuffs and increased relatively the intake of EFA rich products, that is with the single Scottish result where margarine has been lowered. The Scottish margarine butter ratio still remains the highest in the U K.

Whilst accepting the multifactoral nature of IHD, and also that other components of the diet and other sources of non EFA exist, which we have ignored, in view of the butter margarine controversy and the ruminant meat recommendation, taking a dogmatic view point all regions should have improved their IHD mr's, not have worsened over the period discussed.

The inclusion of pork as a source of EFA may be incorrect,³⁵ and we note that in Scotland there may have been a partial replacement of margarine by lard and compound fat which has been ignored in Table 10.

2. EFA deficiency

2.1 Seven European countries cross section analysis in 1972

This represents an attempt to see how well the international data supports the view expressed in the DHSS (1974)¹ report (page 20) that the evidence of the international data is that death rate from IHD correlates positively within one proportion of energy derived from fat, and even better from saturated fat.

Daily per capita intakes of foodstuffs suspected to contain a high proportion of saturated fats - i e ruminant meats and dairy products were obtained from the OECD Food consumption Statistics (1975) - these were expressed in terms of daily grams of fat content, and converted into calories at the rate of 8.84 calories per gram of fat.

The results in Table 11 show two sources of relative energy from saturated fat sources (col 9) and the percentage energy from suspect fats and margarine.

A number of comparisons can be made which suggest the fat energy hypothesis is not clear-cut even if the remarkable French result is discarded.

Table 11 : Fat consumption levels from selected products, relative energy intake and IHD for seven West European nations - 1972

NB in ascending order of increasing relative energy daily intake per capita from fats derived from ruminant meats and dairy products. It is assumed all fats generate 8.84 calories per gram.

COUNTRY	SOURCE OF FAT				Margarine	Total Energy	% Energy from fats		IHD (A83)
	Ruminant Meat		Dairy Products				All Fats	Excluding Margarine	
	Beef	Mutton	Non Butter	Butter					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Netherlands	9.1	0.1	19.4	4.7	41.6	3193	41.4	9.3	190.2
W. Germany	10.0	0.2	14.7	16.3	21.0	3226	45.9	11.3	190.8
Sweden	6.9	0.3	20.1	12.8	40.5	2754	39.2	12.9	364.1
Denmark	5.8	0.2	22.6	19.8	41.9	3241	44.6	13.2	317.1
Norway	6.4	2.5	26.3	10.4	46.2	3014	42.5	13.4	264.3
U.K.	10.4	5.5	19.3	16.0	14.8	3132	39.7	14.5	314.4
France	10.3	1.9	16.4	19.6	7.4	3176	43.4	15.2	87.5

Source : Column 2 - Column 7 : Food Consumption Statistics; OECD; Paris; 1975

Column 2 - Column 6 : daily grams (dg) per person from total disappearance i.e. Production less net exports adjusted for stock change; all data is expressed terms of fat content not product weight.

Column 7 : Calories per day per person

Column 8 : Total of columns 2 - 6 x 8.84 ÷ Column 7

Column 9 : Total of columns 2 - 5 x 8.84 ÷ Column 7 per gram; Food Consumption Statistics; OECD; 1975; page XX.

Column 10 : WHO Annual Statistics; Vol 1; WHO; Geneva; 1975 (rate per 100,000 population).

2.2 Nineteen Countries (OECD) Regression analysis of cross section data for 1972

Still pursuing the assertion that an increase in the relative energy intake from fats taken up in previous sections (1.2; 1.3; 2.1 above) the daily grams consumption in terms of fat derived from ruminant meats, dairy products and margarine were obtained for nineteen OECD countries where data was available: source Food Consumption Statistics (1975) with the difference that total fats in grams per day were added.

Again, assuming 8.84 calories per gram for fats the percentage energy from fats was computed for each country.

Also a series of variables for non fat calories was computed by the difference:

$$\text{total calories} - 8.84 \text{ total fats}$$

The percentage energy obtained from ruminant fats was obtained by the ratio

$$884 (\text{total Ruminant Fats}) \div \text{Total Calories}$$

Dairy products excludes butter. So separate figures were obtained for Butter and margarine.

Two series of IHD mr were used: one for all ages and sexes, and the second for men only aged 55-64 years.

The regression results are presented in Table 12.

Table 12: Regression results for IHD mortality rates for total populations and for males aged 55-64 years for nineteen OECD countries - 1972

IHD TOTAL POPULATION			
INDEPENDENT VARIABLES	COEFFICIENT	t-STATISTIC	R ²
1. Constant term	-161.72	-1.29	0.34
% Food energy (FATS)	9.57	2.95	
2. Constant term	152.49	3.99	0.14
% Food energy (Ruminant Fats)	13.25	1.65	
3. Constant term	- 15.21	-0.31	0.57
% Food energy (Dairy Fats)	43.78	4.71	
4. Constant term	- 27.14	-0.55	0.60
% Food energy (Dairy Fats)	40.92	4.30	
% Food energy (Ruminant Fats)	6.87	1.18	
5. Constant term	84.17	2.67	0.56
Butter consumption	4.83	3.07	
Margarine consumption	3.61	3.40	
6. Constant term	- 15.76	-0.31	0.57
Ruminant fat consumption	1.69	1.00	
Dairy fat consumption	11.04	4.00	
7. Constant term	252.00	0.75	0.32
Non fat calories	- 0.14	-1.03	
Fat calories	0.18	1.76	
IHD MALES AGED 55-64 YEARS			
8. Constant	-209.73	-0.44	0.25
% Food Energy (FATS)	22.86	2.15	
% males aged 55-64	- 13.55	-0.26	
9. Constant	441.77	1.03	0.49
Butter consumption	16.85	3.54	
Margarine consumption	5.59	1.42	
% males aged 55-64	- 23.65	-0.47	

Direct consumption data are in grams per day of fat equivalents (i.e. fat content in the OECD Food consumption statistics tables). Energy consumption is again on a per person per day basis.

The regression trials were limited to linear form OLS and it was again assumed the omission of relevant independent variables would not lead to biased estimators.

With the exception of the coefficient of margarine consumption and the intake of food energy as non-fat calories it was expected that all the coefficients would have positive signs.

The International cross section results suggest that margarine has a direct relationship with IHD mortality. In trials 5 and 9 it was perhaps unfortunate that butter and margarine disappearance were not measured in relative energy terms, nevertheless the sign of the margarine coefficient was positive and did not confirm the negative signs of the time series results for the UK (trials 4, 5, 10 and 12) of Table 9.

Remembering the positive coefficient of PUFA vegetable oils utilised in margarine and compound fat manufactured in the UK time series, it was unfortunate this series did not include the most powerful explanatory variable in the International cross section ie dairy fats excluding butter.

Whilst the omission of relevant explanatory variables may have led to low values of the t-statistic, it is fairly clear that ruminant meats are possibly not significant in IHD causation - trials 4 and 6.

It would appear reasonable to attempt to explore the influence of diary fats other than butter in the UK, and the influence of PUFA vegetable oils in International margarine and compound fat manufacture.

Again it would seem important to explore the influence of the ratios of various sources of protein, with fats, on the suggestion that low protein diets require high EFA intakes.

However interesting such a development could be we are concerned with economic issues. We feel that the evidence on butter is inconclusive, that the effect of margarine and compound cooking fat may well be to raise IHD incidence. We can offer no explanation as to why butter and margarine together should lower IHD mr in the UK time series, whereas together they both raise IHD mr in the International cross section. The disaggregated effect of dairy fats other than butter clearly needs to be explored in detail by some authority.

We therefore conclude the 'Sinclair' hypothesis which is repeated below is not disproved:

"Margarine and shortenings made with less hardening of fats would be important factors in thus decreasing some very serious diseases of civilisation."
Sinclair⁴⁰

The view point of the DHSS which was given in the first paragraph of section 2.1 above also appears substantially correct, the conclusion taken by the DHSS panel ⁶⁰

"..... that they cannot recommend an increase in the intake of PUFA in the diet as a measure intended to reduce the risk of the development of IHD. the available evidence that such a dietary alteration would reduce that risk in the UK at the present time is not convincing."

would also appear well founded.

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9. AAS (1975); page 54.
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11. RCP (1976); page 4.
12. RCP (1976); page 19.
13. AAS (1975); page 7.
14. Flora Information Service.
15. Sinclair-Hollingsworth (1969); page 585.
16. Sinclair-Hollingsworth (1969); page 172.
17. The constituent fatty acids in fats and oils may vary depending on the source, the age and the treatment of the sample.

The "Handbook of Chemistry and Physics" 56th Edn 1975-76 gives the following typical values for % fatty acids

	Saturated	Unsaturated	
		Oleic	Lineoleic
Soya bean oil	13.4	28.9	50.7
Cottonseed	27.2	22.9	47.8
Rape seed	1.0	32.0	15.0
Sunflower	8.7	25.1	66.2
Palm	47.0	42.7	10.3

17. (continued)

Butterfat	59.0	26.7	3.6
Pig Lard	59.7	36.0	4.3
Whale	27.9	35.2	-
Menharden	23.4	-	29.6

18. RCP (1976); page 60.

19. Eating for a healthy heart; Flora Information Service; page 6.

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59. DHSS (1974); page 20.
60. DHSS (1974); page 23; paragraph 12.4.
61. Meittinen (1972); Meittinen, M. et al; Effect of cholesterol - lowering diet on mortality from CHD, and other causes; The Lancet; October 21st, 1972; page 835.

Table 1 of the Meittinen paper reproduced below indicates that in one hospital (hospital K) change in the P/S ratio in the diet from 0.22-0.29 to an experimental 1.42-1.78, led to the following fatty acid changes in adipose tissue samples taken from a group of patients

	Myristic acid (14-0)*	Linolenic acid (18-2)*
1964	3.8	10.2
1966	2.1	19.7
1968	1.6	32.4
1970	1.5	32.0

*figures indicate percentages of fatty acids

CHAPTER 4

THE DEMAND FOR MARGARINE

Recognising that government activity can be subdivided into three sectors ie allocation, distribution and stable growth,¹ and that policy decisions interact, the following discussion concentrates on the allocation problem of the UK fats market.

In the UK market for fats the allocation problem has two important features, these consist of (i) the obvious substitution possibilities that exist between butter and margarine in consumption, and (ii) the effect of substitution in the situation where the minimum efficient scale of margarine production is large compared to the size of aggregate margarine demand.²

Substitution is important in that it appears to be the only market based defence available to the consumer against a monopoly derived from efficiency criteria associated with large scale operation. Under conditions where big is claimed and accepted as best, from the viewpoint of economic theory policy has to become concerned with the interrelations between structure and conduct (particularly pricing behaviour and advertising in our case), and the performance of the margarine industry with respect to productive and allocative efficiency, equity, industrial progress and inflation.³ Thus official support for the substitute product may be a reasonable outcome.

The discussion that follows continues into Chapter 5 where the question of the monopoly problem is developed. This Chapter concentrates upon the problem of substitution and market demand and is organised on the following lines. First we consider some obvious difficulties that we anticipate will arise with respect to market demand estimation and then present our programme of empirical work. Next we turn to the

theoretical background picking up the issues identified in the introduction, and finally present our empirical results together with the conclusions appropriate to this section.

The anticipated problems in estimating margarine demand

These may conveniently be itemised as below:

- i) previous reported work has encountered difficulty in establishing parameters that are consistent and reliable, that this is so is obvious by a cursory reference to the works of Prest, Schultz and Wold for example. The following is repeated from a paper by

Morgan:²⁹

"Professor Herman Wold has studied demand for butter as well as other food products. His analysis of butter demand uses logs, deriving income and price elasticities, always with quantity of butter as the dependent variable. As explaining variables he uses butter price, margarine price, and income in some cases, and ratio of butter to margarine price, time and income in others. He is not satisfied with the results of multiple correlations using both prices and income, and also uses income elasticities apparently estimated from budget studies. There is a great deal of variation in the elasticities derived, depending on the form of the equation, the particular income series used, the elasticities inserted from outside information, or the trend used."

- ii) reference to obvious aspects of consumer behaviour and market performance suggest these problem areas:
 - a) the substitution of the newer and cheaper product has not taken place except in countries where margarine is protected, or where butter is relatively dear. There is a good deal of support for the idea that in the yellow fats market that the price of butter is the determining factor. Income changes appear to have conflicting effects depending on the method of estimation,
 - b) consumers appear to have strong regional preferences, possibly depending on the pressure of supply,

- c) margarine prices in the UK have until recently shown little variation over time,
 - d) margarine promotional activity varies over time and in relation to butter promotion. Up until recently margarine promotion has emphasised the negative aspects of the product and has not materially altered the image of margarine as an imitation of butter. Recently this has changed and the more positive promotional activity that has emerged attempts to differentiate soft margarines in particular as the preferred product in the yellow fats market, superior to butter in terms of ease of use and in terms of its nutritional advantages,
- iii) further problems arise when working with different time periods, in particular:
- a) multivariate regression analysis generate income coefficients which differ in sign between budget data derived from cross section studies, and market data based on time series information,
 - b) time series data presents all the usual estimation problems of autocorrelation, multicollinearity and different aspects of the simultaneity problem,
- iv) finally we anticipate serious problems with the need to avoid bias in the parameters that can be expected when adjustment for quality change is absent from the analysis, and when the influence of advertising is ignored. In particular we note the problem of own-price elasticities of demand which should they turn out to be less than unity will create difficulties in the study of price cost margins in Chapter 5.

As has been suggested in the introduction we are interested in the effect on demand parameters of using a dynamic approach to estimation,

the problem of simultaneity and the effects of seasonal adjustment, the result of treating advertising as a stock variable together with the problems of promotional activity and of allowing for changes in advertising rates. These are issues to which we return, more or less in the order specified above within the discussion of the theoretical background of estimation.

The program of empirical work in market demand analysis

Within the general framework of a substitution approach the usual inverse form of the demand relationship can be written:

$$Q_m = f(p_r, A_r, Y, G, H) \quad (I)$$

where

Q_m is margarine share of the yellow fats demand,

p_r is the margarine/butter price ratio,

A_r is an advertising ratio for margarine to butter,

Y is real income,

G is a Government policy dummy for butter subsidies,

H is a dummy for health propaganda.

Apart from being significant we expect coefficients of explanatory variables in multivariate regressions to be signed as follows:

- i) the price coefficient to be negative following an inverse law,
- ii) the advertising coefficient to be positive assuming that there is no quality difference between margarine and butter advertising, and we note that estimating in a log-log form assumes that there is diminishing returns to advertising,
- iii) the income coefficient to be negative, and achieve a higher absolute value when the income series used is consumer expenditure as compared to disposable income,
- iv) the Government policy coefficient to be negative when policy supports butter,

- v) the Health coefficient to be positive if the substitution of margarine for butter is recommended by the authorities.

Rewriting Q_m in I above as margarine physical demand, the relationship in its constant elasticity form remains unchanged when it is accepted that own-price elasticity and cross-price elasticities are equal but opposite in sign, and that the coefficients of margarine and butter advertising are once again equal but are opposite in sign. In the absence of this restriction the ratio terms have to be disaggregated in a single equation model.

The empirical program is as follows, and we note that data problems and peripheral issues will be allowed to fall out and discussed as they arise:

1. the problem of adjustment for changes in margarine quality will be considered by -
 - 1.1 attempting to derive implicit specification prices for margarine from cross data derived from two sources - namely a WHICH magazine report on butter and margarine which gives specification data for margarines by brand in February 1973, and a second cross section study that will assume that margarine (brand) prices are highly determined by advertising (media). In the second study regressions for brand price as the dependent variable will be carried out on adjacent pairs of months from June 1973 to May 1974 in order to attempt to estimate the percentage change in the average price of margarine brands, whilst holding the attributes of brand image (advertising) and 'softness' constant,
 - 1.2 by estimating the change in average margarine specification, and the cost of the fat phase in the margarine emulsion using time series data over the period 1960-1974 obtained

from edible fat utilisation data published by the Commonwealth Secretariat, and import price data calculated from the Overseas Trade Accounts.

Within this section we shall discuss more general aspects of margarine specification and edible fat utilisation and processing, and in addition attempt to estimate the proportion of margarine production that enters non-domestic consumption. Thus a brief survey of margarine specification and disappearance will be made, and we shall discuss the basis for the assumption that composition differences between trade use and domestic margarine can be ignored in estimating quality differences from the viewpoint of edible oil input cost,

1.3 we shall next turn to the derivation of a quality variable for margarine based on the ratio of average margarine price to constant quality price which will be used in the subsequent study of substitution and margarine demand.

2. Substitution relations will next be examined by -

2.1 in which is presented a brief discussion of the data sources and variables to be used for estimation,

2.2 a presentation of the result of double log regressions in a static and dynamic form, using the structure of demand for yellow fats as the dependent variable, and a range of explanatory variables in ratio form. Mainly we are interested in this section in comparing results which introduce the price of compound fats and butter as explanatory variables, together with media advertising, and disposable income or consumer expenditure as alternative sources of the income variable. Quality adjustment will also be considered.

3. Margarine demand will be examined by -

a presentation of the result of double log regressions in a static and dynamic form, using the approach outlined in 2.2 above but abandoning the ratio approach. A procedure that introduces problems of deflation which previously have been ignored with regard to the advertising variable, and additional problems with adjustment for quality changes. A feature of this section will be the use of Koyck adjustment to estimate the effect of the advertising variable. Adjustment for seasonal variation and for the introduction of soft qualities of margarine are also to be considered.

4. The results of using modified estimating procedures will be given -

- 4.1 which utilise margarine expenditure as the dependent variable,
- 4.2 which use Two Stage Least Squares estimation to consider the effect of simultaneity between advertising appropriations and quantity demanded,
- 4.3 Which use variables in their first difference form as an approach to the problem of **multicollinearity**.

At times we will use these conventions as an aid to exposition: by the expression 'dynamic' we generally mean that the last quarter's value of the dependent variable appears on the right hand side of estimating relationships, and a 'Koyck' adjustment implies that the estimating form has been modified to allow for a build up in the effect of an independent variable. Time periods invariably capture the first quarter of the base year and continue to the fourth quarter of the end year in the series:

- i) 1960-1968 (36 quarters) during which soft margarine is not available,
- ii) 1969-1974 (24 quarters) during which soft margarine is available,
- iii) 1969-1976 (32 quarters) which includes two years for which we have not been able to obtain disaggregated appropriation figures for media advertising.

THE THEORETICAL BACKGROUND

The Structure of Demand

Initially we consider the potential determinants of demand, and briefly discuss the ideas upon which estimating relationships may be based.

Accepting that it is usual in Western-European diets for 35-40 per cent of the total intake of food energy to be in the form of visible and invisible fats⁴ and that whilst invisible fat consumption has risen per capita the per capita consumption rate of yellow fat has remained relatively constant over the post war period for which data is readily available within the UK⁵, we are interested in the consequences of changes in the determinants of the margarine-butter ratio and with the measurement of absolute demand for margarine, rather than with each commodity taken separately. (See Fig 7 page 110).

Thus we could predict a change in the relative structure of demand in favour of margarine as the price structure adjusts to the increasing relative scarcity of terrestrial-animal fats as compared with fats of vegetable and marine origin that has been observed during the twentieth century. Whilst some vegetable oil prices have risen, the margarine manufacturers have been able to hold down input costs by means of improvements in the technology of oil processing and by developing the use of vegetable oils in surplus supply, particularly in respect of products based on the USA soy bean surplus.⁶ The fact that the anticipated change in the structure of demand in favour of margarine as the newer and cheaper product has not been evident in the UK market, whilst it has been observed to be a feature of other markets, for example in the USA,⁷ could be one effect of Government subsidies on the exports of butter surpluses to the UK,⁸ the operation of producers' cartels,⁹ and to the effect of the UK Government consumer subsidy and the form of support given to agriculture in the UK.¹⁰

Average weekly
consumption-ozs per person

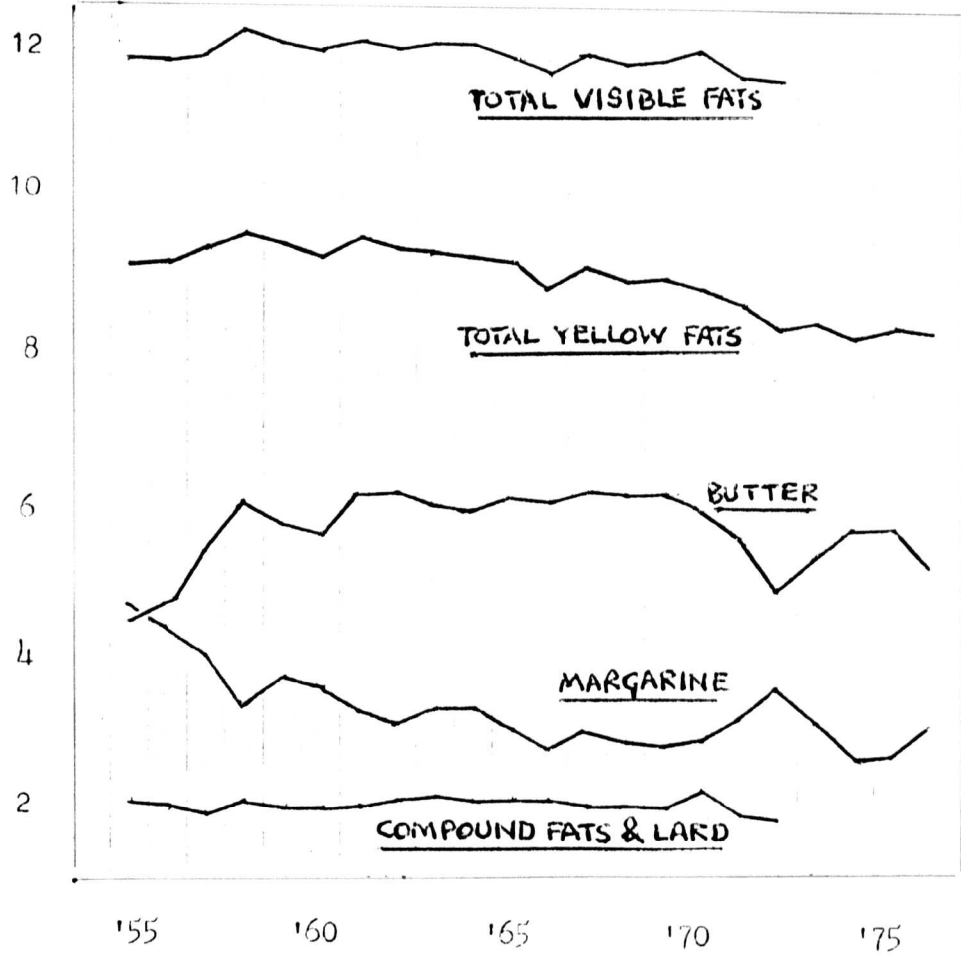


Fig 7: Annual Consumption of Yellow Fats 1955 - 1976

source: National Food Survey

Non-price determinants of the structure of demand

Apart from the price ratio the other main determinants of the margarine-butter ratio and the level of the consumption of fats are the general level of prosperity and changing tastes, with which the influence of advertising and health propaganda has to be included.¹¹

Examination of the literature reveals that the issue of substitution is indeterminate. Apart from cross elasticity of demand the most useful theoretical concept in relation to substitution is the elasticity of substitution which can be written in a form which will reveal how market share will respond to changes in the relevant price ratio. Morrisett¹² discusses the problems associated with the use of this concept. It has been pointed out that the independent demand functions for butter and margarine, and the ratio relations upon which the elasticity of substitution is based both depend on the same variables and it might be possible to go from one approach to the other,¹³ this is also true for cross price elasticity.

Before considering the general form of the estimating relations we intend to use, together with the hypotheses it is intended to investigate, a summary is given of the apparent conflicts in the published results that we have read.

Against the improvements in margarine in respect of price, packaging, ease of use etc., increased prosperity may have worked in favour of the traditional preference for butter shown by consumers in some countries (notably France), and in some regions of the UK (notably Wales). Esche¹⁴ for example suggests somewhat arbitrarily in respect of a result reported from one cross-section study of West-German butter consumption, that households may budget for a given expenditure on fats, and this may mean that more money can be spent on butter if margarine costs less. Hoffmann¹¹ puts an alternative point of view and argues that in several countries that margarine consumption has

risen with increasing prosperity and that the consumer preference for margarine is becoming less dependent on price, whilst the preference for butter is price dependent. Other determinants which Hoffmann argues are more important in respect of margarine consumption are habits of health, health awareness, durability, advertising etc.

In the UK the relative preference for butter could be expected to alter as the consumer subsidy is withdrawn, and the effect of the Common Market prices lead to a structural price change in favour of margarine. The effect of the price ratio is thought by Tousley¹⁵ to be an important determinant in the marketing mix for butter and margarine and whilst its effect is thought to vary between countries it appears to play an important role in the long run. In opposition to this point Esche¹⁴ reports that price ratios are without influence in a statistical survey of international cross-section data.

The National Food Survey in the UK reports negative (cross-section) values for the income elasticity of demand for margarine, and positive values for butter, a result repeated elsewhere.¹⁶ The fact that income increases may raise the proportions of margarine consumed is mentioned in some international pre World War II studies. One feature of this may be that low-income families treat margarine as a superior product to solid fat in some uses.¹⁷ The idea that butter might not be a substitute for margarine in all its uses gives some support to this conclusion.¹⁸ Some studies showed that the physical consumption of butter increases with income, whilst the consumption of table fat other than butter decreases. This could have been an effect of family size rather than income.¹⁷

Butter and margarine perform similar roles and are near perfect substitutes for many uses in consumption. However, the margarine industry in the UK has recently been attempting to differentiate margarine, particularly luxury-soft-margarine as a product which is superior to

butter in performance, and which has an added nutritional advantage in relation to health,¹⁹ a problem which is discussed elsewhere in this thesis. Towards this end the identity of margarine as a cheap substitute for butter is steadily being eroded away.

Given the above it is tempting to follow Lancaster²⁰ and treat the two commodities as a single product group, as they both possess similar characteristics which more or less overlap. Unfortunately it has not proved possible to identify characteristics which capture both commodities and which are at the same time quantified by producers, or which can be described in any other ~~than~~ subjective terms. To identify the composition of margarine for example in such loose terms as 'pure vegetable oil' is of little consequence when what is required for nutritional evaluation is a detailed statement of the actual composition in terms of the specific oils used in the blending of the fat phase used in the margarine emulsion, or a definite statement of the chemical composition independently of the oil blend. Again such performance variables as 'ease of spreadability following refrigeration' is of little consequence in the absence of a comparative measure of performance differences. Organoleptic properties suffer similar defects. For these reasons this particular application of the Lancaster characteristics approach has not been pursued owing to the measurement problem. However the characteristics approach is discussed later in this chapter in reference to the adjustment of margarine data to allow for quality changes.²¹

The conventional approach remains in which shares in the market mix between butter and margarine is to be examined in relation to changes in the price ratio, increases in purchasing power over time and the effect of commodity advertising, Government policy and the current awareness of the health issue.

Substitution - the general background to the estimation problem

Theoretical attention has been given to the problem of substitution since the days of Walras. However treating the consumption of a commodity as being dependent on its own price together with the prices of all other commodities is too complex for our purpose. It is more usual to assume that the prices of all the other commodities have a negligible effect upon the commodity in question, or to restrict the investigation to an attempt to estimate the interrelationship between two or three commodities and neglect the effect of the remainder.

The initial hypothesis usually made for a commodity is the unknown demand function can be approximated by an empirical function of the form:

$$Q_t^d = Q(x_i, Y, Z_i, t) \quad (II)$$

where Q_t^d is some rate of consumption in period t,
 X_i is a vector of relevant prices,
 Y is a consumer's real income,
 Z_i is a vector of non-price determinants,
 t is a trend term.

It is normal to assume the function takes an inverse relationship with regard to own-price when the investigation can proceed by introducing other X_i as the price of complements or substitutes for the commodity under consideration, and attempting to estimate cross price elasticities as one method of tackling the substitution problem which has added relevance in relation to the monopoly issue.²²

Alternatively substitution relations can be written

$$\frac{Q_m}{Q_b} = a_0 \left(\frac{p_m}{p_b} \right)^{a_1} \left(\frac{A_m}{A_b} \right)^{a_2} Y^{a_3} \quad (III)$$

where : in one time period

a_1 is elasticity of substitution expressed in its consumer equilibrium form,

Q is volume rates of consumption,

Y is real per capita income in unit time,

A is advertising,

p is unit prices,

m, b subscripts denoting margarine and butter.

Whilst the above suppresses other independent variables the ratio form avoids the implicit problems of a simultaneous equation approach such as adjusting variables for the effect of changing money values, of changing advertising costs and of changes in population, together with the problems of identification and multicollinearity.

From the above, by analogy to the Cournot-Marshall demand curve, the measure of volume market share will move in favour of butter (*ceteris paribus*) when there is a relative price increase in margarine. The exponent a_1 will have a negative sign as is usual with an inverse law of demand. Expressing the dependent variable in value terms the exponent on the price ratio variable becomes equal to $a_1 + 1$. Following the usual rule by which the response of consumer expenditure to relative price changes is governed by own-price elasticity of demand, it can be predicted that revenue market share will only rise in favour of margarine following a reduction in the value of p_m/p_b when the negatively signed a_1 has an absolute value greater than unity.

Equation III in its double log form implies the value for the exponent a_1 which stands for the elasticity of substitution in its consumer equilibrium form is constant and incidently is negatively signed. The consequences of constant elasticity of substitution, implicit in the ratio form, and the conceptual problems that emerge are now discussed.

Totally differentiating III yields

$$d \ln \left(\frac{Q_m}{Q_b} \right) = a_1 d \ln \left(\frac{P_m}{P_b} \right) + a_2 d \ln \left(\frac{A_m}{A_b} \right) + a_3 d \ln Y \quad (\text{IIIa})$$

where

$$a_1 = \frac{\partial \ln (Q_m/Q_b)}{\partial \ln (P_m/P_b)}$$

$$a_2 = \frac{\partial \ln (Q_m/Q_b)}{\partial \ln (A_m/A_b)}$$

$$a_3 = \frac{\partial \ln Q_m}{\partial \ln Y}$$

In a 'structural' format equation III becomes

$$\frac{Q_m}{Q_b} = \frac{c_0 P_m^{c_1} P_b^{c_2} A_m^{c_3} A_b^{c_4} Y^{c_5}}{d_0 P_m^{d_1} P_b^{d_2} A_m^{d_3} A_b^{d_4} Y^{d_5}} \quad (\text{IIIb})$$

where

$c_1 - c_5$, $d_1 - d_5$ represent partial elasticities for margarine and butter respectively, and for illustration,

$$c_1 = \frac{\partial \ln Q_m}{\partial \ln P_m}$$

Neglecting the advertising terms and putting IIIb into its logarithmic form, a total differential can be written as follows

$$d \ln Q_m - d \ln Q_b = (C_1 - d_1) d \ln P_m - (d_2 - c_2) d \ln P_b + (C_5 - d_5) d \ln Y \quad (\text{IIIc})$$

Comparing equation IIIa with IIIc it becomes obvious that the assumption of constant elasticity gives the following equalities in the coefficients,

$$a_1 = c_1 - d_1$$

$$a_1 = d_2 - c_2$$

$$a_3 = c_5 - d_5$$

(IIId)

It has been pointed out by Meinken and others that it is possible to maintain the equality implied in the above i.e.

$$e_{mm} - e_{mb} = e_{bb} - e_{bm} ; e \equiv \text{price elasticities}$$

(IIIe)

and to obtain the same value for elasticity of substitution (a_1) for independent goods as well as for goods that are substitutes and complements in consumption.

Given these problems, provided that the identities of equation IIIe are obeyed it might be preferable to calculate elasticity of substitution by using direct estimates of own price and cross price elasticities. These have the advantage of giving direct confirmation of suspected relationships in demand.

Finally we note from equation IIIa that

$$\frac{d \ln \frac{Q_m}{Q_b}}{d \ln \frac{P_m}{P_b}} = \frac{\partial \ln \frac{Q_m}{Q_b}}{\partial \ln \frac{P_m}{P_b}} \quad \text{(IIIIf)}$$

provided the summation terms disappear

i.e. $\sum a_i \{d \ln x_i / (d \ln p_m - d \ln p_b)\} = 0$

The short-run and long-run in demand

In estimating empirical demand functions of the form given in II as is discussed for example by Schultz²³ and others, it is possible to work with family budget data, or alternatively with time series data. Data used in price studies are obtained from budget studies (cross section data) and from market information (time series data). In cost studies cross section data is used to provide information for long run analyses, whereas time series cost output data is used to provide short run cost functions.²⁴ Similarly in demand studies while budget information is used to provide long run elasticities, time series data is considered to provide short run parameters. In demand studies lags and rates of change of price variables can be introduced to estimate long run elasticities from short run data by making assumptions about the adjustment mechanism,²⁵ a point to which we return.

Micro relations (firm production functions, and household expenditure) are typically estimated in cross section studies, while macro relations (aggregate production functions, and market demand functions) are typically estimated in time series work.²⁶

The main disadvantages of aggregate data in time series form is the existence of correlation between the explanatory variables - price and income - which makes it difficult to isolate the effect of each variable. One way of dealing with this problem is to use an independent estimate of the income coefficient in the time series analysis,²⁷ for example Stone²⁸ uses family budget data to provide an extraneous estimator for the time coefficient of income in time series analysis. In the UK family budgets provide negative income elasticities which suggest that margarine is an inferior good. Morgan²⁹ quoting Herman Wold's work on butter and margarine reports considerable variation in the results, depending on the form of the estimating equation used;

in addition Morgan emphasises that Haavelmo has suggested that many more variables should be used in cross section studies than are commonly used as one solution to the problem of the reported differences in the value of the sign of the income variable in cross section and time series studies.

Holmes³⁰ commenting on the use of extraneous estimators discusses the use of extraneous estimation for the income coefficient in demand analysis and suggests that it is possibly incorrect to assume the price variables exogenous and the quantity variable endogenous in both cross section and time series data. Basically he argues that whereas in cross section information consumers may be assumed to adjust expenditure to price, in time series data the quantity may adjust to price in time units longer than in the unit in which the time series is measured, thus the direction of causation may be reversed. The transfer of the income coefficient from budget to time series data thus becomes more difficult.

The attempt to reconcile short run and long run elasticities has led to several papers. Working³¹ suggested that in considering short and long run elasticities demand dynamics are unsatisfactory and the complexity of the problem depends on whether demand is for consumption or for storage, or for both, whether measurement is in terms of producer or market wholesale or retail price, the time span of the observational period and the time span of response in price quantity relationships. Houthakker³² stresses the fundamental importance of the period of adjustment as follows:

"... we conclude in demand analysis it is important to specify the period of adjustment. It is vain to search for the elasticity of demand."

The difficulty of the time span also receives attention in the micro studies of plant costs where accounting periods upon which the data is based may be a bad approximation to the time period relevant in economic theory.³³

It has been argued that time periods have greater significance in the study of supply than in the analysis of demand. Cassels (quoted by Nerlove-Addison)³⁴ suggests that the investigation of market supply curves when stocks of the commodity are fixed are doomed from the start. Long run relationships are also likely to prove difficult in that would not be possible to hold determinants constant for a period which is long enough to observe long run equilibrium. Cassels suggested that there may be irreversibility in the short run supply relationship. Nerlove tested out the implication that the elasticity of adjustment would differ between expansion and contraction of output. Irreversibility in the demand function has been tested by Farrell³⁵ as a possible explanation of trend terms in demand studies.

Apart from the problem of irreversibility in short run functions the difficulty of obtaining empirical coefficients for long run functions stems from the fact that long run relations are not directly observed. One way round this problem is to make assumptions about the relations between the short and long run responses to changes in explanatory variables, and to consider the adjustment process in dynamic models. The process of adjustment is recognised implicitly by the introduction of time as a trend term, by autoregressive structures in models, or explicitly by a recursive system such as a cobweb model or by a distributed lag system. Basically explicit models of adjustment treat the problem in two ways:

- i) as a cobweb oscillation of prices and production around long run equilibrium values in market systems;³⁶
- ii) where adjustment is such that the value of observed variables is assumed to converge monotonically towards equilibrium e.g. the following first order difference equation,³⁷

$$X_t - X_{t-1} = V(\bar{X} - X_{t-1}) \quad (\text{IVa})$$

where X , \bar{X} are the observed and the equilibrium values of the variable;

V is restricted as a positive constant less than unity to ensure convergence of X on \bar{X} over time. or in its ratio form,³⁸

$$\frac{X_t}{X_{t-1}} = \left(\frac{\bar{X}}{X_{t-1}} \right)^V \quad (\text{IVb})$$

the effect of alternative restrictions on the value of V are discussed by Horowitz,³⁸ as is ^{the} implied rejection of the possibility of X fluctuating around \bar{X} in its approach path over time.

Nerlove³⁹ claimed that the first order difference form of the relationship assumed an explicit dynamic model of market behaviour that implies a distributed lag only incidentally, and that statistical analysis based on such dynamic models yields coefficients that are more reasonable in size and magnitude, and that the calculated residuals yield a lesser degree of serial correlation than the equivalent static model. With particular reference to Stone's earlier results for butter and margarine,⁴⁰ Nerlove-Addison attribute the poor results obtained for margarine and other fats to the omission of the price for butter.⁴¹ We note in passing that Nerlove-Addison assumed that supply was perfectly elastic in their demand results.

Accepting equation III as a model of long-run demand, and that succeeding time periods will give a closer agreement between short and long-run demand, the adjustment can be written

$$\frac{Q_{t,L}}{Q_{t,S}} = \left(\frac{Q_{t,L}}{Q_{t-1,S}} \right)^b \quad (IVc)$$

where : L,S = subscripts denoting long and short-run demand,
 $0 < b < 1$ defines the adjustment process.

and the following equation is derived by combining III and IVc

$$\left(\frac{Q_m}{Q_b} \right)_{t,s} = a_o^{(1-b)} \left(\frac{p_m}{p_b} \right)^{a_1(1-b)} \left(\frac{A_m}{A_b} \right)^{a_2(1-b)} Y_t^{a_3(1-b)} \left(\frac{Q_m}{Q_b} \right)_{t-1,S}^b \quad (V)$$

Writing Q for margarine demand in its semi-ratio form equation V becomes:

$$Q_{t,s} = a_o^{(1-b)} \left(\frac{p_m}{p_b} \right)^{a_1(1-b)} \left(\frac{A_m}{A_b} \right)^{a_2(1-b)} Y^{a_3(1-b)} Q_{t-1,S}^b \quad (VI)$$

in which $a_1(1-b)$ the exponent of the price ratio divided by the complement of the exponent of the lagged term for quantity in the adjustment equation gives the value of a_1 . In the form above the equation assumes the long-run values for own-price and cross elasticity of demand are equal but opposite in sign. Similarly for the term for the advertising ratio in which the long-run advertising elasticities i.e. the exponent a_2 , are again assumed equal and opposite in sign. To avoid this restriction the constant elasticity form has to be rewritten as:

$$Q_{m,t} = a_o^{(1-b)} p_m^{a_1(1-b)} p_b^{a_2(1-b)} A_m^{a_3(1-b)} A_b^{a_4(1-b)} Y^{a_5(1-b)} Q_{m,t-1}^b \quad (VII)$$

Simultaneous Equation Models and the seasonal influence

Turning to the controversy between the use of single equation as opposed to simultaneous equation market models it may be argued that simultaneous equation systems probably represent the basic economic structure of a problem better than the single equation model.⁴² Foote⁴³ states that if no close substitute or complementary commodities exist then a single structural demand or price equation is sufficient and that elasticity of demand can be measured by least squares; where close substitutes do exist a minimum system will contain one equation for each of the substitutes. When the product moves into several price determined outlets a price equation will be required for each outlet. For example Rojko⁴⁴ uses four price relations for milk going forward into different outlets in dairy manufacturing. Fox⁴⁵ gives evidence that for some commodities single equation price relations are satisfactory, for others, particularly in the case of dairy products, any detailed analysis must be conceived in terms of many simultaneous equations.

Haavelemo⁴⁶ demonstrated that the simultaneous character of the relations of theory might imply that ordinary least squares applied to single equation models can not be relied on in estimation. This was a generalisation of the problem of identification formulated by Working.⁴⁷ Ezekiel⁴⁸ demonstrated that a lagged relationship between supply and price resolved this difficulty for agricultural products. Nevertheless it is claimed the property of interdependence implicit in the widely used single period equilibrium systems of Marshall and Walras rules out the single equation approach.⁴⁹

It is agreed that classical least squares procedure can be properly applied only in situations where a single dependent variable is to be explained by variables whose values are either exogenously determined or predetermined with respect to the dependent variable; but not

where variables are jointly determined and interdependent. In the event that the system is recursive, which implies that the simultaneous system can be written in the form of current period dependent variables, and the independent variables are all lagged variables and parameters the method of ordinary least squares can be used.

Houthakker⁵⁰ gives the opinion that the principle obstacle to the use of a more sophisticated estimation technique than ordinary least squares in demand analysis is the absence of a well developed theory of supply, and argues that a wrongly specified supply function may be worse than none at all.

The normal treatment of the supply function in a market model is to combine the demand function with a second equation system whereby quantity supplied depends on price and selected shift variables; and the alternatives are as follows:

- i) behavioural equations writing $q = f(p)$;
- ii) production functions writing $q = f(\text{physical inputs})$; (VIII)
- iii) a cost approach writing $q = f(\text{accounting costs})$;

In simultaneous equation model the above imply different adjustment mechanisms thus the first suggest movement to an equilibrium at zero excess demand, whilst the other two imply optimal behaviour being attempted in physical or in value terms to achieve a constrained equilibrium. Optimal behaviour is particularly important when market power is high, and admits an extension of theory in the general direction of optimal decision taking when non price variables are considered as decision alternatives to either price or output variation. For example Dorfman-Steiner⁵¹ discuss the substitution of price adjustment by deliberate changes in the firm's costs which have the objective of shifting the aggregate demand function. The use of the cost approach to the supply function in Two-Stage Least Squares estimation

of instant coffee demand is illustrated by Cowling and others.⁵²

Following Morgan a general model of the UK market for fats can be written in the form of the following simultaneous equation system:

$$Q_b^S = f_a(M_s, G, M_b, p_j, S) + u_a \quad (\text{IXa})$$

$$Q_m^S = f_b(p_m, p_c, p_v) + u_b \quad (\text{IXb})$$

assuming that supplies are predetermined prices become dependent variables,

$$p_b = f_c(Q_b^S, Q_m^S, Q_c^S, p_m, Y, A_b) + u_c \quad (\text{IXc})$$

$$p_m = f_d(Q_b^S, Q_m^S, Q_c^S, p_b, Y, A_m) + u_d \quad (\text{IXd})$$

where

Q^S is the rate of supply in the UK,

M_s is the UK milk surplus,

G is a Government policy variable relating to butter subsidies,

M_b is the rate of butter import in the UK,

p_j is a vector of prices for joint products in UK dairying
e.g. for beef and dairy products,

S is a stock variable,

p is a unit price,

b, m, c, v are subscripts denoting butter, margarine, compound
fats and lard, and vegetable oils respectively.

Y, A are real income and advertising

Alternatively we may take quantity as the dependent variable in the demand equation. This is based on the assumption that consumers treat price as given and adjust quantity accordingly. There are further considerations in favour of this approach which are now briefly discussed.

The prices of butter and lard in the UK are closely tied to the world

market, and there is some reason to assume perfectly elastic supply in respect of these two commodities, and also incidentally for the vegetable oil supply. The assumption of perfectly elastic supply in respect of margarine may be a weaker approximation in that whereas all vegetable oil is imported the derived products are UK manufactures. However, as we believe there is substantial excess capacity in the UK margarine enterprise the assumption may not be unreasonable.⁵³

The assumption of perfectly elastic supply is convenient in the situation where current price and quantity are jointly determined by supply and demand in the short run, where least squares estimation of single equations such as VII repeated below (also see page 122), or equation IXc written in its quantity dependent form, will generate coefficients which are statistically biased. The degree of bias is taken to be negligible when supply approximates to perfect elasticity.

A further feature of the simultaneity problem is implicit in a single equation approach such as in equation VII which neglects the possibility of interdependence between the current volume of sales and advertising.

Equation VII is now repeated:

$$Q_{m,t} = a_0^{(1-b)} p_m^{a_1(1-b)} p_b^{a_2(1-b)} A_m^{a_3(1-b)} A_b^{a_4(1-b)} Y^5 a_5^{(1-b)} Q_{m,t-1}^b \quad (X)$$

Assuming other variables predetermined a simultaneous relationship between margarine sales volume and advertising expenditure can be investigated using Two Stage Least Squares.

Turning to the problem of seasonal influence in time series data which is based on periods of less than one year, it seems reasonable to expect the disturbances to be serially correlated due to seasonal fluctuations in consumption. Brown⁵⁴ finds that margarine unlike butter shows a slight seasonal variation in demand, and we would expect u_d in equation IXd to be serially correlated with time. In this case we would expect the use of binary variables to be necessary to estimate the seasonal

influence.

Finally there are reasons to think that the ratio between margarine and butter in household consumption is strongly influenced by the relevant price ratio or by the difference between prices, and not so much by the variation of income over time.

For example, in 1971 consumption level estimates in the UK indicated that margarine per capita consumption rose absolutely and relatively to butter, largely due to changes in the price difference. It should be pointed out that whilst the effect of the change in relative price levels was possibly being weakened by income rises per capita, at this time the introduction of soft margarine was influencing margarine demand; in 1971 soft margarine accounted for thirty five per cent of margarine sales, and in the next two years this figure increased to sixty five per cent of the sales volume.⁵⁵ In the event that the proportions in which butter and margarine are consumed depends on price ratios without much influence from income an estimating form such as equation III, page 115 can be derived from a ratio of equations IXc and IXd written in a quantity dependent form. It is assumed that consumers react to changes in real purchasing power, and are less conscious of changes of money income, therefore in respect of fat demand we assume money illusion can be neglected.

The stock of advertising messages

The influence of advertising on market shares has been dealt with in a fashion which is similar to equation V in Cowling⁵⁶ which uses Two-Stage Least Squares as the estimating technique and treats market-share by brands in various markets and advertising as being simultaneously determined and hypothesise a dynamic relationship between market share, price and advertising for each firm in the market. Feinberg⁵⁷ studying butter-margarine substitution considers both commodities as being dependent on price ratio, butter advertising and margarine advertising in the following single equation model:

$$Q_m = a + a_1 \left(\frac{P_b}{P_m} \right) + a_2 \ln Ad_m + a_3 Ad_b \quad (XI)$$

where

Q_m is the percentage of total fats; the price ratio is the ratio of annual average retail prices deflated by means of a retail price index; the annual advertising expenditures are deflated by an index of advertising costs.

Demsetz⁵⁸ in studying the effect of consumer experience in relation to brand loyalty in the market for advertised and non-advertised brands of frozen orange concentrate uses the following relationship:

$$\frac{Q_1}{Q_2} = a_0 \left(\frac{p_1}{p_2} \right)^{a_1} p_2^{a_2} t^{a_3} \quad (XII)$$

where

the subscripts stand for advertised (1)
and non-advertised (2)

this model overlooks factors of quality and income and accepts the dangers inherent in using t as a measure of experience of a times series. Nevertheless the negative coefficient for the t term indicates that consumer experience shifts consumption in favour of non-advertised brands. Demetz suggests models of market behaviour require the incorporation of

such a learning process if market structure and behaviour are to be more adequately predicted, and feels that the results may be generalised for items that are low in unit price, purchased frequently and are not too complex in character. In the Demsetz model the variable P_2 is included as an explanatory variable with the intention of separating out the influence of buyers whose effect on market shares cannot be attributed to the learning process. We note in passing that Unilever in rejecting the assumptions made by the Monopolies Commission in respect of costs in the household detergent industry argued that the use of mass media economises on other intermediate selling expenses, and maintained that the cheapest price is not the only consideration for the housewife.⁵⁹ Experience seems to confirm that this is true in respect of choice for synthetic household detergents, however, Unilever at the same time that they were confirming that market share did not grow in favour of cheaper unadvertised household detergents were also introducing a product variation in the shape of the well publicised enzyme brands of detergent.

Various authors⁶⁰ treat advertising in market demand as a stock variable. McGuinness⁶¹ for example assumes that the current ratio of advertising stocks is related to current and past ratios of advertising expenditures in the following way:

$$\left(\frac{K_m}{K_b} \right)_t = \left(\frac{A_m}{A_b} \right)_t \left(\frac{A_m}{A_b} \right)^u \left(\frac{A_m}{A_b} \right)^{u^2} \dots \left(\frac{A_m}{A_b} \right)^{u^n} \quad \text{(XIII)}$$

where : K is the current stock of advertising messages;

A is advertising expenditure in time t etc;

$0 < u < 1$.

using this relationship in the basic equation overleaf,

$$\ln Q_m = a_0 + a_1 \ln Y + a_2 \ln P_m + a_3 \ln P_b + a_4 \ln \left(\frac{K_m}{K_b} \right) + a_5 d_2 + a_6 d_3 + a_7 d_4 \quad (\text{XIV})$$

where Q_m is margarine consumption per capita;
 d_i are dummy variables for the 2nd, 3rd and 4th quarters.

McGuinness obtains by means of a Koyck transformation:

$$\begin{aligned} \ln Q_t = & a_0 + a_1 \ln Y_t - u a_1 \ln Y_{t-1} + a_2 \ln P_{m,t} - u a_2 \ln P_{m,t-1} \\ & + a_3 \ln P_b - u a_3 \ln P_{b,t-1} + a_4 \ln \left(\frac{A_{m,t}}{A_{b,t}} \right) \\ & + u \ln Q_{t-1} + a_5 d_2 + a_6 d_3 + a_7 d_4 \end{aligned} \quad (\text{XV})$$

In its constant elasticity form this model has the obvious attraction of allowing for a build up of the effect of advertising expenditure over time, it implicitly assumes that advertising is the only variable that has a dynamic effect on sales and ignores the effect of health propaganda which was not an issue during the period of analysis 1962-1972. McGuinness did not consider any form of the share of market approach.

Promotional activity and the problem of changing rates in advertising

Apart from the suggestion that advertising should be treated as a stock item rather than in current expenditure terms in regression analysis, other problems emerge in the treatment of the advertising variable. These relate to the restricted nature of advertising expenditure data, and to the problem that the expenditure data available fails to allow for current variations in advertising costs and for cost variation over time.

The only available expenditure data for advertising relates to press and television advertising, and this ignores other promotional activity.⁶² At the same time expenditure data for press and television (TV) advertising in respect of butter and margarine fails to allow for premium payments over basic rates, such as the fixed-spot surcharge in TV advertising, or for the effect of bulk purchase discounts on the basic rate. This failure makes advertising expenditure as such an inappropriate variable. Again time series data needs to be adjusted for changes in the basic rate over time. TV advertising expenditure for example needs to be deflated by an index of unit costs per minute of household viewing.⁶³

The Advertising Association (AA) annual index of TV advertising rates which is to be used to deflate TV advertising expenditure in this research is based on AA estimates of total advertising revenue net of discounts for the TV contractors in the UK.⁶⁴ This index then becomes the net advertising revenue per minute of annual advertising transmissions weighted by the number of homes with an independent television facility. The use of homes as a weighting factor, rather than an audience rating directly concerned with fat-purchases, may introduce a downward bias to average costs. This is ignored and it is also assumed that advertising impact or quality does not present a problem, and that inefficient promotion schemes do not survive. As will become apparent the estimating procedure uses quarterly data, and the construction of a quarterly index of TV rates by interpolation does not allow for any

seasonal variation in rates, nor for the fact that TV rates vary by company, region, peak viewing time, and according to audience ratings for specific programmes with which the advertising transmission may be associated. We assume a random variation from these sources. In view of the time and effort required to attempt to construct a quarterly series of costs for the time period in which we are interested, a separate attempt to derive a quarterly series was ruled out, instead quarterly index figures for TV rates were obtained by interpolation of the AA annual index for TV rates.

The AA index of press rates is less satisfactory in that it fails to allow for discounts. It is based on rate card estimates each September for single page advertisements in a sample of the national press, periodicals and smaller circulation publications, weighted by circulation. Again a quarterly series of index number for press advertising rates was derived by interpolation.

Generally we are concerned with the estimation of the significance of coefficients of 'advertising messages' conveyed by the media. Therefore in deflating TV and press advertising expenditures by the AA index of media rates, the concept of an advertising message we are using is that a minute of television advertising is equivalent to a page of newspaper advertising.

Adjustments for quality variations in butter and margarine

The problem to be solved is that of eliminating the bias given to regression coefficients arising from quality variations in the dependent variable. Considering the 'characteristics' of margarine it would appear that although specification data is generally unsatisfactory for the measurement of quality changes for which a price can be attached, some possibilities do exist for an attempt to derive a set of implicit prices for certain dimensions of quality change that can be identified.

We can proceed to derive implicit specification prices for specific brands of margarine by carrying out OLS regression analyses of cross section data on the specification or characteristics of each brand. By writing $p_{k,t}$ for the price of the k'th brand during time period t we argue:

$$p_{k,t} = f(x_{ikt} \ z_{jkt} \ u_k) \quad (XVI)$$

where x_{ikt} is a vector of $i (= 1 \dots m)$ characteristics or qualities common to all brands of margarine and which can be quantified,
 z_{jkt} is a vector of $j (= 1 \dots n)$ non-numerical characteristics which are valued at 1 if present, and at 0 otherwise,
 u_k is a disturbance term

Repeating Griliches ⁷⁰⁻¹ we may choose the following explicit form of (XVI) and express the logarithm of brand price in terms of the absolute values of characteristics:

$$\ln p_{kt} = a_0 + (b_1 x_{1k} + \dots + b_m x_{mk}) + (c_1 z_{1k} + \dots + c_n z_{nk}) + u_k \quad (XVII)$$

where a, b, c are constants which ceteris paribus measure the percentage increase in price of brand k consequent upon a one unit change in the elements of $x_{ik} \ z_{jk}$.

As written equation XV excludes any adjustment for quality differences in margarine output, and it could be predicted that estimated price elasticities for margarine could be too low owing to the omission of a suitable quality variable. The problem might not be so severe if it could be argued that butter quality changed in a manner similar to margarine, this however has not been the case in the post war era. If it should turn out that there is no convenient way of estimating demand response to changes in specification (quality) characteristics which are not quantifiable, a possible alternative to equation XVII is to include in the estimating equation a time series variable calculated as the ratio of the current average price for margarine to the current price for a constant quality margarine.⁶⁵ Assuming that prices can be interpreted as the weighted sum of combinations of specifications (characteristics) as in equation XVI, this calculation removes the effects of changes in implicit prices of specification characteristics from the average price series to obtain a weighted index of the current combination of specifications for the average margarine. This can be used as an implicit quality variable when the price term for margarine in the regression equation becomes the price series for the constant quality brand deflated by the General Price Index.

Data Review

1. Adjustment for changes in margarine quality

1.1 Implicit specification prices from cross section data

Two attempts to derive implicit prices for margarine characteristics from cross section data for margarine brands are now reported.

The first of these, for convenience referred to as the WHICH study, attempted to use characteristics identified in a WHICH report on butter and margarine; this report in February 1973⁶⁶ published information on the probable composition of soft margarines and tablet margarines together with information on the product characteristics under these headings:

- i) numerical qualities
 - a) salt content
 - b) Polyunsaturated acid (PuFA) content.
- ii) dummy variables
 - a) tablet form
 - b) foil wrapped
 - c) advertised on television - information added in from prior knowledge.

These characteristics used to estimate implicit prices in the manner of equation XVII above, give the following result for 27 brands of margarine by OLS regression:

$$\ln P_m = 2.01 + 0.02X_1 - 0.13X_2 + 0.26Z_1 - 0.11Z_2 - 0.09Z_3 \quad (\text{XVIII})$$

(7.27) (2.95) (-1.20) (2.23) (-1.03) (-0.95)

$$R^2 = 0.60$$

$$F = 6.40$$

where (in February 1973)

P_m = margarine price (p/8ozs)

X_1 = probable PuFA content %

X_2 = salt content %

Z_1 = dummy for foil wrapped

Z_2 = dummy for tablet form

Z_3 = dummy for brands advertised on TV

The second cross section study identified as the advertising study is based on the idea that the consumer buys brand image and convenience in use, and is not concerned with specification issues. In general terms information given by manufactures about brand composition is insufficient and probably misleading in relation to the nutritional problem during the period of the twelve months (June 1973 to May 1974) for which cross section results are reported in Table 13. In terms of usage, that is for domestic food preparation, use as a spread and as a source of food energy, margarine is a nearly perfect homogeneous product.

The advertising study is based entirely on two preselected characteristics. Brand image which is assumed to be correlated with current advertising expenditure in the media, together with a dummy for the characteristic 'softness'. The dependent variable is log price for eleven brands obtained from Shaw's Guide⁶⁷ for each month June 1973 to May 1974 inclusive. Total advertising expenditure is taken from the MEAL digest⁶⁸. Regressions are carried out in adjacent pairs of months in order to estimate the percentage change in the average price of margarine whilst holding the attributes of brand image and softness constant. Each pair of months included a time dummy^{which} is set equal to unity in the second month in each pair, and set equal to zero in the first month in each pair.

In no case is the fit of the equations particularly impressive. The significance of the regression coefficients in Table 13 is

unstable, and the signs turn out to be inconsistent. The results, disappointing with regard to advertising expenditure, are found to be significant in one case only; the monthly price changes taken as the coefficients on the time dummy x 100 are poorly determined throughout.

Table 13 : Regression results for the advertising study in eleven margarine brand prices June 1973 to May 1974

Dependent variable : ln Brand Price (p/lb)

	C	Coefficients			R ²	F
		Advertising	Softness	Time dummy		
Jun-Jul	2.43 (6.85)	0.00001 (1.94)	-0.53 (-1.28)	0.22 (0.59)	0.18	1.31
Jul-Aug	2.64 (7.39)	0.00001 (1.34)	-0.46 (-1.03)	-0.01 (0.03)	0.09	0.65
Aug-Sep	2.64 (6.97)	0.000004 (0.51)	-0.27 (-0.62)	0.06 (0.15)	0.03	0.17
Sep-Oct	2.61 (9.13)	0.0000005 (0.10)	-0.003 (-0.009)	0.29 (0.98)	0.06	0.37
Oct-Nov	2.81 (41.32)	-0.000002 (-1.52)	0.28 (3.96)	-0.02 (-0.28)	0.46	5.23
Nov-Dec	2.82 (46.92)	-0.000003 (-2.63)	0.30 (4.76)	0.01 (0.24)	0.58	8.37
Dec-Jan	2.81 (43.81)	-0.000001 (-1.00)	0.71 (3.99)	-0.007 (-0.11)	0.47	5.32
Jan-Feb	2.80 (44.14)	-0.0000002 (-0.13)	0.25 (3.41)	0.04 (0.65)	0.43	4.61
Feb-Mar	2.85 (47.39)	-0.000001 (-0.91)	0.25 (3.81)	0.01 (1.55)	0.47	5.47
Mar-Apr	2.96 (46.09)	-0.0000008 (-0.95)	0.23 (3.60)	-0.004 (-0.07)	0.46	5.02
Apr-May	2.92 (41.71)	-0.0000004 (-0.49)	0.28 (3.83)	0.06 (0.96)	0.51	6.34

Source : Brand prices from SHAWS Price Guide
 Advertising expenditure from MEAL digest - current expenditure
 Soft dummy from prior knowledge
 Time dummy = 1 in second month being estimated together;
 = 0 in the first in each pair of observations.
 t-statistic in parenthesis

The sample used in the WHICH study included fifteen brands for which the MEAL digest failed to record any media advertising, the advertising study on the other hand reports advertised brands only, notably Kraft and Van den Berghs products.

Owing to the unstable regression coefficients and the poor explanatory power of the advertising study further work was undertaken from the specification view point of implicit prices. The main query was how far could vegetable oil utilisation data be used in margarine price specifications? This is discussed in the next section.

1.2 Margarine specification and the change in edible oil utilisation over time

From the production viewpoint of specification, annual data for the changing utilisation of selected vegetable and animal edible oils in compound fat manufacture and margarine production can be used as a specification for the fat phase in margarine production and the composition of compound fats. Such data is readily available for the period 1960-1974 from the Commonwealth Economic Committee (CEC)⁶⁹ and is based on Ministry of Agriculture (MAFF) published estimates.

Whilst margarine is a substitute for butter, it is more adaptable with regard to its physical characteristics, its nutritional properties and to its economic value. Adaption in these terms can be accomplished by adjusting the composition of the fatty phase of the margarine emulsion, and at the same time this may involve altering the chemical structure of the constituent glycerides that are present in nature in the various fats of different genetic origin.⁷⁰

Thus the materials used in the fat phase may be blended and/or have their chemical structure altered for any or all of the

following reasons:

- i) to modify the melting point and adapt the plasticity of the final blend to meet a wide range of requirements in domestic use and in food manufacture;
- ii) to take account of developments in the field of nutrition, chiefly in the direction of increasing the level of PuFA in the final product;
- iii) to maintain price competitiveness as the relative prices of constituent raw materials fluctuate in response to changes in the world conditions relating to the supply and demand of edible oils.

Materials used in the fat phase of margarine, and in the solid fats sold as compound cooking fats, are the refined, hydrogenated fractionated, interesterified products of a wide range of oils which may be available at the point of manufacture at different times.

Hydrogenation, or the hardening of edible oils for use in margarine and shortening, has been in use since about 1906.⁷¹ This process improves the stability of unsaturated oils by reducing the level of unsaturation of the PuFA, and produces some 20-40% of unnatural isomers in the residual fatty acids. Whale oil and all the oils of vegetable origin which are important in commerce which are known to have a high content of linoleic acid, have been hydrogenated for use in commercial food products. To what extent the development of luxury-soft margarines has altered the use of hydrogenated oils is not known. It is clear that hydrogenated whale oil is a thing of the past, and oil utilisation figures for UK production indicate that the utilisation of lard, soy bean oil and other fish oils has recently increased for both margarine and cooking fats.

The failure of the supply of whale oil took place from about 1964 onwards, it was also at about this time that the influence of a new catalyst in the hydro-refining of soya bean oil came into general use which allows for the selective hydrogenation of soya bean oil to retain the essential PuFA linolenic acid. Utilisation figures for the oils and fats entering UK margarine and compound fat production are given in Tables 14 and 15, pages 141-2. The two most important vegetable oils used in margarine production in the UK in the early 1970's are soya bean oil and palm oil. Soya bean oil is the major oil entering world trade at the present time being based on exports of Brazil, Canada and the USA. Unilever is a producer of plantation palm oil.⁷²

Fat Utilisation % of total

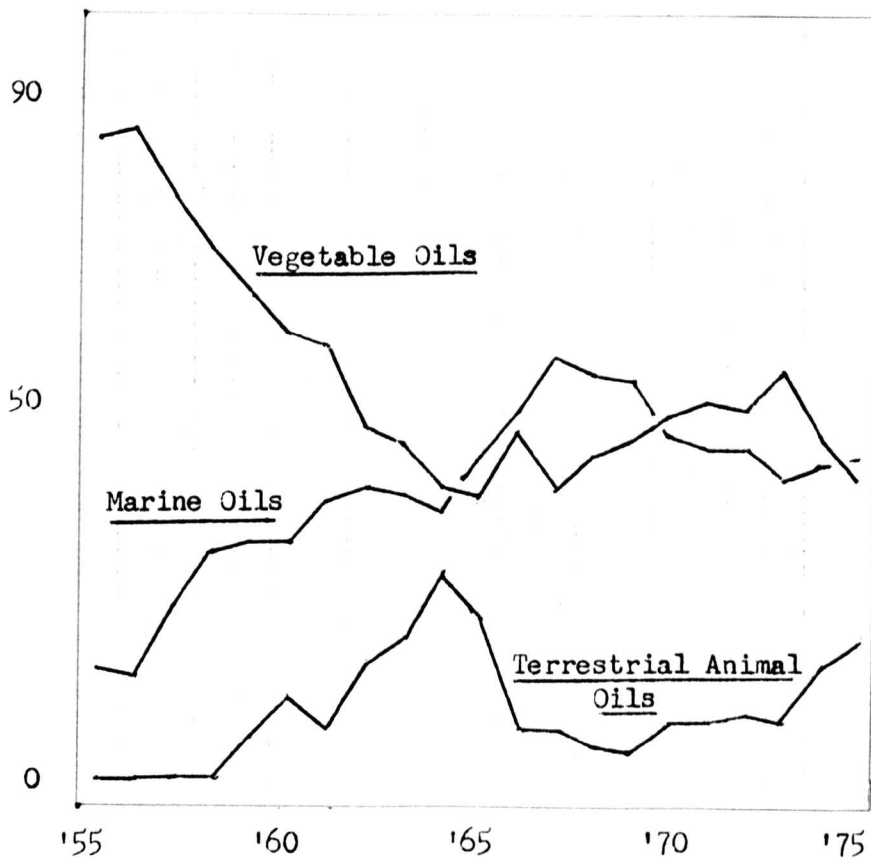


Fig 8 : Oil utilisation in margarine 1954-72

Source : Table 14

Table 14 : Oils and fats used in UK margarine production - thousand tons per annum

	'55	'56	'57	'58	'59	'60	'61	'62	'63	'64	'65	'66	'67	'68	'69	'70	'71	'72	'73	'74	'75	
<u>Vegetable</u>																						
Groundnut	92	67	38	35	37	29	19	18	20	13	11	14	15	17	9	10	8	4	6	5	2	
Soy bean	-	1	4	9	17	24	17	24	27	28	31	25	21	16	24	47	60	67	66	45	31	
Cottonseed	11	9	9	5	4	11	9	7	9	5	7	4	1	-	-	12	1	2	-	-		
Rapeseed	-	-	-	-	-	-	-	-	-	-	-	-	6	12	13	2	4	10	11	16	15	
Sunflower	-	-	-	-	-	-	-	-	-	-	-	-	10	22	33	9	4	7	5	4	4	
Coconut	55	62	56	40	20	19	27	23	26	13	10	8	6	2	2	2	2	4	4	1	4	
Palm Kernel	35	30	28	13	9	8	7	6	3	2	1	1	1	1	1	1	2	3	-	-		
Palm	56	75	64	73	82	67	61	32	24	30	25	41	21	20	25	29	53	46	44	32	29	
Others	11	16	21	11	13	18	15	14	17	14	15	22	17	17	14	14	8	7	17	10	11	
% of total*	84	85	76	69	63	58	57	46	44	38	37	45	38	42	44	47	49	48	53	44	39	
<u>Animal</u>																						
Lard	2	2	2	2	14	32	17	41	53	74	51	14	12	10	8	18	16	21	20	33	39	
Others					3	3	2	2	2	2	4	5	5	4	4	5	7	6	4	5	9	
% of total*	1	1	1	1	6	11	7	16	19	27	21	7	7	5	4	8	8	9	8	15	19	
<u>Marine</u>																						
Whale							56	45	29	19	13	5	3	3	3	1	-	-	-	-	-	
Fish	45	43	67	80	91	97	41	58	77	78	99	120	137	133	139	123	126	132	114	105	105	
% of total*	15	14	23	30	31	31	36	38	37	35	42	48	55	53	52	45	43	43	39	41	42	
Total	307	289	268	290	308	271	271	270	287	278	267	255	255	257	275	273	291	291	291	259	256	
Utilisation	305	289	268	290	308	271	270	270	287	278	267	259	255	257	273	273	291	291	291	259	256	

Source etc. : see footnote Table 15 page 142

Table 15 : Oils and fats used in UK compound fat production - thousand tons per annum

	'55	'56	'57	'58	'59	'60	'61	'62	'63	'64	'65	'66	'67	'68	'69	'70	'71	'72	'73	'74	'75
<u>Vegetable</u>																					
Groundnut	39	33	24	25	24	11	12	9	9	9	5	4	5	4	3	2	2	3	5	10	2
Soy bean	3	5	6	8	9	14	8	12	12	15	11	6	6	3	5	7	8	11	18	15	10
Cottonseed	10	6	5	3	5	4	4	2	2	1	2	2	-	-	-	1	1	1	-	-	-
Rapeseed	-	-	-	-	-	-	-	-	-	-	-	-	4	6	6	5	4	7	7	5	5
Sunflower	-	-	-	-	-	-	-	-	-	-	-	-	2	5	5	2	-	-	-	-	-
Coconut	2	3	3	2	1	1	2	2	1	1	1	1	2	1	1	1	1	1	1	-	1
Palm Kernel	7	8	7	8	3	4	2	2	2	1	2	2	3	2	2	2	2	2	-	-	-
Palm	35	37	33	35	33	28	35	32	30	26	24	23	20	19	24	28	26	22	26	23	18
Others	2	5	6	6	4	5	3	3	4	5	5	8	3	5	3	1	2	-	7	5	5
% of total*	62	65	62	61	57	48	47	44	39	36	35	34	32	32	34	36	33	34	36	35	33
<u>Animal</u>																					
Lard	4	4	7	8	12	21	15	19	28	38	23	16	12	14	10	14	31	30	56	29	7
Others	-	-	-	-	3	6	5	6	8	11	12	12	12	6	8	10	13	11	7	15	18
% of total*	3	3	5	6	11	19	14	17	24	33	25	20	17	14	13	18	31	28	32	29	20
<u>Marine</u>																					
Whale	55	48	44	47	45	45	25	25	17	15	12	4	3	3	3	1	-	-	-	-	-
Fish	-	-	-	-	-	28	31	40	30	43	59	67	71	72	62	53	57	62	52	56	56
% of total*	35	32	33	33	32	32	38	39	37	30	40	46	51	54	54	47	37	39	32	35	46
Total	157	135	142	139	139	139	143	153	148	148	139	138	138	138	140	144	144	147	194	121	148
Utilisation	149	135	142	139	139	139	143	153	148	148	138	138	138	138	140	144	144	147	194	121	148

Source : Vegetable Oils and Oil Seeds - CEC 1972-1975 data converted from thousand metric tons p.a.

1.0159 metric ton = 1 long ton

metric ton = 2205 lbs

* may not sum to 100 owing to rounding errors

Before dealing with the problem of quality variations from the cost view point, we briefly discuss how far the data of Table 14 represents the average specifications for margarine consumed by private households. An exercise which will also serve to illustrate some features of the relationship between raw material costs and average retail prices.

The data for edible oil utilisation in compound fats and margarine refers to total output which moves into catering and manufacturing as well as into private domestic consumption.

It is reported⁷³ for example that seventy five per cent of the total compound fat produced by UK manufacturers is used for trade purposes. In the case of margarine however the proportion is far less, being of the order of twenty per cent.

Further information on this point has been obtained from two sources. The first relates to the total disappearance of margarine in the UK, and the second refers to the data in various census of production.

Independently consumption level estimates were calculated from the total UK supply of butter and margarine as the official figure published in Trade and Industry do not allow for end year stocks.⁷⁴

Weekly ounces per person moving into total supply were calculated for the years 1955-1972, using the following identities:

$$\text{butter} = \frac{\text{UK production} + \text{Imports} + \text{net stock change}}{\text{UK mid year population}}$$

(XIX)

$$\text{margarine} = \frac{\text{UK production} + \text{net exports}}{\text{UK mid year population}}$$

Butter exports were ignored as being negligible, and it was assumed in the absence of any better information that margarine stocks are constant. Butter stocks offset seasonal variation in milk supply, there is no evidence they act as a speculative device.

Simultaneously data for private consumption by households was abstracted from National Food Survey (NFS) annual estimates,⁷⁵ and as this data is reported directly as per capita weekly ounces of butter and margarine, a direct ratio of NFS estimates to the calculated disappearance figure yields a final estimate of the proportion moving into private consumption. Table 16 reports results which apparently show that whilst the relative amount of butter entering trade use is minimal compared to margarine, between twenty and twenty five per cent of margarine is used outside the home or for food manufacturing.

Despite minor differences in the reported figures, the Production Census Reports⁷⁶ tend to confirm that about seventy five per cent of compound fat production is used outside the home, whilst only about twenty per cent of margarine output is destined for trade use (see Table 16 page 145).

In the absence of detailed information about the formulation deficiencies that exist between domestic and trade margarines, it is assumed that catering margarine is similar in composition to margarine used by households, and that in view of the relatively small proportion of margarine entering manufacturing it is reasonable to assume the average composition revealed in Table 14, may be used to identify the composition of average household margarine for the years in question. The CEC utilisation data in Table 14 was recalculated as an annual series giving the proportion of various oils and fats in UK margarine production for the twelve years 1961-1972.

Estimates of the transactions prices for the various oils reported in Table 14 were calculated as a ratio of the value/volume figures published in the overseas trade accounts.

Finally cross products of the transactions prices (measured as £ per cut) and the relevant figure for proportion of oil utilised were calculated

Table 16 : Disappearance of butter and margarine calculated from various sources (a)

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	
Butter																			
Production	15.6	25.2	33.6	30.0	14.4	39.6	50.4	60.0	43.2	22.8	36.0	30.0	37.2	50.4	55.2	62.4	64.8	93.6	
Imports	307.2	354.0	364.8	422.4	400.8	405.6	423.6	406.8	416.4	463.2	441.6	454.8	480.0	446.4	417.6	399.6	384.0	350.4	
Opening stock	20.1	9.1	38.7	35.5	31.3	10.6	27.0	36.6	12.6	16.2	36.3	41.6	37.6	36.5	50.6	29.8	18.2	22.4	
less closing stock	342.9	388.3	437.1	487.9	446.5	455.8	501.0	503.4	472.2	502.2	513.9	526.4	554.8	533.3	523.4	491.8	467.0	466.4	
Disappearance in thousand tons per annum	9.1	38.7	35.5	31.3	10.6	27.0	36.6	12.6	16.2 ^(b)	36.3	41.6	37.6	36.5	50.6	29.8	18.2	22.4	68.2	
Disappearance in ozs per person per week	333.8	349.6	401.6	456.6	435.9	428.8	464.4	490.8	456.0	465.9	472.3	488.8	518.3	482.7	493.6	473.6	444.6	398.2	
Food survey weekly ozs per person	4.59	4.71	5.38	6.10	5.79	5.65	6.06	6.35	5.87	5.97	6.01	6.19	6.53	6.05	6.15	5.89	5.51	4.92	
Ratio % (d)	4.47	4.70	5.37	6.10	5.74	5.68	6.20	6.20	5.98	5.98	6.10	6.07	6.18	6.13	6.15	5.99	5.53	4.78	
Margarine																			
Production	366.0	366.0	351.6	328.8	357.6	368.4	330.0	330.0	337.2	339.6	314.4	310.8	303.6	297.6	312.0	309.6	339.6	361.2	
Imports	41.7	33.5	14.6	3.6	3.4	2.2	1.6	1.6	1.3	18.6 ^(c)	3.5	3.5	3.0	2.2	2.2	1.3	0.9	2.5	
less Exports	407.7	399.5	366.2	332.4	361.0	370.6	331.6	331.6	338.5	358.2	317.9	314.3	306.6	299.8	314.2	310.9	340.5	363.7	
Disappearance in thousand tons per annum	6.1	5.4	6.4	5.4	6.5	6.7	7.5	7.3	7.5	7.8	8.7	7.2	8.0	8.1	9.5	7.1	7.2	7.6	
Disappearance in ozs per person per week	401.6	394.1	359.8	327.0	354.5	363.9	324.1	324.3	331.0	350.4	309.2	307.1	298.6	291.7	304.7	303.8	333.3	356.1	
Food Survey weekly ozs per person	5.44	5.30	4.82	4.37	4.71	4.79	4.23	4.19	4.26	4.49	3.93	3.89	3.76	3.65	3.79	3.78	4.13	4.39	
Ratio % (d)	4.68	4.48	4.02	3.46	3.74	3.66	3.30	3.15	3.32	3.35	3.04	2.79	3.00	2.81	2.78	2.86	3.15	3.52	
Population mid-year estimate (million)	86.0	84.5	83.4	79.2	79.4	76.4	78.0	75.1	77.9	74.6	77.3	71.7	79.8	77.0	73.3	75.7	76.3	80.1	
	50.9	51.2	51.4	51.6	51.9	52.3	52.8	53.3	53.5	53.8	54.2	54.4	54.7	55.0	55.3	55.4	55.6	55.8	

(a) data taken from Monthly Digest (calculated from monthly averages for production and stocks) and from Overseas Trade Accounts (cumulative figures for imports and exports)

(b) from 1964 onwards slight difference in coverage;

(c) not strictly comparable to previous years;

(d) Ratio % - calculated as ratio Food survey data/Disappearance.

and summed to yield a series of annual costs at current prices for the fat phase of average margarine. The results given in Table 18 include additional annual data calculated from the MEAL digest as total media (advertising) expenditure (in £ per cwt), and on margarine prices for export, calculated from the overseas trade figures, and at retail, obtained from the NFS data.

Fig 9, page 147, drawn from the data of Table 18 illustrates the point that the proportional variations in the annual average cost of the margarine fat phase is far greater than that of the export or retail price of the final product, and appears to suggest that whilst price increases are passed on, prices are maintained in times of falling input costs.

Turning to the problem of quality, based on an input cost approach, the specification data for the twenty seven brands identified in the WHICH 1973 report make it possible to calculate an annual series of constant specification costs. For example by assuming a constant specification for the period 1961-1972 for the fat phase of leading brands Blue Band and Stork margarines a constant specification price series can be calculated by assuming proportions of constituent fats remained unchanged during the twelve years in question. Again oils are costed by reference to the import transactions.

The two series of annual costs can be combined to give a constant specification variable using weights to set the ratio to unity in 1961 as follows:

$$\text{Quality variable} = \frac{\text{Fat phase cost for Average margarine}}{a(\text{Fat phase cost for constant specification Blue Band}) + b(\text{Fat phase cost for constant specification Stork})} \quad (\text{XX})$$

where all costs are in £ per cwt

$$a = 0.326$$

$$b = 0.674$$

Average input costs and prices (£/cwt)

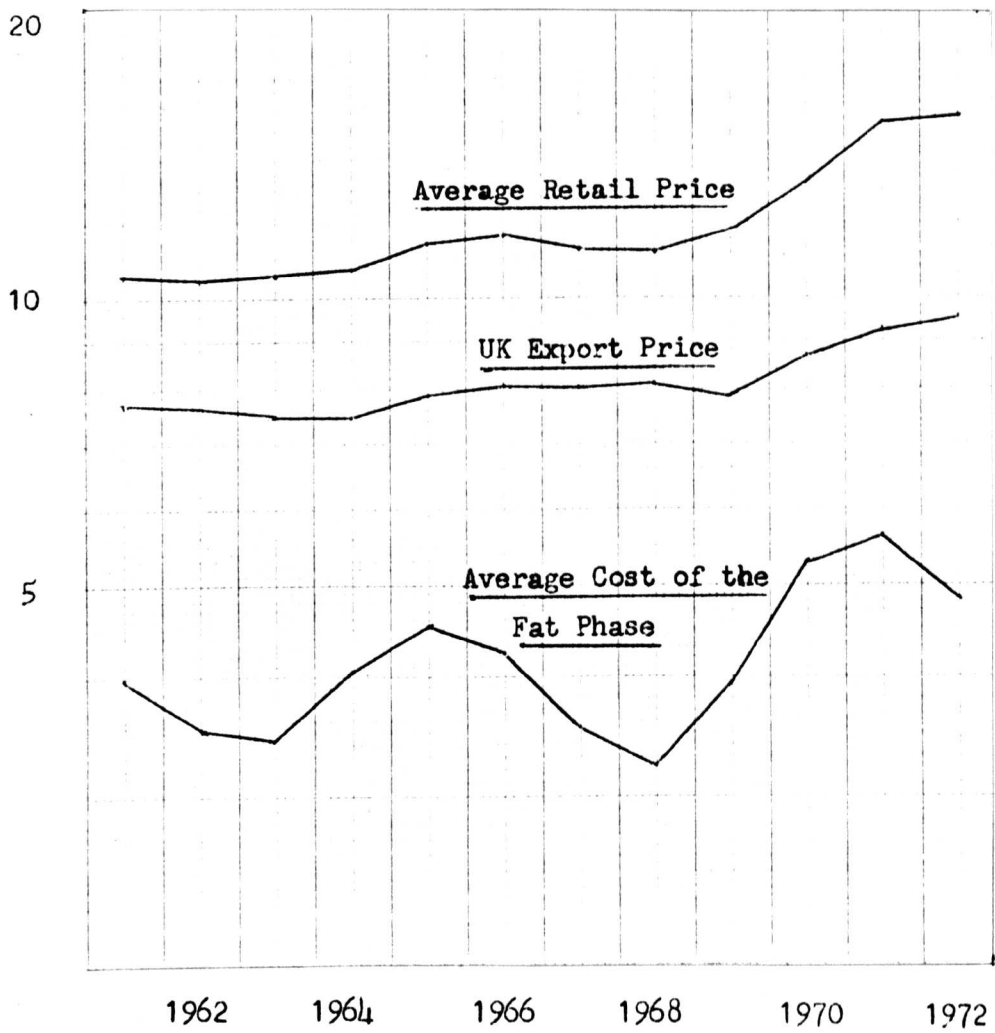


Fig 9 : Margarine average cost for fat phase and UK average transactions price for retail and export sales for 1962-1972

Source : data of Table 18 page 150

The results given below in Table 17 are interesting in that they suggest quality improvements from the cost view point do not generate increased retail prices, for example, the increase in the quality variable in equation XX in 1961 through 1964, and in 1967 through 1969 occurred when retail prices were fairly stable (see Fig 9). Rising retail prices on the other hand appear to be associated with reductions in the estimated quality variable.

Table 17 : Constant specification quality variable for two leading brands of margarine 1961-1972

1961	1.0002
1962	1.0538
1963	1.0770
1964	1.0771
1965	1.0168
1966	1.0024
1967	0.9960
1968	1.0467
1969	1.1671
1970	1.0247
1971	1.0075
1972	1.1185

Source : Equation XX

For reasons given below the quality variable of equation XX was not used to adjust for quality change for the demand equations.

The apparent contra movements of quality and price have already been mentioned. It is also noted that raw material costs for the average fat phase were highly correlated with margarine export price, which appears to move sympathetically with retail price (see Fig 9 page 147) and was assumed to be a reasonable approximation to the margarine wholesale price in the UK.⁷⁷ The zero order correlation coefficient of average cost of the fat phase and the margarine export price was estimated at 0.72 for the annual series for 1961-72.

Most importantly however it was decided that the assumption of a constant formula for Blue Band and Stork was weak. In view of the

obvious changes that had taken place in edible oil utilisation since the Second World War, and the ability of the manufacturer to substitute oils of differing provenance and mixed genetic origin to avoid cost increases on the world market, it is obvious that the assumption of unchanged specification may be unreliable. This does not mean that the 1973 specifications are not a good guide to the cost target to which the blending operation would be directed, but to make this assumption creates further problems of valuation at current prices etc. which we are unwilling to pursue at present. Noting that the specification for constant composition Stork was seventy five per cent Fish oil plus twenty five per cent Soy bean oil, we now briefly consider the implications of the facts that Stork is reported to be the margarine brand leader, together with post World War II changes in edible oil utilisation given in Table 14page 141.

Increased scarcity and the consequent price rises might explain the decline in the use of such oils as groundnut and coconut. Fish oils appear to have replaced the whale oil which declined in supply due to the virtual disappearance of the species. Finally the use of USA soy bean oil increased, a point mentioned previously. It seems unlikely that the leading brands would have escaped these events.

Table 18 : Average cost for the fat phase used in margarine production in the UK (valued at current year import prices) together with total advertising expenditure (as £ total advertising per cwt), average transactions price (NFS estimates) for retail margarine, and UK margarine export price for 1961-1972 (All data current £/cwt)

Year oil etc	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
Groundnut	0.409	0.347	0.354	0.251	0.242	0.291	0.311	0.347	0.217	0.282	0.248	0.116
Soya	0.350	0.410	0.408	0.419	0.596	0.499	0.368	0.262	0.378	1.015	1.423	1.295
Coconut	0.459	0.364	0.282	0.245	0.202	0.193	0.118	0.060	0.045	0.051	0.050	0.115
Palm ¹	0.999	0.546	0.355	0.417	0.454	0.676	0.357	0.297	0.313	0.546	0.967	0.762
Lard	0.324	0.631	0.747	1.174	1.012	0.340	0.247	0.187	0.182	0.471	0.430	0.410
Fish ²	1.011	0.862	0.911	1.237	1.645	1.719	1.473	1.096	1.410	2.161	2.051	1.535
Other oils ³	0.426	0.345	0.400	0.324	0.390	0.508	0.647	0.953	1.415	0.819	0.471	0.620
FAT phase	3.978	3.506	3.456	4.067	4.541	4.226	3.522	3.204	3.960	5.344	5.641	4.852
NFS A g ret. price	10.453	10.416	10.497	10.546	11.386	11.526	11.106	11.106	11.614	13.037	15.064	15.344
Total media advertising	0.432	0.524	0.547	0.572	0.691	0.667	0.574	0.699	0.654	0.617	0.723	0.810
NFS retail price net of advertising	10.021	9.892	9.950	9.974	10.695	10.859	10.532	10.407	10.960	12.420	14.341	14.534
Export price	7.70	7.69	7.52	7.51	7.86	8.15	8.09	8.14	7.85	8.74	10.27	10.57

Source : CEC utilisation data (Table 14) and import transactions prices estimated from overseas trade accounts for the UK.

1. Palm includes Palm Kernel oil; 2. Fish includes whale oil; 3. Cottonseed, Rape seed, Sunflower seed and other oils all estimated at cottonseed oil import price.

Some errors in totals due to rounding.

1.3 Constant quality from the consumer viewpoint

In nutrition terms butter and margarine provide the same quantity of energy calories per gram,⁷⁸ they may differ in the PuFA content, and to a minor extent in their performance in cooking tests.⁶⁶

Price quality relationships estimated in the manner we have suggested above in sections 1.1 and 1.2 are basically cost functions relating brand prices to the variations in the set of characteristics associated with surviving brands, or relating cost to variations in composition of edible oils.

Apart from the problem of low explanatory power noted generally in the relationships investigated, these may have generally failed to account for such qualities as brand superiority, taste and performance characteristics. Neglecting the PuFA problem there is evidence suggesting that there is no 'real' quality difference between margarines, beyond that of ease of spreadability.

Adopting a more demand orientated approach, qualities of the sort attributable to Stork margarine - brand image, taste, spreadability, foil wrapped - may be the characteristics most valued by the public. This is likely to be the case during the period 1961-1972 when Stork appeared to be the brand leader.⁷⁹

Assuming from the consumer viewpoint that Stork margarine may be viewed as a constant quality product, a monthly series of prices for Stork were obtained from Shaw's Price Guide and revalued as quarterly average prices. Using the procedure previously discussed on page 134, these constant quality prices were used to deflate the average transactions price for all margarines obtained from the NFS quarterly estimates, to obtain finally an implicit quality variable.

Whilst recommended fair prices are available from the monthly Shaw's Price Guide for the period in question, these are not transactions prices, and therefore may not accurately measure standard consumer quality price. It was assumed that price discounts were unimportant or of constant proportion.

A main advantage in the use of the series of fair prices, is that the monthly data could be calculated as a quarterly series of prices, and thus was done for the period 1960 (first quarter) to 1976 (fourth quarter).

2. Margarine Substitution

2.1 Variables and their data sources in the substitution analysis

The basic form of the substitution estimating equation is given by equation III page 115.

All data was obtained as a quarterly series from 1960 (1st quarter) to 1976 (4th quarter), within this time span sub-periods are established depending on the availability of data on media expenditure and the presence of soft margarine.

Average transaction prices and per capita physical rates of consumption for the various fats investigated were abstracted as the quarterly series published in Household Food Consumption and Expenditure for each year 1960-1976. All prices were recorded as old pence per lb, after recalculation where necessary. Physical consumption rates per capita were eventually recorded as pounds per person per quarter.

Data was abstracted for butter, compound fats and margarine for use in the substitution analysis.

Monthly data for press and TV advertising were abstracted from the Statistical Review of Press and Independent TV Advertising (Legion) for 1960-1969, and from the MEAL digest subsequently. Current advertising expenditure was calculated for butter and margarine as a quarterly series for both press and TV. Other forms of promotion were ignored. The advertising ratio was a ratio of the sums of media expenditure deflated by the appropriate AA quarterly index of rates obtained by interpolation.

The quarterly series for per capita Consumers Expenditure and for per capita Disposable Income both at 1970 prices were obtained from Economic Trends.⁸⁰

A quarterly series for the General Price Index (1970 = 100) was obtained from the Economic Trends Annual Supplement 1976. The quarterly series of advertising rates were obtained by interpolation from the annual indexes of press rates and TV rates calculated by the AA. Additionally a quarterly series calculated by Cowling and others covered press advertising rates for part of the period i.e. 1960 (1st quarter) to 1968 (4th quarter).⁶³

Prices for various brands of margarine were abstracted on a monthly basis from Shaw's Price Guide for the period 1960 to 1976. These were recalculated as a simple average for quarterly brand prices. Similar data was obtained for compound fats and lard.

2.2 Results for the regression analysis of substitution (Table 20)
page 158

In order to test whether substitution between compound fats and margarine is likely to distort the estimation of the substitution between butter and margarine, two price ratios are introduced in trials 1 and 2. The first price ratio - A admits the price ratio of margarine and butter in the manner of equation III page 115. The second price ratio - B admits the price ratio of margarine to the average transactions price of compound fats and lard as an additional explanatory variable. In both cases the sign of the coefficient on price ratio B is negative as expected, but in neither case does the coefficient of price ratio B turn out to be significant. The second price ratio B is discarded in subsequent estimation.

Price ratio A in its original, and in its derived forms is always well determined and has the expected sign throughout. Considering the derived forms of A, briefly the inverse A^{-1} was used in trial 3, hence the positive sign in the

price ratio - A term. Price ratio - C is a quarterly series of the ratio of average current transactions price for margarine deflated by the Shaw's Fair Price series for Stork margarine, to average current transactions price for butter deflated by the General Price Index. Price ratio - C is used in combination with the implicit quality variable discussed earlier under paragraph 1.3 page 151.

Comparison of the dynamic models with their static counterparts reveal that the R^2 statistic is invariably higher for the lagged equations. Only one result is recorded for the single period approach to illustrate this point. Referring to the values for the Durbin-Watson (d_W) statistic from published statistical tables, at the 5% level of significance the appropriate value of d_L for sixty observations and four explanatory variables is 1.41 indicating significant positive serial correlation is present in trial 1. Noting that for example in trial 2 the appropriate values are $d_L = 1.44$ and $d_U = 1.73$, the reported value for the d_W statistic which is 1.93 implies the absence of positive autoregression. The same conclusion applies to trials 2 through 5.

Despite the usual assumption that margarine is an inferior good, the sign on the income term generally turns out to be positive, suggesting that income increases raise value market share in favour of margarine, a result that has been noted elsewhere.

The final trial replaces real disposable income per capita with real consumption expenditure per capita on the assumption that real expenditure may reflect permanent income status better than disposable income. We note that Morgan
29
reports the elasticity coefficients may differ depending

on the particular income series used. The result seems to indicate that consumption expenditure improves the fit of the regression equation, this is suggested by the marginal improvements in the R^2 , dW and the F statistics, and additionally the income term now becomes significant.

Finally the short run coefficients in trials 2 through 5 may be converted into long run elasticities by dividing each coefficient by the complement of the coefficient of the lagged variable in each equation. The results are presented in Table 19 below

Table 19 : Long run elasticities from Table 20

Independent variable	SR Coefficient	LR Coefficient
Price ratio A		
Trial 2	-0.37*	-1.24
Price ratio C		
Trial 4	-0.36*	-1.16
Trial 5	-0.41*	-1.17
Disposable income		
Trial 2	0.18	0.60
Trial 4	0.21	0.68
Consumer expenditure		
Trial 5	0.41*	1.17

* Significant - t test at 5% level.

With reference to the discussion subsequent to Equation III page 115 the result of Table 19 suggests that in the long run the value share of margarine in the yellow fat market will rise following a reduction in the margarine butter price ratio (ceteris paribus), which is contrary to the short run response.

The results so far reported ignore the effect of any seasonal influence, and neglect any effect on parameters due to the introduction of soft margarine in 1969. One trial was undertaken which treated the seasonal effect in the manner of equation XV above (page 130) and introduced an additional binary variable to allow for the impact of soft margarine (set at zero 1960-1968 and at unity subsequently). The general problem of allowing for the influence of soft grades of margarine is discussed in our next section. Thus we obtain for 1960-1976 (68 quarters), t-values are given in parenthesis:

$$\begin{aligned} \ln QR = & 0.51 - 0.38 \ln PR - C - 0.92 \ln QV + 0.002 \ln AR \\ & (0.43) \quad (-4.81) \quad (-2.81) \quad (0.07) \\ & - 0.19 \ln CE + 0.69 \ln QR_{t-1} - 0.02 D_2 \\ & (-0.76) \quad (9.57) \quad (-0.86) \\ & - 0.06 D_3 + 0.01 D_4 + 0.10 D_5 \end{aligned} \quad (XXI)$$

$$R^2 \quad 0.80 \quad dW \quad 2.28 \quad F(9, 57) \quad 25.29$$

where

QR is ratio of margarine to butter physical consumption per capita in lbs per person per quarter,

PR-C the ratio of Stork margarine price deflated by the General Price Index, to the average butter price deflated by the General Price Index, all in old pence per lb,

QV is the average price of margarine deflated by the price of stork margarine, again in old pence per lb,

AR is the ratio of advertising media appropriation for total margarine expenditure to total butter expenditure,

CE is real consumers expenditure per capita,

D_2 - D_4 are quarterly dummies,

D_5 is valued at zero for 1960-1968, and at unity subsequently.

The quality variable now becomes significant, and also it appears that D_3 and D_5 are significant. The change in the sign of consumer expenditure, and the minor improvement in the R^2 value are additional

points of interest. The SR elasticity of substitution now becomes -0.38 and in its LR form is calculated at -1.23.

Table 20 : Regression results for substitution analysis (1960 (1st quarter - 1974 (4th quarter)

N.B. all equations in double log form

Quantity ratio of margarine to butter consumption					
INDEPENDENT VARIABLES	COEFFICIENT	t-Statistic	R ²	dW	F-statistic
1. Constant term	-2.74	-2.94			
Price ratio -A	-0.77	-4.14			
Price ratio -B	-0.39	-1.02	0.33	0.42	6.94
Advertising ratio	0.09	1.40			
Disposable income	0.34	1.85			
2. Constant term	-1.29	-2.26			
Price ratio -A	-0.37	-3.21			
Price ratio -B	-0.06	-0.28	0.76	1.93	33.13
Advertising ratio	0.04	1.17			
Disposable income	0.18	1.56			
Quantity ratio (t-1)	0.70	9.91			
3. Constant term -1	-1.20	-2.56			
Price ratio -A ⁻¹	0.35	4.17			
Advertising ratio	0.05	1.34	0.76	1.93	41.97
Disposable income	0.16	1.79			
Quantity ratio (t-1)	0.70	10.12			
4. Constant term	-1.48	-2.53			
Price ratio -C	-0.36	-4.22			
Quality variable	-0.05	-0.13	0.76	1.92	33.58
Advertising ratio	0.04	1.30			
Disposable income	0.21	1.91			
Quantity ratio (t-1)	0.69	9.48			
5. Constant term	-2.53	-3.14			
Price ratio -C	-0.41	-4.71			
Quality variable	-0.01	-0.04	0.77	1.93	36.37
Advertising ratio	0.05	1.44			
Consumer expenditure	0.41	2.69			
Quantity ratio (t-1)	0.65	8.84			

3. Margarine Demand

3.1 Results for the regression analysis of demand (Table 21 page 160)

The results of Table 21 illustrate some single equation trials in which the basic model

$$Q_m = a_0 p_m^{a_1} p_b^{a_2} Y^{a_3} \quad (XXII)$$

is estimated in different ways, and in a dynamic form by introducing lagged $Q_{m,t-1}$ as an additional explanatory variable (see equation VII page 122).

Quantity is measured as quarterly consumption in lb per person, and prices are average transactions prices deflated by the General Price Index and expressed as old pence per lb.⁸¹

Trial 1 introduces real transactions price for compound fats and lard as an additional explanatory variable, and uses real per capita consumption expenditure as the income variable. The coefficient for the compound fats price variable turns out to be non-significant, and the signs of the coefficients are as expected from the results of Table 20. The value for the Durbin-Watson statistic indicates the hypothesis of no autoregression is rejected.

Trials 2 and 3 replace p_m by two variables, constant quality price which is the Shaw's Price Guide price for Stork margarine deflated by the General Price Index, and the implicit quality variable discussed in paragraph 1.3 page 151. The dynamic form in which both equations are estimated, includes the quantity of margarine consumed in the previous period as an explanatory variable. The two equations compare disposable income and consumers expenditure as alternative measures of per capita real income. In both cases the R^2 and F statistic are improved, as compared to trial 1, and the Durbin-Watson result indicates the hypothesis of no autoregression is well founded. Whilst trial 3 improves the significance level of variables generally, the coefficient on the constant quality price term is positive contrary to prior expectation.

In all cases the income term has a positive coefficient, reproducing the results of the substitution analysis in Table 20.

Table 21 : Regression results for Quality adjusted demand analysis
1960 (1st Quarter) - 1974 (4th Quarter)
 N.B. All equations in double log form

Quantity of Margarine Consumed					
INDEPENDENT VARIABLES	COEFFICIENT	t-statistic	R ²	dW	F-statistic
1. Constant term	-0.63	-3.32			
Margarine price	-0.05	-0.12			
Butter price	0.63	6.49	0.63	0.85	23.28
Compound fat price	0.12	0.53			
Consumer expenditure	0.33	2.19			
2. Constant term	-2.94	-2.93			
Constant quality price	-0.007	-0.05			
Quality variable	0.45	1.44	0.76	2.18	32.89
Butter price	0.34	4.78			
Disposable income	0.14	1.50			
Quantity (t-1)	0.50	5.47			
3. Constant term	-4.27	-3.60			
Constant quality price	0.03	0.29			
Quality variable	0.56	1.95	0.77	2.22	35.77
Butter price	0.39	5.32			
Consumer expenditure	0.31	2.43			
Quality (t-1)	0.45	4.95			

3.2 Introducing advertising into the demand equations (Table 22 page 162)

Despite the obvious advantages of assuming homogeneity of degree zero in butter and margarine advertising and avoiding the difficulties of measuring advertising expenditure in real terms by using a ratio variable for advertising, separate variables for butter and margarine advertising are used. Some attempts also were made to disaggregate the advertising variable and to use press and TV Advertising as separate regressors for each commodity. Thus in general we have an estimating equation which

mirrors equation XV page 130 except that the ratio form of the advertising variable is abandoned.

The advertising data for quarterly expenditure for each commodity and for both media were deflated by the appropriate AA index for media rates. The deflated expenditure for each media were then summed to obtain the Total Advertising series for each commodity.

In general the results suggest three things:

- (i) the use of a 'Koyck' form, which assumes advertising is the only variable to have a dynamic effect on sales, increases the value of the margarine price coefficient and often reverses the order of absolute values of the coefficients on the 'price' terms. The effect seems to be intensified by the introduction of binary regressors to represent the seasonal factor, and the result generally indicates a higher own price elasticity for margarine than would otherwise be obtained. Table 22 illustrates this point when compared to Table 21, and also demonstrates the emergence of higher values for the t-statistics for own-price coefficients.
- (ii) The use of consumer expenditure data as the measure of real income per capita often improves the values of regression coefficients together with their t-statistic.
- (iii) The introduction of dummy variables for the second, third and fourth quarters lowers the value for the t-statistic for the coefficient on margarine advertising. This is illustrated for example by comparing the result of trial 3 with the remaining equations in Table 22 page 163.

In general none of the results obtained suggest that total advertising influences the volume of sales to any great extent. Introduction of an adjustment for seasonal effects confirms the existence of slight quarterly variations in consumption and also

raises the significance levels of the own price coefficients.

Further gains in the absolute value of own price elasticity and in its significance are achieved when adjustments are made for quality variation.

The signs of the regression coefficients are as expected except for margarine price in trials 1 and 2 and for TV advertising in trial 6 Table 22 page 163. The income coefficient turns out to be positive as with previous results.

Table 22 .: Regression analysis for advertising variable 1960 (1st quarter) 1974 (4th Quarter)
 N.B. All equations in double log form

Quantity of margarine consumed					
INDEPENDENT VARIABLES	COEFFICIENT	t-statistic	R ²	dW	F-statistic
1. Constant term	-6.88	-3.86			
Butter price	0.52	5.91			
Margarine price	0.20	1.29	0.66	0.83	20.56
Consumer expenditure	0.24	1.66			
Total advertising - Margarine	0.10	2.11			
Total advertising - Butter	-0.03	-1.19			
2. Constant term	-3.59	-2.32			
Butter price	0.30	3.77			
Margarine price	0.04	0.30	0.77	2.10	28.45
Consumer expenditure	0.14	1.19			
Total advertising - Margarine	0.06	1.78			
Total advertising - Butter	-0.02	-0.98			
Quantity (t-1)	0.50	5.61			
3. Constant term	-3.79	-2.16			
Butter price	0.36	2.50			
Butter price (t-1)	-0.13	-0.75			
Margarine price	-0.34	-0.98	0.78	2.18	18.81
Margarine price (t-1)	0.46	1.17			
Consumer expenditure	0.33	0.57			
Consumer expenditure (t-1)	-0.18	-0.30			
Total Advertising - Margarine	0.08	1.94			
Total Advertising - Butter	-0.03	-1.11			
Quantity (t-1)	0.52	4.52			

4. Constant term	-1.91	-1.20			
Butter price	0.50	3.72			
Butter price (t-1)	-0.26	-1.72			
Margarine price	-0.66	-2.07			
Margarine price (t-1)	0.64	1.81			
Consumer expenditure	0.51	0.98			
Consumer expenditure (t-1)	-0.35	-0.65			
Total Advertising - Margarine	0.008	0.21	0.84	2.27	20.37
Total Advertising - Butter	-0.04	-1.67			
Quantity (t-1)	0.67	6.26			
D-2	0.02	0.95			
D-3	-0.04	-2.17			
D-4	0.05	2.56			
5. Constant term	-3.48	-2.03			
Butter price	0.57	4.18			
Butter price (t-1)	-0.33	-2.19			
Constant quality price	-0.79	-2.41			
Constant quality price (t-1)	0.88	2.28			
Quality variable	-0.23	-0.63			
Quality variable (t-1)	0.79	2.04			
Consumer expenditure	0.34	0.66	0.86	2.32	18.80
Consumer expenditure (t-1)	-0.04	-0.07			
Total Advertising - Margarine	0.01	0.34			
Total Advertising - Butter	-0.03	-1.25			
Quantity (t-1)	0.62	5.60			
D-2	0.01	0.74			
D-3	-0.04	-2.14			
D-4	0.04	2.15			
6. Constant term	-0.61	-0.51			
Butter price	0.46	3.29			
Butter price (t-1)	-0.24	-1.42			
Constant quality price	-0.84	-2.57			
Constant quality price (t-1)	0.76	2.04			
Quality variable	-0.30	-0.76			
Quality variable (t-1)	0.41	1.09			
Margarine-Press Advert.	0.01	0.84	0.85	2.42	17.98
Butter-Press Advertising	-0.03	-2.28			
Margarine - TV Advert.	-0.003	-0.08			
Butter - TV Advertising	0.002	0.10			
Quantity (t-1)	0.64	5.53			
D-2	0.02	0.98			
D-3	-0.03	-1.27			
D-4	0.05	2.48			

3.3 Margarine demand in the absence of soft qualities of margarine

It was noted when consulting Shaw's Price Guide that brands of soft margarine were not quoted before 1969. The assumption was made that soft varieties of margarine were not influencing national demand before 1969. Flora for example was first quoted in December 1968, and Soft Blue Band was first quoted in April of the following year. By June 1973 soft varieties such as Stork and Summer County were being supplied by Unilever, and by other manufacturers, Kraft in particular. The WHICH Report to which reference has been made earlier (page 135) lists fourteen varieties of soft margarine in 1973.⁸² The development of soft/luxury margarines was reported to be leading to some recovery in sales by 1970.⁸³

Therefore the approach developed in paragraph 3.2 was repeated for a restricted series of quarterly data which ran from 1960 (1st quarter) to 1968 (4th quarter), thus covering a period during which soft margarine was not available nationally and during which whale oil virtually disappeared and the use of soy bean oil increased. There is a further consideration which is now discussed.

In considering the problem of advertising rates Cowling⁸⁴ and others assumed total sales to be a function of some real measure of advertising called 'advertising pressure' which in turn is assumed to be a function of 'messages' conveyed by the media. Messages are defined as the exposure of one reader to a single column inch of newspaper advertising, and for TV this becomes the exposure to one thirty second advertisement spot. By assuming cost minimising behaviour on the part of advertisers, a programming solution is achieved in which the advertising variable in regression analysis is measured by dividing total advertising by the cost per reader of a single column inch of news-

paper advertising, and TV messages are turned into press equivalents by weighting TV expenditure by the ratio of cost per viewer of a thirty second spot to the cost per reader of a single column inch. The method ignores discounts and premiums in the basic rates, for which data is not available.

A quarterly series for press advertising rates based on this method is used in conjunction with the AA series of press rates discussed earlier on page 131. The method entails deflating the press advertising expenditure for each commodity by the 'McGuinness' quarterly series for press rates,⁸⁵ and then calculating a variable for total advertising for each commodity by adding this deflated press series to the quarterly series for TV advertising expenditure deflated by the AA rate for TV advertising.

In this section two methods of estimating total advertising variables (i.e. the above vs that used in the results of Table 22 page 162) are compared in estimating a quality adjusted demand function for margarine over the shorter time period 1960-1968, in which total advertising was assumed to be the only variable to have a dynamic effect on sales.

The results presented in Table 23 differ in several respects from the results previously quoted. Noting that trial 1 reports the result when press advertising is deflated by the 'McGuinness' quarterly series for press rates, in outline the differences appear to be:

- i) the constant term is no longer significant suggesting the absence of a time trend over the shorter period,
- ii) butter price drops in significance,
- iii) the margarine price variable rises from previously estimated values of about -0.8 to about -1.5 suggesting a much higher own price elasticity of demand for current period

- price,
- iv) the quality variable achieves a higher level of significance,
 - v) both the advertising variables are poorly determined, that for the Butter coefficient, having an incorrect sign,
 - vi) the coefficient on the lagged quantity variable is no longer significant,
 - vii) the seasonal dummies are poorly determined,
 - viii) the Durbin Watson statistic is well clear of the inconclusive regions of positive and negative auto regression.

Table 23 : Regression results in the absence of soft margarine 1960 (1st Quarter) - 1968 (4th Quarter)

N.B. All equations in double log form

Quantity of Margarine Consumed					
DEPENDENT VARIABLE	COEFFICIENT	t-statistic	R ²	dW	F-statistic
1. Constant term	1.02	0.57			
Butter price	0.49	2.07			
Butter price (t-1)	0.26	1.15			
Constant quality price	-1.50	-2.65			
Constant quality price (t-1)	0.73	1.38			
Quality variable	-1.14	-1.61			
Quality variable (t-1)	-0.09	-0.12			
Disposable Income	0.09	0.19	0.87	2.12	9.92
Disposable Income (t-1)	-0.96	-2.59			
Total Advertising - Margarine	-0.004	-0.14			
Total Advertising - Butter	0.02	0.42			
Quantity (t-1)	0.14	0.67			
D-2	-0.02	-0.51			
D-3	-0.04	-1.51			
D-4	0.02	0.55			

2. Constant term	0.99	0.57			
Butter price	0.42	1.83			
Butter price (t-1)	0.28	1.10			
Constant quality price	-1.42	-2.65			
Constant quality price (t-1)	0.70	1.28			
Quality variable	-1.06	-1.54			
Quality variable (t-1)	-0.10	-0.14			
Disposable Income	0.17	0.39	0.87	2.17	9.84
Disposable Income (t-1)	-0.98	-2.48			
Total Advertising - Margarine	0.007	0.10			
Total Advertising - Butter	0.01	0.22			
Quantity (t-1)	0.18	0.97			
D-2	-0.009	-0.31			
D-3	-0.03	-0.97			
D-4	0.02	0.81			

3.4 Margarine demand and soft margarine

Tests are now discussed which attempt to deal with the effect of the introduction of soft margarine in the post 1968 period. An obvious way of doing this is to distinguish the two sub periods 1960-1968 1969-1974 by introducing the additional binary variable that takes a value zero for the earlier period, and unity subsequently, when soft grades of margarine become available nationally. If instantaneous adjustment to the innovation is assumed the two periods can be distinguished by the following three approaches: all in Logarithmic form

$$i) \quad Q_{m,t} = a_0 + \sum a_i X_i + b_1 Z_t \quad (XXIIIa)$$

where $a_i X_i$ is a collection of explanatory variables, and Z_t takes a value 0 for the pre 1969 period, and the value 1 for the 1969-1976 period.

$$ii) \quad Q_{m,t} = a_0 + \sum a_i X_i + b_2 (p_{m,t} Z_t) \quad (XXIIIb)$$

where $p_{m,t} Z_t$ is an interaction term between margarine price and the soft margarine dummy, and

$$\frac{\partial \ln Q_m}{\partial \ln p_m} = a_1 + b_2 \quad \text{for the 1969-1974 period,}$$

a_1 is the regression coefficient of p_m , and is an estimate of

own-price elasticity in double log estimation for the 1960-68 period.

$$\text{iii) } Q_{m,t} = f(b_1 Z_t; p_{m,t} Z_t) \quad (\text{XXIIc})$$

where

both the dummy Z_t and the interaction term are included.

All three of these variations have been tested in the absence of seasonal dummies as an extension of trial 2 Table 22 with generally disappointing results. The coefficients are poorly determined, particularly in the case of the own-price coefficient which is not noticeably improved by quality adjustment, and turns out to be positively signed contrary to expectation. In some cases the effect of Z_t is to give the income variable a negative sign.

The co-efficient on total margarine advertising appears significant or nearly significant in respect of its t-test when seasonal correction is absent.

Seasonal dummies added to trial 3 Table 22 improved the R^2 value and produced improvements in the t-statistics for the coefficients on own-price and income variables. The third and fourth quarters appear to be significant, see trial 1 Table 24 page 170.

Including the additional dummy variable Z_t as in XXIIa marginally raises the R^2 value, However the coefficients on variables remain poorly determined and the t-statistic for the coefficient on total margarine advertising becomes much smaller; an effect of seasonal variables which has been noted already. Z_t is significant.

Precautionary trials on the data for 1969-1974, which repeat the general approach of the last paragraph in the absence of Z_t , produce higher values for the R^2 statistic and coefficients which are more reasonable in sign and value, and which are better determined, see trial 2 Table 24 page 170. The dW-statistic remains

disappointingly in the inconclusive region with regard to positive autoregression. The value of dW is higher when margarine price remains unadjusted for quality variation, and as it is observed that own-price coefficients are unaltered by quality adjustment we only present the result in which average margarine price is not adjusted for quality change.

A 'Koyck' version of this formulation of the estimating relationship generates coefficients which have low values in respect of their t-statistic in overall comparison to the version where total advertising is measured in current expenditure terms (deflated by advertising rates). In neither version, i.e. when advertising is treated as a stock variable or in current expenditure terms do the advertising variables turn out to be significant.

It is noted in the twenty four quarter series covering 1969-1974, that it is the third quarter which appears to be the significant seasonal variable.

Treating consumer expenditure (the income variable) as the only regressor to have a dynamic effect on sales, we can employ the method already used to introduce advertising as a stock variable (see equations XIV XV Page 130 and allow for a build up in the effect on income on demand by estimating:

$$\begin{aligned} \ln Q_{m,t} = & a_0 + a_1 \ln Y_t + a_2 \ln p_{m,t} - u a_2 \ln p_{m,t-1} \\ & + a_3 \ln p_{b,t} - u a_3 \ln p_{b,t-1} + u \ln Q_{m,t-1} \\ & + a_4 D_2 + a_5 D_3 + a_6 D_4 \end{aligned} \quad (XXIV)$$

The result of trials based on XXIV is that the coefficient on price retains its value (-0.33) but becomes insignificant in terms of its t-statistic. The consumer expenditure term becomes

significant, and whilst the R^2 value remains at 0.97 the dW-Statistic improves to achieve a value that suggests the absence of autoregression (see trial 3 Table 24 below).

Table 24 : Regression results for the period in which soft margarine has been available 1969 (1st quarter) - 1974 (4th quarter)

N.B. All equations in double log form

Quantity of margarine consumed					
INDEPENDENT VARIABLE	COEFFICIENT	t-STATISTIC	R^2	dW	F-STATISTIC
1. Constant term	-1.91	-1.20			
Butter price	0.50	3.72			
Butter price (t-1)	-0.26	-1.72			
Margarine price	-0.66	-2.07			
Margarine price (t-1)	0.64	1.81			
Consumer Expenditure	0.51	0.98			
Consumer Expenditure (t-1)	-0.35	-0.65	0.84	2.27	20.37
Total advertising - margarine	0.008	0.21			(12,46)
Total advertising - butter	-0.04	-1.67			
Quantity (t-1)	0.67	6.26			
D-2	0.02	0.95			
D-3	-0.04	-2.17			
D-4	0.05	2.55			
2. Constant term	-3.89	-2.98			
Butter price	0.58	7.28			
Margarine price	-0.34	-2.29			
Consumer expenditure	0.53	2.48			
Total advertising - margarine	0.02	0.37	0.96	1.85	38.47
Total advertising - butter	-0.04	-1.65			(9,14)
Quantity (t-1)	0.29	2.29			
D-2	0.01	0.49			
D-3	0.05	-2.58			
D-4	0.02	1.02			
3. Constant term	-4.49	-2.09			
Butter price	0.80	4.64			
Butter price (t-1)	-0.36	-1.18			
Constant quality price	-0.33	-0.90			
Constant quality price (t-1)	-0.02	-0.05			
Quality variable	0.16	0.41	0.97	2.14	30.49
Quality variable (t-1)	0.07	0.19			(11,12)
Consumer expenditure	0.82	2.57			
Quantity (t-1)	0.42	1.49			
D-2	0.01	0.55			
D-3	-0.04	-2.15			
D-4	0.02	0.80			

(N.B.; This reproduces trial 4 Table 22 page 163)

Noting in particular that the coefficient of the own price variable when estimated in its constant elasticity form is of the order of 0.35 in the soft margarine period (trials 2 and 3 Table 24) the relationship was re-estimated for the longest period for which data was available i.e. 1960-1976 (68 quarters); using advertising ratios of current expenditure which are not deflated as disaggregated data for media expenditure are not available in 1975-6, and allowing consumer expenditure as the only variable to have a 'build up' effect, the form given in XXIIb (page 167) yields:

$$\begin{aligned}
 \ln Q_m = & -2.43 + 0.54 \ln p_b - 0.24 \ln p_{b,t-1} - 0.48 \ln PR-C \\
 & (-1.55) \quad (4.17) \quad (-1.50) \quad (2.03) \\
 & + 0.49 \ln PR-C_{t-1} - 0.38 \ln QV + 0.59 \ln QV_{t-1} \\
 & (2.01) \quad (-1.07) \quad (1.59) \\
 & + 0.05 \ln CE + 0.007 \ln AR + 0.0009 \ln AR_{t-1} \\
 & (0.26) \quad (0.40) \quad (0.06) \\
 & + 0.59 \ln Q_{m,t-1} + 0.004 D_2 - 0.04 D_3 \\
 & (5.36) \quad (0.21)^2 \quad (-2.10)^3 \\
 & + 0.04 D_4 + 0.006 ITZ_t \\
 & (2.59)^4 \quad (1.51)
 \end{aligned}
 \tag{XXV}$$

$$R^2 \quad 0.85 \quad dW \quad 2.44 \quad F(14, 52) \quad 21.29$$

where

$PR-C$ is Stork margarine price deflated by the General Price Index

ITZ_t is an interaction term between $PR-C$ and Z_t

Z_t see page 167

Other variables as on page 157

4. Modification of the estimating relations

4.1 Using expenditure as the dependent variable

The use of a value as opposed to a volume measure of consumption is undertaken in view of the trading up issue previously discussed on pages 56-61, and also to confirm the inelastic results for market demand. Coefficients turn out to be better determined and increased values for R^2 are obtained. Relatively higher values for the dW and F statistics give cause for disquiet on the grounds of negative autoregression and multicollinearity. The coefficient of own price is positive, confirming short run inelasticity.

As was previously the case the introduction of dummy variables for seasons suggested that advertising is without significance, whether estimated as a stock variable, or in terms of current expenditure.

The dynamic form including lagged expenditure as an independent variable improves the dW statistic as expected. One such result is given below, all variables are estimated in log form:

$$\begin{aligned}
 E_m &= 0.35 P_b + 0.70 P_m - 0.005 ITP_m + 0.51 CE \\
 &\quad (4.46) \quad (4.69) \quad (-1.34) \quad (1.08) \\
 &+ 0.07 A_m - 0.03 A_b + 0.37 E_{m,t-1} + 0.09 Z_t \\
 &\quad (1.81) \quad (-1.23) \quad (3.86) \quad (3.13) \\
 &- 8.60 \\
 &\quad (-3.14)
 \end{aligned}
 \tag{XXVIa}$$

$$R^2 = 0.89 \quad dW = 2.15 \quad F(8,50) = 54.94$$

where

- E_m is current margarine expenditure deflated by the General Price Index,
- P_b is average butter price deflated by the General Price Index,
- P_m is average margarine price deflated by the General Price Index,
- CE is real per capita consumer expenditure at 1970 prices,

A_m, A_t are total current media expenditures deflated by the AA indexes of advertising rates,

$E_{m,t-1}$ is margarine expenditure in the last quarter,

ITp_m is an interaction term between p_m and time in quarterly periods

Z_t see page 167

4.2 Two Stage Least Squares

It was assumed that quantity and total margarine media advertising expenditure are simultaneously determined in the period 1969-1974. The predetermined variables are butter price, margarine price, total butter media advertising expenditure, consumer expenditure and the margarine quantity consumed in the previous quarter. The results are as follows:

Demand equation

$$\ln Q_m = -4.37 + 0.60 \ln p_b - 0.38 \ln p_m + 0.70 \ln CE$$

(-2.40) (5.56) (-1.86)_m (2.66)

$$-0.03 \ln A_m + 0.23 \ln Q_{m,t-1}$$

(-0.49) (1.42)

(XXVIb)

Advertising appropriation

$$\ln A_m = 20.02 - 1.20 \ln p_b - 0.60 \ln p_m + 0.43 \ln A_b$$

(3.41) (-1.50) (-0.95) (4.20)

$$+ 2.55 \ln Q_m - 0.24 \ln Q_{m,t-1}$$

(1.53) (-0.25)

(XXVIc)

The results are as expected from OLS estimations. The low value for the t-statistic for the coefficient on current and previous quantity in the advertising equation may be explained by their high standard errors.

Re-estimating for 1960-1974 and including the seasonal dummies and the soft margarine dummy with the predetermined variables

gives the following result:

Demand Equation

$$\begin{aligned}
 \ln Q_m &= 0.46 + 0.54 \ln p_b - 0.29 \ln p_m \\
 &\quad (0.20) \quad (3.55) \quad (-1.39) \\
 &+ 0.06 \ln CE - 0.20 \ln A_m \\
 &\quad (0.30) \quad (-1.46) \\
 &+ 0.67 \ln Q_{m,t-1} + 0.02 D_2 - 0.07 D_3 \\
 &\quad (5.54) \quad (0.78) \quad (-1.95) \\
 &+ 0.06 D_4 + 0.05 Z_t \\
 &\quad (2.41) \quad (2.02)
 \end{aligned}
 \tag{XXVIId}$$

Advertising Appropriation (standard errors in parenthesis)

$$\begin{aligned}
 \ln A_m &= -1.18 + 4.14 \ln p_b - 1.93 \ln p_m \\
 &\quad (25.86) \quad (5.98) \quad (1.81) \\
 &- 0.13 \ln A_b - 8.50 \ln Q_m \\
 &\quad (-0.58) \quad (14.40) \\
 &+ 5.25 \ln Q_{m,t-1} + 0.15 D_2 - 0.46 D_3 \\
 &\quad (8.05) \quad (0.33) \quad (0.50) \\
 &+ 0.45 D_4 + 0.48 Z_t \\
 &\quad (0.67) \quad (0.75)
 \end{aligned}
 \tag{XXVIe}$$

4.3 The method of first differences

In order to reduce the effect of multicollinearity trial 1 Table 22 page 162 was estimated in first differences using a log form. The two income series were compared, and average margarine price was replaced by quality adjusted price and the quality variable for the 1960-1974 period:

i) 1960-1974

$$\begin{aligned}
 \Delta \ln Q_m &= -0.0007 + 0.51 \Delta \ln p_b - 0.59 \Delta \ln P_{R-C} - 0.01 \Delta \ln QV \\
 &\quad (0.08) \quad (3.64) \quad (-1.80) \quad (-0.03) \\
 &+ 0.06 \Delta \ln A_m + 0.003 \Delta \ln A_b \\
 &\quad (2.14) \quad (0.14) \\
 &+ 0.12 \Delta \ln CE \\
 &\quad (0.20)
 \end{aligned}
 \tag{XXVIIIf}$$

$$R^2 = 0.36 \quad dW = 2.79 \quad F(6, 52) \quad 4.88$$

The sign on $\ln A_b$ is contrary to expectation.

Using the longest period for which data is available, which means that advertising is introduced in the form of ratio term (as for example in XXV page 171), the introduction of the Z_t term as a binary variable to distinguish the soft margarine period (1969-1976), and dropping the income term yields the following result:

1960-1976

$$\begin{aligned} \Delta \ln Q_m = & -0.004 + 0.58 \Delta \ln p_b - 0.32 \Delta \ln p_m - 0.002 \Delta \ln AR \\ & (-0.41) \quad (4.29) \quad (-1.19) \quad (-0.16) \\ & + 0.008 Z_t \\ & (0.52) \end{aligned} \quad (XXVIg)$$

$$R^2 \quad 0.24 \quad dW \quad 2.91 \quad F(4, 62) \quad 4.98$$

Whilst the advertising term becomes significant in equation XXVIg, contrary to some earlier results, the results otherwise add nothing to our earlier trials, and surprisingly in XXVIg suggest the introduction of soft margarine is not significant. Similar results are obtained by including an interaction term between p_m and time in the estimating relation (XXVIg), when the advertising term becomes perverse and non-significant.

Conclusions

It is possible to argue that the simultaneity problem does not exist in relation to advertising and aggregate market demand. It is conceivable that the margarine industry does not set the aggregate advertising appropriation in terms of some relationship with sales, or in relation to butter advertising. For example the significance of the butter advertising term in equation XXVIc, and its non-significance and reversal of sign in XXVIe illustrate the difficulties.

Assuming advertising and quantity are simultaneously determined, Two Stage Least Squares estimation of the constant elasticity equation in its dynamic form (XXVI d) which includes seasonal dummies and which treats the soft margarine innovation in the manner of equation XXIIIa , generates own-price coefficients of about -0.29 on margarine price, compared to -0.32 by the method of first differences (equation XXVIg) which allows for soft margarine by a dummy variable, according to the method of equation XXIIIa . The low values of the coefficient on advertising (0.01), previously noted in Koyck plus seasonal Dummies estimation (page 163: trials, 4-6) we conclude are biased downward by reference to the advertising appropriation equation (XXVIe) where a negative relationship is observed between margarine advertising and current period quantity. Thus Two Stage Least Squares estimation of the demand relationship (XXVI d) raises the coefficient of margarine advertising to a value of 0.2.

Thus we may add two points to our previous 'general' conclusions of page 161 above:

- i) allowing for simultaneity between advertising and quantity consumed raises the value of the advertising coefficient, and lowers the coefficient on own price,
 - ii) allowing for soft margarine innovation generates lower coefficients on own-price, with some indication that quality adjustment may marginally raise the value of own-price elasticity.
- The advertising terms in their disaggregated form sometimes suggest the coefficients on newspaper advertising are close to being significant, whilst the coefficients on TV advertising are poorly determined and may be negatively signed with respect to margarine advertising on TV. Given the evidence for margarine trading-up,⁸⁶ we would suggest this is not an unexpected result. Confirmation of this point may be sought by replacing the volume.

measure of consumption by a value measure. This is illustrated by the result of equation XXVIa.

As can be expected coefficients are better determined, and the margarine advertising is ^{nearly} significant, albeit with a low value for its coefficient which we anticipate because of simultaneity between advertising and consumption levels. The coefficient on own-price is invariably positively signed lending support to the conclusion that own-price elasticity is less than unity.

Briefly we attempted to estimate various 'Koyck' forms that allowed yellow fat prices, advertising and income to build up their effect on expenditure, and additionally considered the effect of lagged income on expenditure. Of these we consider the build up of fat prices and the effect of last period's income on current expenditure merit further examination.

As was anticipated at the outset there is a great deal of variation in the elasticity coefficients derived from estimation, depending on the form of the estimating relationship, the income series used, and between different time periods. In terms of data availability we were restricted to quarterly periods in the consideration of the adjustment process, This may be too long in that consumer adjustment should be examined in respect of shorter time periods of adjustment.

The effects of the UK quota system and of UK Government Consumer Subsidies have not been introduced as a separate issue, nor was the influence of health propaganda included. In the first case the Government Subsidy is captured in the average transactions price for butter, and in the second case it could not be expected that health propaganda is a serious factor before 1976 onwards,

which is too late to include in the data series available.

As a final point it is noted that in equation XXXVIa page 172 an interaction term between margarine price and time is included. Briefly this means the introduction of a price-time interaction term can allow price elasticity to vary over time.

Given that own-price elasticity falls linearly over time, and considering only quantity and price:

$$Q_m = p_m^{-(b_0 - b_1 t)} \quad ; t \text{ is time in quarterly periods}$$

$$\text{and} \quad \ln Q_m = -b_0 \ln p_m + b_1 t \ln p_m$$

Whilst the interaction term turns out to be non-significant in the case where expenditure on margarine is used as the dependent variable, this is not the case when quantity is used as the dependent variable. One such result is reported as equation XIII on page 195. This repeats trial 2 Table 23 (page 167) for the period 1960 - 1976 (which means that the ratio of margarine to butter advertising is used as the advertising variable); in the absence of quarterly dummies, and using the constant quality price series as the price term, the price-time interaction term regression coefficient is significant, with a positive sign as expected. Although the result suggests that the fall in value of own-price elasticity is small, nevertheless the significance of the result does suggest that the possibility of own-price elasticity falling over time can not be discounted.

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CHAPTER 5

THE DEGREE OF MONOPOLY IN THE MARGARINE INDUSTRY -
WITH REFERENCE TO STRUCTURE, ADVERTISING
AND INFLATIONARY PRESSURES

Introduction

In this chapter we attempt to examine the relationship between the change over time in advertising, concentration, and price cost margins; mainly with the purpose of considering whether policy should be 'redirected from intervention over the size-distribution of firms towards intervention over advertising', but also with the objective of considering whether market power makes a positive contribution to inflationary pressures. The approach adopted is to consider the advertising-concentration issue first, and the inflation issue second. We commence by a brief consideration of the literature, next turn to the structure-performance problem, and briefly discuss the price adjustment problem implicit in the inflation issue, before finally presenting our results.

Cowling¹ suggesting that profit, in the form of an analogue of the Lerner Index, is a convenient measure of performance, also points out that the structure-performance relation may be viewed as one equation within a recursive system.

This basic measure of profitability in assuming constant costs of production, generates the hypothesis that profits are positively related to concentration. Against this when scale economies are present, we have an alternative source of high price-cost margins which has to be reconciled with a greater degree of market power in the static situation. The arguments which support market power, by implication appear to justify a negative policy of non-intervention in situations where market power is associated with large scale economies, are seen to stem

from two view points (i) where it is argued that welfare loss from monopoly is small,² and (ii) where it is argued that the dynamic advantages of imperfect competition lay in the application of monopoly rents to innovation, to the increase of consumer choice, and to cost reduction.

It is not our purpose to undertake an exhaustive examination of the structure-performance literature at this point, however it is necessary to emphasise the relevance of papers by Stigler,³ Cowling-Watson,⁴ and Nickell-Metcalf⁵ to our discussion. In addition it is necessary to refer to the Herfindahl Index,⁶ that we intend to introduce as an additional component of structure-performance relations that allows monopoly power to be an increasing function of fewness of sellers, and of inequality in their size distribution.

Apart from the problem of performance, we are interested in the contribution of oligopolistic pricing policies to inflation and the relationship of price inflation to some measure of concentration.⁷ This point is developed independently in a paper by Domberger who attempts to 're-appraise the role of market power as a positive contributor to inflationary pressures'.⁸

In completing our brief list of antecedents we finally mention the Comanor-Wilson article^{9(a)} that:

"..... demonstrated a positive and significant relation between profit rate and the ratio of advertising to sales and at the same time the influence of concentration on profit rate was brought into question. The general conclusion was that advertising, via barrier creation, provided an important element in the evolution of market power and thus policy should be re-directed from intervention over the size-distribution of firms towards intervention over advertising."^{9(b)}

We now turn to a theoretical discussion leading up to the estimating relationships we shall use in our empirical work on the structure-performance issue, and follow this by a brief discussion of the price adjustment problem. Finally we shall conclude with our empirical results.

Monopoly power - the theoretical background

Microstatic analysis suggests that any industry pricing its product in excess of marginal cost is suspect in terms of allocative efficiency. This is particularly so when high advertising expenditures or pricing behaviour indicate that performance and conduct suggest that resources are not fully employed at the micro level.

According to the partial equilibrium (static) rules for maximum economic efficiency, all profit maximising enterprises should produce an output where $p = mr = mc = ac$ ($p =$ price ; $mr =$ marginal revenue; $mc =$ marginal cost; $ac =$ average cost), provided that the mc function has a positive slope, which implies the presence of diminishing returns. These conditions are only achievable under conditions of perfect competition, when the absolute value of the firm's price elasticity of demand is equal to infinity. Under conditions of imperfect competition, when the firm's price elasticity of demand has an absolute value which is less than infinity, in the absence of substitutes and given free entry the profit maximising enterprise produces an output where $p = ac > mr = mc$. These conditions imply that a 'capacity' problem exists in terms of allocative efficiency. Under similar conditions, when entry is blocked $p > ac$ if $mr = mc$, which implies an additional welfare problem in that monopoly rent is earned.

Arising from these general conditions the relation between p and mc has received particular attention. Firstly there is the argument that $p = mc$ maximises welfare;¹⁰ and secondly the difference between p and mc receives attention in empirical studies of the relationship between performance and structure in industrial studies.^{4, 5, 7}

The difference between p and mc can be used as the theoretical basis for examining the relationship between profitability and concentration. This is now developed.

In theory monopoly can be treated as a special market form in which, in the absence of substitutes entry is blocked. A determinate solution to the monopoly problem is obtained by assuming the firm maximises profits with respect to price, or volume or to some alternative market variable, notably advertising. Oligopoly is a milder form of the extreme case in which determinate solutions are obtainable by making arbitrary assumptions about the degree of collusion that exists, or about conjectural variations by rival firms.¹¹ Additionally, the static implications arising from the idea that volume increases in sales achieved by adjusting non-price determinants of sales can be obtained without price concessions have been given attention in the literature.¹²

Assuming the margarine industry is a monopoly, which implies the acceptance of the hypothesis that oligopoly producers collude to maximise joint profits (that is the combined profits of the entire set of producers in the industry are greatest when they act as a monopoly),¹³ the static solution to optimal behaviour is contained within the Lerner Index¹⁴ (L), which may be written as:

$$L = \frac{p - mc}{p} = \frac{1}{|e|} \quad (I)$$

where

e = industry price elasticity of demand

The implication of the relationship is that if values of L predicted by the index are achieved in practice then the maximum benefit of collusion is being obtained by the producers.

Briefly if sales volume rises by $e\%$ following a price reduction of 1% , then 1% additional sales volume will result from a price concession of

e^{-1} . The addition to revenue arising from such a concession is given by the expression : $p \left(1 - \frac{1}{e} \right)$; and the profit maximising monopoly will choose the output where this expression is equal to mc .

A point of difficulty is encountered in that where e has an absolute value less than unity then total revenue will fall (rise) as a result of ceteris paribus price reductions (increases) against the trend of the response of sales volume to price changes, given the usual inverse price relationship in demand ($e < 0$). In the situation where e is less than unity in absolute value, which our empirical results sometimes suggest for market demand for margarine produced in the United Kingdom, joint profit maximising behaviour would require the selection of an output where mc is negative^{11, 15} which is clearly impossible. We note in passing that most price elasticity estimates are biased in that they assume quality constant, an argument which is confirmed by our empirical results.

One way in which to avoid this problem is to argue that colluding firms ignore e altogether, and adopt a common gross profit margin policy whereby prices are equal to some standard mark up over cost. The temptation to follow such an approach is strong under the following conditions:

- (i) in the market situation where $ar_i > ac_i$ over a range of output, the firm has a potential to exercise a discretion to behave non-optimally. This is not the case when market behaviour results in an equilibrium tangency between ar_i and ac_i . Given the existence of discretion, behaviour might be reformulated as the maximisation of the net present value of future profits, or as a trade off between current profits as a source of future growth against the advantage of entry forestalling, and a higher current sales volume than current profit maximisation would allow;
- (ii) it would appear that imperfect competition is inevitable when scale economies are not exhausted by market demand, in other words when market saturation limits the opportunity for expansion of

capacity. Where firms wish to operate as near to capacity as possible in order to obtain a unit cost advantage, price will be lower than optimal provided a satisfactory margin is achieved. An extension of this problem exists in the situation where equalising marginal costs over several plants does not minimise cost for any plant. Depending on the arithmetic of the situation it might well be that the average output to maximise profits over n plants will be maintained but production will be concentrated into $n-\theta$ plants,¹⁶

- (iii) whilst maximum economic efficiency is achieved when each firm is constrained to build optimum scales of plants and to operate them at optimal rates, there is no automatic tendency for this to occur in oligopolistic market structures. Output depends on each firm's market share, or its predictions with regard to its revenues and costs. For static efficiency, a firm having chosen a long run rate of output, will adjust investment to achieve a scale where short run ac is tangent to the long run ac at the selected output. Coincidence of this point of tangency with any single scale optimum is unlikely,
- (iv) where technology is such that there is no output rate which is optimal, for example when the firm's planning curve is L shaped, or plant capacity is large in relation to the size of aggregate demand for the commodity, any attempt to restructure towards optimality in the least cost sense will add to scarcity and lead to a Paretian reduction in welfare. Thus disembodiment of large enterprise may lead away from productive efficiency.

The suggestions contained in the above points imply firms could ignore e in setting gross profit margins and set price by means of some cost plus behaviour.¹⁷ This would avoid the problems of assuming profit maximising behaviour when e is less than unity. However there is empirical evidence

that margins adjust to changing values of e which suggests that optimal behaviour is not entirely ruled out.

Returning to the degree of monopoly power: in his original paper Lerner³¹ suggested that the degree of monopoly power (L) could be predicted from e , which for optimal behaviour equals $|e|^{-1}$; it is noteworthy that Lerner also suggested:¹⁸

"the easiest way of finding the value of e was via the degree of monopoly."

In discussing the causes of failure to obtain the maximum monopoly revenue Lerner suggested that values of e which are lower than optimal according to the static prediction may arise for the following causes: unintentionally, because the monopolist does not know the value of e for the product, or intentionally for reasons which Lerner called philanthropic. Intentionally may also include other pragmatic objectives such as the avoidance of political opposition, or the prevention of entry by other firms.

To the foregoing we could add other causes, including other forms of discretionary behaviour and the effect of exogenous events for example government policy changes which influence the price of substitutes in consumption. With regard to the problem of substitutes Lerner made the following observation:¹⁹

"..... control by a single firm of 100 per cent of the supply of a commodity for which the demand is infinitely elastic (which will always be the case if there is some equally satisfactory substitute available at a constant price) is absolutely unimportant and has no economic significance, while a 'partial' monopoly of a commodity for which the demand is inelastic may be able to raise price by reducing output and is clearly a much more effective case of monopoly."

Finally we recognise the basic relationship for L may be incorrectly specified because naive joint profit maximisation fails to allow for the reaction between producers where the oligopoly model is based for example on a Cournot type solution, and more sophisticated versions of the L

relationship emerge when conjectural variations are no longer set at zero,

Models of oligopoly to allow for this last problem have been developed which include a concentration term.^{3,4,5,7} Here the L term of the Lerner Index is replaced by L* a ratio which measures at constant marginal cost, the ratio of industry profits to total industry sales. At equilibrium output L* is equal to a concentration weighted inverse function of industry price elasticity, provided market shares and relative price changes are constant between firms.

Thus whilst:

$$L = (p - mc)/p = -e^{-1}$$

the new term L* is given by versions of the following relationship,

where $atc = mc$:

$$L^* = \frac{\text{sum of individual producers profit}}{\text{industry sales revenue}} = \frac{H}{|e|} \quad (\text{II})$$

where

conjectural variations are zero

H = Herfindahl index of concentration.

$$\text{and } L^* = \frac{H}{|e|} \frac{dQ}{dQ_i} \quad (\text{III})$$

when

conjectural variations are included, we note $\frac{dQ}{dQ_i} \neq 1$ and

$$\frac{dQ}{dQ_i} = \left(1 + \sum_{j \neq i} \frac{dQ_j}{dQ_i} \right)$$

Q is total quantity, the subscripts indicating the i'th j'th firm.

In addition to studying the influence of concentration on profit-sales ratios, some workers have extended the investigation of structure-performance in the direction of considering the influence of advertising on price-cost margins, and it has been suggested that the role of concentration may have been over-emphasised.⁹ We

observe that competition policy documents tend to veer away from the problem of advertising as a barrier to entry.²⁰

This completes the section on general theory. We now turn to the problem of the general relationship between profit ratios, the brand-structure of the margarine industry, and advertising to sales revenue.

The use of brand share in the concentration term which we shall propose, as opposed to the more conventional firms share of the market, is based on the following reasons. First there are many more brands than firms. Second firms share can only be identified by aggregating brand share. Third brand share data is more or less readily available from consumer panel audits. Fourth, and finally, we assume that there is competition between brands for a share of firms' revenues, as well as for market share.

Price cost margins for margarine brands

Writing Q_i for the demand for the i 'th brand, and Q_R for the balance of demand, total demand over all brands Q_T is assumed to follow a conventional inverse law relationship:

$$Q_T = f(p, Z) \quad (IV)$$

where

p is the market share weighted average of brand prices,

Z is a vector of shift variables influencing Q_T .

Thus in unit time,

$$Q_i = f(p, Z) - Q_R \quad (V)$$

and the i 'th brand's profit function is the identity

$$\pi_i = p_i Q_i - C_i(Q_i) - A_i \quad (VI)$$

where : for the i 'th brand

π_i is profit in the current period,

p_i is unit price, $\partial Q_i / \partial p_i < 0$,

$C_i(Q_i)$ is the cost function,

A_i is current period advertising expenditure.

Writing mc_i (marginal cost) for dC_i/dQ_i , and assuming $\partial Z/\partial p_i = \partial Q_R/\partial p_i = 0$, we obtain the following optimal (profit maximising) result for brand i :

$$\frac{\partial \pi_i}{\partial p_i} = Q_i + (p_i - mc_i) \frac{\partial f}{\partial p} \cdot \frac{dp}{dp_i} = 0 \quad (\text{VII})$$

After multiplication and division of the margin term $(p_i - mc_i)$ by p , and division throughout by Q_T , subsequent rearrangement of VII yields:

$$\frac{(p_i - mc_i)}{p} \cdot \frac{\partial f}{\partial p} \cdot \frac{p}{Q_T} \cdot \frac{dp}{dp_i} + \frac{Q_i}{Q_T} = 0 \quad (\text{VIII})$$

In a Lerner format this becomes:

$$\frac{p_i - mc_i}{p} = - \frac{Q_i}{Q_T} \cdot \frac{1}{e_I} \cdot \frac{dp_i}{dp} \quad (\text{IX})$$

and obviously

$$\frac{Q_i (p_i - mc_i)}{p Q_T} = \frac{Q_i^2}{Q_T^2} \cdot \frac{1}{|e_I|} \cdot \frac{dp_i}{dp} \quad (\text{X})$$

where

e_I is market price elasticity of demand, and the left hand term is the ratio of brand i 's profit margin to industry sales.

Considering the extreme right hand term (dp/dp_i) and writing s_i for Q_i/Q_T etc, in its inverse form dp/dp_i becomes:

$$dp/dp_i = (s_i dp_i + \sum_{i \neq j} s_j dp_j) \div dp_i \quad (\text{Xa})$$

assuming that relative price changes are matched by parallel pricing

$dp_j = (p_j/p_i) dp_i$, and Xa becomes:

$$dp/dp_i = s_i + \sum_{i \neq j} s_j p_j p_i^{-1} \quad (\text{Xb})$$

$$= (s_i p_i + \sum_{i \neq j} s_j p_j) \div p_i \quad (\text{Xc})$$

$$= p/p_i \quad (\text{Xd})$$

substituting Xd in X in its final form the first order profit maximising relation becomes:

$$\frac{Q_i (p_i - mc_i)}{p Q_T} = \frac{Q_i^2}{Q_T^2} \cdot \frac{1}{|e|} \cdot \frac{p_i}{p} \quad (\text{XI})$$

The equation now implies (ceteris paribus) that the ratio of the i'th brands profit to the total industry revenue will rise, if any of the following events take place:

- i) an increase in market share for the i'th brand,
- ii) a reduction in the absolute value of industry price elasticity of demand,
- iii) any increase in the i'th brand's price differential over the market share weighted average price for all brands.

The influence of concentration on all brands' profits can be specified by summing over brands, when:

$$\sum_i Q_i \frac{(p_i - mc_i)}{pQ_T} = \frac{1}{|e_I|} \sum_i \frac{p_i}{p} \cdot \left(\frac{Q_i}{Q_T}\right)^2 \quad (\text{XII})$$

The margin relationship above is now in a form which is suitable for regression analysis, but it needs further treatment to include the effect of the ratio of advertising to sales revenue on profit rate.

In view of Unilever's trading up activity, and given it is not unreasonable to assume that as part of their discretionary behaviour, the propensity to advertise is strong amongst Unilever executives, on intuitive grounds there exists a strong temptation to include an advertising variable in equation XII.

Despite the failure of our demand estimates to confirm that advertising influences aggregate market demand in any clear cut fashion, there is some evidence in support of the idea that demand price elasticity may have altered over time, particularly in respect of the soft margarine innovation, and that there may be some influence on own-price elasticity due to advertising. For example one estimate shows for 1960-1976 (68 quarters): (explanatory variables are defined on page 171; and IT PR-C represents an interaction term between PR-C and time).

$$\begin{aligned}
 \ln Q_m &= 0.55 \ln p_b - 0.15 \ln p_{b,t-1} - 1.76 \ln PR-C + 1.76 \ln PR-C_{t-1} \\
 &\quad (3.52) \quad (-0.86) \quad (-2.34) \quad (2.35) \\
 &- 0.33 \ln QV + 0.50 \ln QV_{t-1} + 0.03 \ln CE + 0.22 \ln CE_{t-1} \\
 &\quad (-0.85) \quad (1.16) \quad (0.05) \quad (0.34) \\
 &+ 0.014 \ln AR + 0.46 \ln Q_{m,t-1} + 0.065 Z_t \\
 &\quad (0.78) \quad (3.75) \quad (1.84) \\
 &+ 0.026 IT PR-C - 0.026 IT PR-C_{t-1} - 4.06 \\
 &\quad (2.02) \quad (-2.03) \quad (-1.55)
 \end{aligned} \tag{XIII}$$

$$R^2 = 0.80 \quad dW = 2.22 \quad F(13,53) = 16.60$$

Noting the high value (>1) for the coefficient on the margarine price term in XIII, and also noting the significance of the coefficient of the price-time interaction term, we could argue that:

$$|e_I| = f(A/R)^{-1} \tag{XIV}$$

which may be used to replace e_I in XII as follows:

$$\sum_i \frac{Q_i (p_i - mc_i)}{PQ_T} = \frac{A}{R} \sum_i \frac{p_i}{P} \cdot \left(\frac{Q_i}{Q_T} \right)^2 \tag{XV}$$

Following a suggestion made by Cowling-Watson²¹ the estimating relation may be reformulated in a dynamic format, in which θ periods are allowed for changes in the advertising and concentration terms to effect an equilibrium in the price-cost margin dependent variable, and in which changes over time are considered as a ratio of current to previous period equations, thus

$$\frac{\sum_{i,t} \frac{Q_i (p_i - mc_i)}{PQ_{T,t}}}{\sum_{i,t-1} \frac{Q_i (p_i - mc_i)}{PQ_{T,t-1}}} = \frac{\frac{A}{R_{t-\theta}} \sum_{i,t-\theta} \frac{p_i}{P} \cdot \left(\frac{Q_i}{Q_T} \right)^2}{\frac{A}{R_{t-\theta-1}} \sum_{i,t-\theta-1} \frac{p_i}{P} \cdot \left(\frac{Q_i}{Q_T} \right)^2} \tag{XVI}$$

represents a final form of the margin relationship we shall attempt to estimate. The results will be reported in the data review at the end of this chapter.

Price Adjustment

We next turn to a brief discussion of the price adjustment problem.

To some degree this represents an extension of the previous results of equation XVIII and Table 13, given on pages 135-137 which tend to support the view that input costs rather than advertising expenditure determine average margarine price. The treatment of the next section is based largely on a paper by Domberger⁸, who is estimating price adjustment relations, compared industries having different levels of concentration, in an attempt to examine the impact of structure on inflation. In his conclusions Domberger states:²²

"The important policy implication to be derived from this analysis is that market power can contribute to inflation through the speed with which cost changes are passed on, and that the link between market power and inflation is worthy of further research."

In our case we shall attempt to consider the issue of the speed of price adjustment to cost changes in the margarine industry, and also introduce butter price and advertising appropriations as regressors in the price adjustment equation.

Changes in cost and changes in demand will be examined in relation to their influence on price movements in the margarine market. In the situation of the margarine enterprise we assume that changes in cost and changes in demand are independent. It would seem most unlikely that expansion of output at the micro level will generate price increases in the labour input; or indeed in the price of the edible oil input utilised in margarine manufacture, a price which is taken to be exogenously determined on the world markets. It is further assumed that the adjustment of price in response to changes in input cost and demand varies for reasons of uncertainty, and that the level of uncertainty will be lower for changes in input costs, as compared to changes in demand, and lowest when we assume cost functions to be linear.

With regard to this last point we did not succeed in an attempt to

estimate a cost function by means of either statistical analysis of historical costs, or by the engineering cost approach. The firms we approached in margarine production, with a request for either time series or cross section data on historical accounting costs, were unable to release any accounting data for reasons of confidentiality. The engineering cost data we have been able to obtain is minimal. However, at various points in our discussions, we obtained some unofficial support for the idea that, in continuous processing plants, the production costs for margarine may be considered to be linear.

An examination of Production Census reports (MLH 219(1) 1968), looking for evidence for the existence of optimum scale in terms of the survivor principle,²³ is of little help. Not only have size classifications changed over time, but compound fat and margarine production are merged in the same minimum list heading.

Following Domberger's approach to price-cost adjustment we can write our basic specification as:

$$P_i = f(C_i, Q_i, P_b) \tag{XVII}$$

where

dP_i, dC_i, dQ_i are price, cost and demand adjustments for margarine, for the i 'th firm,

dP_b is the exogenous change in the price of butter the main substitute.

and the main hypotheses are:

$$\frac{\partial P_i}{\partial C_i} = a_1 \quad \begin{cases} e = \infty, a_1 = 0 \\ e = 0, a_1 = 1 \end{cases}$$

$\frac{\partial P_i}{\partial Q_i} = 0,$ assuming 'producers make price decisions first, and observe market response before contemplating output adjustment',²⁴

$\frac{\partial P_i}{\partial P_b} > 0$, in the situation where downward pressure on margarine price is eased by butter price increases.

In the event that uncertainty or pessimism about rivals reactions is not a barrier to upward price movements, ie in the absence of a 'kinked demand curve' situation, in an oligopoly situation it is predicted that price adjustments to input cost increases will take place more readily (that is the lag of adjustment will be lowest) in high concentration situations. The main alternatives available to upward price adjustment in defence of price-cost margins, lie in the direction of cost reducing quality adjustments eg by altering product specification as part of a unit-cost reducing exercise, or by means of technical innovation. Because continuous quality adjustment is implicit in the changes in raw material utilisation in margarine production, we neglect the problem of quality adjustment for our present purposes as these are picked up as raw material cost changes.

In relation to the demand variable it could be suggested that consumer response to quality change will lead to a further source of uncertainty in the relationship between price adjustment and demand change.

The estimating relationships are based on the assumption of a Nerlove adjustment²⁵ in the pricing process whereby:

$$P_{i,t} - P_{i,t-1} = \lambda(P - P_{i,t-1}) \quad (\text{XVIII})$$

where

P is the desired price in relation to current expectations,

$\lambda < 0 < 1$ is the coefficient of expectations or adjustment.²⁶

By rearrangement and substitution for P by equation (XVI) and dropping the i subscript, we obtain:

$$P_t = \lambda f(C, Q, P_b) + (1 - \lambda) P_{t-1} \quad (\text{XIX})$$

and finally for the industry:

$$\sum_i d P_{i,t} = \sum_i \{ (a_1 dC_j + a_2 dQ + a_3 dP_b)_i + (1 - \lambda) dP_{i,t-1} \} \quad (XX)$$

where we hypothesise:

$$a_1 = \frac{\partial P}{\partial C_j} > 0 \quad C_j = C_j \text{ (Raw material costs; labour costs)}$$

$$a_2 = \frac{\partial P}{\partial Q} = 0$$

$$a_3 = \frac{\partial P}{\partial P_b} > 0$$

(1 - λ) will be small, and non-significant implying that the proportion of input price increases passed on in the current period is high, as is expected in a concentrated industry.²⁷

This completes the background discussion to the empirical work which will begin with the data sources, and discuss the preliminary arithmetic, before turning to the margin and price adjustment results, and concluding with our conclusions and reservations.

Data Review

1. Variables, sources and preliminary arithmetic

All data used is in the form of a quarterly series from 1960 (1st quarter) to 1974 (4th quarter).

Basically the variables refer to the two estimating equations (XV) page 195, and (XX) above.

1.1 The dependent variable in equation (XV) page 195

$$\text{ie } \sum_i Q_i (P_i - mc_i) / pQ_T$$

this is calculated as:

$$\text{(Total Revenue - Total Cost) / Total Revenue}$$

when marginal cost (mc_i) is assumed to be constant in each time period.

The components are calculated as follows:

(i) Quarterly total revenue:

(Quarterly average price x Quarterly supply)

Quarterly average price is taken as average transactions price for margarine, obtained directly from National Food Survey Annual estimates published in Household Food Consumption and Expenditure, and finally entered as £ per cwt.

Quarterly supply is taken to be the quarterly interpolated figures obtained from the annual estimates of food disappearance data for margarine, published in Annual Abstracts. These, given as lbs per head per annum, are recalculated as lbs per head per quarter, and then weighted by interpolated population figures, from mid-year estimates published in Annual Abstracts, to obtain a figure for Quarterly supply, as cwts per quarter.

Given that three quarters of total disappearance moves into domestic consumption (see page 144), the quarterly total revenue figure becomes:

(Quarterly average price x 0.75 Quarterly Sales)

(ii) Total Cost:

(0.75 Labour cost + raw material cost)

The labour cost (wages and salaries) for margarine production in 1972 is obtainable from the Production Census. The quarterly series for labour costs is calculated by weighting the average quarterly expenditure on labour in 1972, by the quarterly index (1972 = 100) of wages in manufacturing, published in the December 1976 annual supplement to Economic Trends.

Data for 1960 is obtained by extrapolation. A comparison between labour costs predicted by this methods, and actual Census Reports is given below:

Table 25 : Labour costs (salaries and wages) predicted and actual

Census year	Predicted £'000	Actual £'000
1963	3883	3317
1968	4818	4389
1970	5681	5678
1971	6400	6341
1972	7192	7192

We are unable to allocate costs between margarine and compound fats, and note that fuel costs are merged with raw material costs in the Census. Labour costs were about 10 per cent in 1970-1972, and value added about 14 per cent of sales of goods produced. As margarine production volume is about twice that of compound fat production assuming labour costs are divided proportionately suggests labour is overstated by about 30 per cent.

With regard to processing costs in relation to the refining and hydrogenation of raw materials, as has already been pointed out we failed to obtain worth while information. The procedure adopted was to obtain spot quotations from various firms, for specific vegetable oils at different levels of processing, and to compare the results with information obtained from the 1968 Census of Production for Vegetable oil processing MLH 221(1) (1968), this suggests a refining cost of £13 per ton for Palm oil, and also £13 per ton to hydrogenate Palm and Soy Bean oils in 1968. These figures were obtained from a ratio of value-volume data in various categories in the 1968

Census. This is a curious result, in that Soy Bean oil hydrogenation employs a more sophisticated catalyst, and costs could be presumed to be higher per ton owing to its higher Iodine value (Iodine value is an index of unsaturation). Therefore, on the same day in June 1977 we obtained independent telephone quotations from three UK manufacturers, which suggested that premiums for hydrogenation are constant between oils, and that they are £25 per metric ton in 1977. We sampled Groundnut, Palm and Soy Bean oil.

In order to estimate a quarterly processing cost the figures of £28 per ton for 1968, and £60 per ton for 1977, were taken as reference points in a linear relationship over time, and the series is estimated in £ per cwt for 1960-1974.

With regard to raw material input costs these are calculated on a replacement cost basis (we did not consider costs as historic costs), as follows:

$$\sum_i w_i p_i \text{ for each quarter}$$

where

w_i = weight or proportion of i'th fat or oil utilised in each year's production of margarine. Data obtained from Vegetable Oils and Oil seeds CEC (see Table 14 page 141). It was assumed weights are constant within each year.

p_i = average quarterly price for i'th fat or oil calculated from value-volume data published in the Overseas Trading Accounts.

Raw material costs are calculated in £ per cwt as:

$$(\text{processing costs} + \sum_i w_i p_i)$$

1.2 The independent variables in equation (XV) page 195

ie
$$\frac{A}{R} \sum_i \frac{P_i}{P} \cdot \left(\frac{Q_i}{Q_T} \right)^2$$

(i) The A/R variable is taken as the sum of margarine television and press quarterly expenditure, calculated for the monthly data published in the Statistical Review of Press and Independent Television Advertising for 1960-1969 and from the MEAL digest subsequently, divided by the appropriate quarterly total revenue (see 1.1(i) above).

(ii) The price differential weighted concentration term

This is simply the ratio of brand price (obtained by averaging the monthly prices published in Shaw's Price Guide to obtain quarterly average prices), which has been weighted by the appropriate square of brand shares in the margarine market (obtained from confidential sources), to average transaction price obtained from NFS estimates, all summed over brands:

ie
$$\frac{\sum_i P_i \cdot \left(\frac{Q_i}{Q_T} \right)^2}{P}$$

1.3 Variables in equation (XX) page 199

These are to be estimated as first differences throughout. Margarine is the average transactions price 1.1(i) above, cost is decomposed into total Labour cost and Raw material costs for the industry as in 1.1 (ii) above. Quantity demanded (Q) is estimated as Quarterly Supply as in 1.1(i) above.

Butter price is introduced as the average transactions price for butter, obtained directly from National Food Survey Annual

estimates published in Household Food Consumption and Expenditure, and entered as old pence per lb.

2. Price cost margins

Results for equation (XVI)

The equation is estimated (i) in its logarithmic form and (ii) in its linear form, except for the advertising - sales regression coefficient, which is estimated as the log-variable in both cases. This is to allow for diminishing returns to the advertising-sales ratio.

The estimating procedure is ordinary least squares.

Trials were undertaken to vary the value of θ to see if different lags on the advertising-sales and the concentration terms improved the values and signs of the t-statistics.

Generally values for R^2 and F-statistics are low and whilst the Advertising Sales Coefficient turned out positive and significant, the coefficient of concentration is generally non-significant.

Different θ values did not improve the situation, neither did the introduction of a dummy variable (Z_t) set at zero for the period 1960-1969, and at unity subsequently (ie in the soft-margarine period. Results in Table 26 illustrate the general position.

In view of Unilever's complaints about the effect of price subsidies on margins, (see page 25-26 above) the ratio of butter price to margarine price was included as a regressor in equation XVI ie $(p_b/p_m)_t \div (p_b/p_m)_{t-1}$ and generally turned out significant in the log-log estimation but not so in linear relations.

Table 26 : Regression results for equation XVI (page 195)

$\ln \{ (\pi/R)_t \div (\pi/R)_{t-1} \}; (1,2)^*$					
INDEPENDENT VARIABLE	COEFFICIENT	t-statistic	R^2	dW	F-statistic
1. Constant term	-0.005	-0.12			
log AR (2,3)*	0.35	3.26			
log cncn. term (2,3)*	0.06	0.11	0.22	1.34	3.63
log p_b/p_m (1,2)*	1.25	2.02			(4,51)
Z_t	-0.02	-0.27			
2. Constant term	-0.01	-0.37			
log AR (2,3)*	0.35	3.35			
log cncn. term (2,3)*	0.10	0.20	0.22	1.34	4.91
log p_b/p_m (1,2)*	1.29	2.17			(3,52)
3. Constant term	-0.02	-0.78			
log AR (2,3)*	0.32	3.01			
log cncn. term (2,3)*	-0.02	-0.05	0.15	1.20	4.68
					(2,53)
4. Constant term	-0.02	-0.63			
log AR (2,3)*	0.34	3.35			
log cncn. term (3,4)*	-0.61	-1.27	0.24	1.35	5.58
log p_b/p_m (1,2)*	1.38	2.35			(3,52)
5. Constant term	-0.02	-0.69			
log AR (3,4)*	-0.21	-1.85			
log cncn. term (3,4)*	-0.85	-1.64	0.14	1.36	2.76
log p_b/p_m (1,2)*	1.36	2.15			(3,52)
$(\pi/R)_t - (\pi/R)_{t-1}$					
6. Constant term	0.69	0.60			
log AR (2,3)*	0.40	2.67			
log cncn. term (2,3)*	-0.30	-0.43	0.14	1.20	2.77
p_b/p_m (1,2)*	0.62	0.72			(3,52)

* figures in brackets measure the lag structure of the regression variables

Whilst the explanatory power of the dynamic model is not impressive it should be remembered we are trying to explain the changes in profit-sales revenue ratios over sixty quarterly periods during which many omitted factors can be expected to have contributed to the industry's performance.

Considering the dynamic effects of the advertising to sales ratio, the model receives some support as the advertising variable in Table 26 turns out to be significant in trials 1 to 4 and 6. The experiments on the effects of different lags in the effect of advertising to sales ratio on performance suggest that there is a time lag of about two quarters for changes to become effective. This fits in with statements made by two brand managers who privately told us that new brand advertising was expected to become effective after six to nine months expenditure on the media.

Turning to the price differential weighted concentration term, this turns out to be insignificant, a result which may well be due to the small changes to be observed in brand shares during the period of estimation. An alternative dynamic form (assuming a Nerlovian adjustment process) for equation XV gave rather different results. These suggest that some (Table 27) interaction is present between concentration and advertising, which we did not pursue. The results generally appear to suggest (excepting trial 1) that the advertising ratio is without significance, whereas the concentration term achieves a high level of significance in the current period. We note that the concentration term is weighted by brand price differentials, which take effect only in the current quarter. The form of estimation allows the effect of the concentration term and the advertising/sales term to build up over time. The 'Koyck' method, in favour of concentration, produces indifferent results. The results in Table 27 do not accord with the general conclusions of reported studies of the influence of concentration and advertising on profitability based on inter-industry cross section analysis of Production Census data.²⁸

Table 27 : Regression results for equation XV

$(\pi/R)_t$					
INDEPENDENT VARIABLE	COEFFICIENT	t-Statistic	R ²	dW	F-statistic
1. Constant term	0.47	3.67			
log AR(t)	0.12	3.15			
cncn.term (t)	1.04	4.66	0.45	0.53	8.68
D-2	-0.006	-0.22			(5,53)
D-3	0.01	0.52			
D-4	0.002	0.07			
2. Constant term	-0.04	-0.56			
log AR(t)	-0.005	-0.22			
cncn.term (t)	0.30	2.35	0.85	1.59	101.45
$(\pi/R)_t$ -1	0.89	12.03			(3,55)
3. Constant term	-0.19	-2.07			
log AR(t)	-0.01	-0.61			
cncn.term (t)	0.49	3.22			
$(\pi/R)_t$ -1	0.84	11.44	0.87	1.83	(73.49)
Butter price (t)	0.003	3.19			(5,53)
Z _t *	-0.03	-2.34			

* Z_t is the dummy variable for the soft margarine period.

The obvious conclusion is that the Advertising term and the concentration term are **related in some complex fashion** and the system of equations which determine performance, behaviour and structure cannot be treated as recursive, and cannot be reliably estimated by the technique of ordinary least squares. Whilst we could argue, referring to Table 26, that in trial 4 for example, that the changes in the profit margin term could not have influenced the earlier change in the advertising variable, nor that this in turn could have influenced a still earlier change in the concentration term, this is not the case with the reported results of Table 27, where the situation is different, using current period quarterly variables.

The general conclusion we draw from this is that we could have assumed profit margins and advertising expenditure to be simultaneously determined, and proceeded to estimate by means of two stage least squares possibly using the ratio of butter price to margarine price as an additional pre-determined variable.

In particular whilst the results of Table 26 above confirm the significance of the Advertising to sales ratio in relation to profit rates, and that there is a positive relationship, the results of Table 27 tend to support the view that increases in the concentration term and the advertising-sales ratio raise profit margins, and that there is some interaction between the two in which the causal relationship is not obvious.

From the policy viewpoint the implications of the results of Tables 26 and 27 differ. The significance of the Advertising ratio in the former supports the view that advertising creates barriers which are an important element in the evolution of market power. It must be remembered that in one case we are dealing with brand power rather than market power, we take the two to be synonymous.

Considering our measure of concentration (and we note that we did not re-estimate the relationships by dropping the price differential term ie by using the Herfindahl index instead) which can easily be turned into a revenue form:

$$\sum_i \frac{p_i}{p} \left(\frac{Q_i}{Q_T} \right)^2 = \sum_i \frac{p}{p_i} \cdot \left(\frac{p_i Q_i}{p Q_T} \right)^2 \quad (\text{XXI})$$

It would then be possible to estimate the margin relationship by comparing different sources of the data for the concentration term (eg Family Expenditure Survey could be used as the source

of revenue data in relation to profit rates, and the National Food Survey estimates of quantity as a source of the quantity supplied variable), and by using a more sophisticated estimation technique than OLS.

Commenting on the calculation of the margin term - obviously we assume omitted costs are a constant proportion of total cost - the main justification for the procedure adopted lies in the absence of cost data. As we have pointed out, the Census of Production data, although it now produces information on MLH 229 (1) on a quarterly basis (since 1973 as Business Monitor), fails to give adequate information for our purpose. It is emphasised we are not trying to examine a structure-performance relationship generally, instead we are trying to explain the movement in margins (as our performance variable) over time, in response to changing price differentials, structure, and advertising to sales ratio.

Census data in respect of margarine production, gives data which merges raw material and fuel costs and which relates to specific Census Years, with obvious gaps. In looking for a long series of data we are attempting to fill in the gaps between Census years, and are using the shortest time period for which information can reasonably be assembled. We would prefer to work towards a shorter period still ie replace thirteen week periods, by monthly data.

One obvious difficulty in production costs lies in the treatment of Labour as a variable cost, and therefore part of the marginal cost component, when intuitively we would expect that the industry treats labour as a fixed input. Indeed we obtained confirmation of this point in conversation with one national brand producer.

At another point we assume the proportion of various oils and fats utilised in production, to be constant over the four quarterly periods in each year, and calculate the quarterly input cost by assuming all inputs are hydrogenated and refined, the costs of which are standardised and allowed to increase linearly over the time period, the price of the raw material being allowed to vary quarterly as import prices change, and annually as utilisation changes. Obviously a good deal more needs to be done to improve this quarterly series, the main difficulty that arises is the general problem of the labour involved in data capture, and the general uncertainty that the returns would be worth while.

We assumed that the costs of continuous emulsification are minimal, and by ignoring the fact that about 15 per cent of the margarine emulsion is water phase, we are overstating the cost of oils and fats by an amount sufficient to pick up the packaging and emulsification cost. These in general we predict may well have decreased relatively over time, with the utilisation of more liquid fats and oils, which intuitively we argue require a lower energy input per unit to emulsify, and also because packing in tubs is likely to be less costly than tableting.

Despite these problems there is a reasonable check on our cost estimation which can be made by comparing the calculation of raw material cost with margarine export price, where in the absence of dumping and assuming full cost or cost plus behaviour, we would expect a reasonable match. The zero order correlation coefficient between our calculation of raw material cost and margarine export price, estimated from overseas trade data, turns out to be 0.95 for the 60 quarterly

observations 1960-1974.

We now turn to the price adjustment results.

3. Price adjustment

3.1 Results for equation (XIX)

This is an estimation of

$$\Delta P = f(\Delta RM; \Delta L; \Delta Q; \Delta P_b; \Delta P_{t-1}) \quad (XXII)$$

where

- ΔP is the change in margarine price,
- ΔRM is the change in raw material cost,
- ΔL is the change in labour cost,
- ΔQ is the change in margarine demand,
- ΔP_b is the change in butter price,
- ΔP_{t-1} is the second order change in margarine price.

Using ordinary least squares regression, and the method of first differences, the results of linear regression analysis are reported in Table 29 and Logarithmic results are given in Table 30.

The variables are discussed in the preliminary arithmetic of section 2, given in section 1 above.

Briefly, this means prices are measured as average transactions prices in old pence per lb (from NFS data); materials are costed on a replacement basis and labour costs are on a current expenditure basis, as previously discussed; demand is estimated as interpolated data from total disappearance, again as previously discussed.

The results are as predicted (page 199). Both labour and raw materials cost are significant and positive. Demand changes turn out to be non-significant as predicted. The coefficient

on the lagged dependent variable is low and non-significant. Butter price introduced from trial 3 onwards generates a positive and significant coefficient. The dummy for soft margarine introduced in trials 4 and 5

Table 28 : Regression results for equation XX
Linear relationships

ΔP (margarine)						
INDEPENDENT VARIABLE	COEFFICIENT	t-statistic	R	dW	F-statistic	
1. Constant term	-0.07	-0.5				
ΔRM	0.97	4.36				
ΔL	0.1×10^{-4}	3.91	0.53	1.85		20.93
ΔQ	-0.8×10^{-7}	-0.03				(3,55)
2. Constant term	-0.10	-0.65				
ΔRM	1.00	4.50				
ΔL	0.1×10^{-4}	3.65	0.55	1.85		16.38
ΔQ	0.2×10^{-6}	0.05				(4,54)
$\Delta P_m(t-1)$	0.05	1.31				
3. Constant term	-0.15	-1.17				
ΔRM	0.95	4.78				
ΔL	0.1×10^{-4}	4.16	0.65	2.37		19.45
ΔQ	-0.9×10^{-6}	-0.33				(5,53)
$\Delta P(t-1)$	0.09	2.62				
ΔP_b	0.14	3.86				
4. Constant term	-0.15	-1.04				
ΔRM	0.96	4.57				
ΔL	0.1×10^{-4}	3.62	0.65	2.39		15.92
ΔQ	-0.9×10^{-6}	-0.30				(6,52)
$\Delta P(t-1)$	0.09	2.61				
ΔP_b^m	0.14	3.78				
Z_t^*	-0.05	-0.17				
5. Constant term	-0.16	-1.15				
ΔRM	0.94	4.39				
ΔL	0.1×10^{-4}	3.72	0.65	2.31		13.72
ΔQ	-0.1×10^{-5}	-0.47				(7,51)
$\Delta P(t-1)$	0.09	2.64				
ΔP_b^m	0.14	3.70				
Z_t	-0.05	-0.19				
ΔADV^{**}	0.4×10^{-6}	0.91				

* Z_t ; a binary variable for the soft margarine period set at 0 for 1960-1969 and at 1 for 1970-1974,

** ΔADV ; the first difference in current expenditure on media expenditure.

Table 29 : OLS regressions of equation (XXII)

Logarithmic variables

$\Delta \ln P$ (Margarine)					
INDEPENDENT VARIABLE	COEFFICIENT	t-statistic	R ²	dW	F-statistic
1. Constant term	-1.58	-2.00			
ln ΔRM	0.17	2.10			
ln ΔL	0.19	2.64	0.25	1.71	4.49
ln ΔQ	-0.09	-2.35			(4,54)
ln $\Delta P_m(t-1)$	-0.07	-0.61			
2. Constant term	-0.92	-1.11			
ln ΔRM	0.17	2.18			
ln ΔL	0.10	1.22	0.31	1.75	4.68
ln ΔQ	-0.10	-2.61			(5,53)
ln $\Delta P_m(t-1)$	-0.10	-0.85			
z_t	0.58	2.08			

turns out to be non-significant, as also does the coefficient on the advertising variable in trial 5, confirming the result of the advertising study given in Table 13 above, (page 137).

The log-variable estimates reported as Table 30 are closely similar to the linear variable results in their implications.

3.2 Conclusions and comments

It seems clear that the speed with which cost changes are passed on is high. The coefficient of $\Delta P_m(t-1)$ ie $(1 - \lambda)$ is low in all the trials reported in Tables 28 and 29. The smallest value obtained for λ , the coefficient of adjustment, in equation (XVIII), is 0.95 which is in line for the results for high concentration ratio industries reported by Domberger. We obtain a somewhat higher figure for λ , when butter price is neglected.

The input cost information could be improved by using index numbers as the estimating variables, to replace variables measured in their original units. In this manner an independent index of fuel costs could be introduced, and coefficients with

larger absolute values would be expected. One test was made using index numbers calculated from our data based on the trial results of Table 29. These produce larger values of coefficients as expected, whilst the significance results are not disturbed. However, the value of λ turned out to be 0.950536 in an index based analogue of trial 2 Table 29, which is one of the highest response coefficients we found.

Finally, it would be of interest to extend this particular approach to other industries in which Unilever or its subsidiaries account for 25 per cent or more of sales (eg Household detergents and Frozen Foods), when we would expect high values for the λ term above.

This completes the account of our empirical work, and we turn to the concluding Chapter of this thesis.

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17. Scherer (1971); pages 176-177.

18. Breit-Hochman (1969); page 251.

19. Breit-Hochman (1969); page 248.

20. For example:

The monopolies and Mergers Commission; Frozen Foodstuffs; HMSO HC 674; 1976.

Against this, and earlier;

i) The Monopolies Commission; Chlordiazepoxide and Diazepam; HMSO 197; 1973; in paragraph 235 (b) states that promotion costs exceed the level that should be taken into account to arrive at fair prices.

ii) The Monopolies Commission; Household Detergents; HMSO 1966 (Reprinted 1969); in paragraph 127 (2) argues the policies pursued by Unilever and Proctor & Gamble on advertising and promotion are undertaken for the purpose of preserving their monopoly positions: also paragraph 105.

21. Cowling-Watson; (1976); page 269.

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Also see note 25 on page 239.

CHAPTER 6

POLICY, FATS AND UNILEVER - A REAPPRAISAL

In this research an attempt has been made to recognise the realities of the institutional and political background to the margarine market in the UK, which inevitably has meant close attention to Unilever operations. The health issue whilst a peculiarity, is not unknown in the study of oligopoly behaviour (for example tobacco), however the combination of a health problem with the existence of a close substitute is fairly unique.

The empirical investigation we have undertaken has as far as possible been geared to 'falsify rather than to verify' and in general we attempt to establish a theoretical basis from which to derive testable hypotheses. Nevertheless as is inevitable given the subject matter of the enquiry, and is a general problem in social science we are driven on occasion to rely on intuition, and the use of inductive methodology.

In this concluding chapter the opportunity is to recapitulate and to some extent reconsider aspects of the institutional background to which reference has been made, whilst adding a minor number of new points, the whole is reviewed against the empirical work we have reported in the text, and emphasises the relations between the Government and Unilever as revealed in selected policy documents.

The following headings summarise this conclusion:

- i) Technology and Health,
- ii) Economic self defence,
- iii) The run down in UK oil processing,
- iv) Cost control and the public interest,
- v) New product innovation,

- vi) Advertising and resource wastage,
- vii) The control of structure,
- viii) Inflationary pressures,
- ix) Survey of conclusions.

Technology and Health

In writing this thesis an attempt has been made to stress the many and varied aspects of the UK market for fats and oils. Emphasis has been given throughout to the wide range of fats and oils that enter production and consumption, together with their different sources of supply, which may be used by the oil and fats trade, for a variety of purposes and in the production of a wide range of end products.

The changes that have taken place in margarine production, with respect to oil utilisation, are as obvious as are the changes that have been observed over time in the parts of the world from which oil bearing materials and fats are exported to Europe and to the UK. The range, and the extent of use, of the technological processes that may be employed (i) to alter the physical and chemical characteristics of the various raw materials, (ii) to raise the economic value of the end products, and (iii) to modify the input cost of the oil phase in the margarine emulsion, have received specific mention.

In reference to margarine technology, it has been suggested that in the search for economic advantage, benefit to the human population may have emerged, albeit somewhat fortuitously, in the shape of a nutritional advantage, and changes that have taken place in the technology and in the purposes for which edible oils undergo hydrogenation, may have an important role to play within the sphere of the public health problem associated with chronic forms of Coronary Heart disease. We have attempted to demonstrate in Chapter 3 that this claim is not beyond question. Despite its research commitment in this field,

and despite its considerable presence in the USA, Unilever was slow to introduce the so-called health margarines into the UK. It appears that soft margarines were introduced into the USA market in 1964¹, and it is noted that it was not until 1968 that a similar event took place in the UK.

Economic Self Defence

Attention has been given to the political and strategic issues arising from the dependence of the UK fats market on imported supplies of carcass fats and edible oils, as well as for oils destined for industrial purposes, a circumstance that creates problems for the Government in regard to its economic and political strategy. On the other hand this dependence on overseas supplies simplifies the control of food-stuffs in war time conditions, and a great deal of valuable experience was accumulated in relation to the problems and administration of control, in the two world wars of the present century.

In terms of economic strategy the use of economic surplus as a weapon of political power, which was mentioned on page 66, clearly has an antecedent in the programme of Imperial self sufficiency that is reported to have had considerable appeal in official circles during World War I,² when the feeling of war time unity was at its greatest. Whilst there was at the time no basis for assuming that an Imperial surplus was a reliable weapon of economic self defence, nevertheless it does fit in with a view point that sees economic activity and trade generally as being pursued against a background of permanent international political conflict. Not only does the current problem associated with the utilisation of the USA soy bean surplus in the production of oil for margarine production and compound foodstuffs for livestock production, and in which Unilever claims a prominent role in Europe and in the UK, fit in with a protectionist view of the nation-state, but it also fits into the idea that political units

form alliances, united by common ideologies or by common ethnic interest, in which objectives and attitudes are slow to adapt and to change.

In recognising the problem of the use of the soy bean surplus as one weapon of political bargaining by the USA, there is no reason to suppose that other powers will fail in their attempts to supplant this source of soy bean, by increased domestic production of alternative materials, or by obtaining supplies elsewhere. There is nothing new in the use of Agro-power. The view that this is a valid use of economic surplus earlier provided thrust to a capitalist idea of British Imperial and Commonwealth self sufficiency; and much of the current attitude that the Common Market is about butter, and that entry negotiations had to be conducted with the defence of the New Zealand dairy export market in the UK as a major objective, stem from this idea. On the basis of history, it seems reasonable to conclude that the insensitive use of economic power in this manner will stimulate market forces that will correct the international imbalance in resource allocation, and that it is a short term problem.

The point has been made elsewhere³ that the post World War II reliance on non-European raw materials is one source of irritation in North Atlantic relations. In a number of extractive industries supply is dominated by the same firms headquartered in the USA and in the UK as before 1939. In the 1960's Continental European Governments were encouraging large enterprise to become instruments of Government policy, to serve as a counterforce to threats to National Sovereignty.

The run-down in UK oil processing

The same view cannot be taken of the run down that has taken place

since 1945 in the UK oil refining capacity, to which attention has been drawn on page 30. In terms of the indigenous supply, in the UK there is very little vegetable oil available from home produced seed, and although attempts were made during World War I to encourage Sunflower seed production in the UK, the amount that became available was insignificant. Commercial production of UK oil seed is limited to rape seed,⁴ which appears to be used for industrial frying purposes. Carcass fats are another obvious possibility, but as appears usual with dairy farm output and animal production in the UK, the products are destined primarily for higher priced outlets, and for the production of convenience foods. For example the use of surplus milk is well known in this respect. Another example lies in the breeding of fat hogs in the UK which apparently is supported by T. Walls and Son, (a Unilever subsidiary), for the joint production of sausage meat and fat destined to be utilised in ice cream manufacture.

Turning to the origin of soy bean imports, although we have not made an exhaustive examination of the trade figures the British Ports Association Statistics reveal that in 1966 the UK obtained 12 per cent of its indirect soy bean import from the Netherlands, in 1972 this figure was 21 per cent. In the same year 29 per cent of the soy bean oil import came from the same source, which was also the second largest supplier of these commodities in the UK. Whilst the actual commercial source is unknown, the prominence of Unilever NV in the Netherlands is well known. The problem of the UK dependence on the Continent for oil extraction has already been mentioned (pages 30 and 53) in respect to the running down of the UK refining capacity since 1945. The question arises as to how far this dependence on the supply of soy bean and extracted oil from the Continent be allowed to proceed unchallenged? Costs have been claimed to be lower

on the Continent; one is tempted to ask whether British oil and Cake Mill (acquired by Leverhulme in 1929) and other Unilever subsidiaries in the oil trade would subscribe to this view, if these enterprises were to be divorced from Unilever. The situation may be said to become of greater importance in relation to post war increases in the dependence of farmers on compound feeds for cattle and other domestic livestock in British agriculture.

Wilson's commentary on the contraction of oil processing in the UK⁵ presents a confusing picture of the opening and closure of UK plants in the oil trade since 1945, this he attributes to the effect of economic development in seed producing countries, where developing nation ambitions to process oil bearing materials in the country of origin have been realised, which has led to an increasing proportion of exports in the form of oil, rather than as seed or nuts. Wilson also draws attention to the point that as the total amount of UK produced oil fell, so the production of animal feedstuffs rose. These are curious arguments as EEC data shows (Fig 3 page 30) a similar growth rates in the imports of oils and oil bearing materials over the period when the UK crushing activity is in decline.

One obvious suggestion apart from the dismantling of the Unilever oil seed interest in the UK, is that the situation should be reviewed by means of a reference on animal feeding stuffs to the Monopolies and Mergers Commission to consider the implications of post war contraction.

Cost control and the public interest

Turning to the point made earlier, that a trade wholly dependent on imported materials presents an easier problem in terms of control than does an industry based on domestic raw materials, there seems to be no fundamental reason why the techniques of control used in war time, should not be employed in peace time conditions, or under conditions

where the economic surplus of overseas countries or territories becomes unavailable under Free trade rules on the world markets. The system of official costing applied to milk processing provides a precedent for peace time conditions. The system of costing and control that was applied in World War I to margarine production, generated, in a more competitive environment, undoubted benefits to the consumer, and assisted the margarine interest to develop out of its infant industry stage in the UK. This was however in circumstances where there existed a public consensus in favour of the situation where a Food Controller took possession of all raw materials, and also controlled distribution.

Where the Government is concerned with the problem of fair prices and inflation, regulation provides some advantage to the consumer as compared to the situation in which regulation is absent, provided the costing system is standardised, and the margins established ensure a reasonable return on capital invested by the industry; rather than on the costs of the marginal producer, which would allow the more efficient to make excessive profits on the unit of production. This problem receives general treatment in the literature of food control,⁶ and in official reports on milk distribution in the UK.⁷

The peace time benefits of war time experience in food supply control were briefly touched upon in the opening paragraphs of Chapter 1. The surprising feature of this in regard to the UK margarine industry, which was created as one result of the 1914 emergency with Government support, and in regard to UK edible oil hydrogenation capacity, which was expanded to a condition of UK self sufficiency in 1940, again with Government support in war time a quarter of a century later, lies in the peace time withdrawal of official control and in the abandonment of these control activities to a situation where control of the relevant price levels appears to be undertaken 'by the sellers

in the industry in their own interests.' The unanswerable question arises as to whether the re-creation of the UK hydrogenation capacity would have been necessary of Lever had not absorbed Crossfields in 1919 (see page 14).

The potential damage to the consumers' interest of seller control of prices is associated with problems of excessive costs and inflationary pressures, points which become much the thrust of the arguments in paragraphs 110 to 112 in the 1973 Monopolies and Mergers Commission Report on Parallel Pricing⁸ where the argument is concluded (of which the following is a paraphrase), in respect of a situation in which devices for increasing competition are not easily to be found, that in order to limit the possible damage, direct supervision of costs as well as prices might be considered by the authorities. Internal price control by sellers safeguarding their own interest would ideally be replaced by 'control from without aimed at safeguarding the public interest.'

Only one other official report relevant to margarine pricing has come to our notice. Published by the National Board for Prices and Incomes in 1970, this in reference to margarine recommended that in the event of a reduction in vegetable oil prices 'it is important that consumers should benefit fully from such a decline by way of reductions in price.'⁹ This is an interesting recommendation in view of the decline in the average cost of oils utilised in margarine production in 1972 does not appear to have led to a reduction in average NFS prices. With the exception of Echo margarine, Van den Berghs brand prices remained unchanged during 1972. Cooking fats also remained constant during 1972 (Shaws Price Guide data).

The point about the direct supervision of costs as well as prices seems to be important, in view of the speed with which cost increases are passed on to the consumer (see page 213).

New product innovation

Unilever has argued:¹⁰

"..... that free enterprise is still the system best suited to meet our needs, even when they change as rapidly as they are doing today. With profit as the motive force and the measure of effectiveness, the free enterprise system ensures that we listen to the faintest shift in society's priorities, and that we do not shift our priorities for those of our customers. The risks can be considerable; it is very easy to mishear faint signals. The rewards are adequate but not princely. On £1 of sales, we make 3p profit, of that, you, the shareholder, get just over 1p. The rest is ploughed back into the business and provides more growth."

In financing research, which is charged against the current year's income, and is reported to be a centralised activity in Unilever operations, sales rather than profits appear to be the source of the necessary cash flow that is used to support the rapid introduction of new products.

In the context of recent UK experience, the changes that have taken place in the quality and presentation of food generally results in the consumer spending more. The growth of the market in convenience and frozen foods has been a recent economic phenomenon, and for Unilever it is stated that frozen food sales rose from £2.5 million in 1953 to nearly £45 million in 1965.¹¹ The recent Monopolies and Mergers Commission Report on Frozen Foods suggests the market was worth £343 million in 1973 and £407 million in 1974, and of this Unilever's share was £117 million and £133 million in each respective year.¹²

In order to survive it could be argued that tacit price agreements with high profit margins will emerge in oligopoly situations to enable high cost specific capital investment to be amortised quickly in a changing world, this capital investment could well include advertising costs, which in the production and distribution of national

brands, and in the development of a market, are likely to represent a high proportion of operating costs and investment. In order to survive the dynamic firm will attempt to maintain their operating margins by being the first to develop more expensive products which will successfully meet a consumer need. The unsuccessful become vulnerable to the predatory activity of more aggressive firms, who are trying to enforce concentration. The successful may succumb to the large firm who finds itself short of the technical knowledge which is necessary for it to enlarge its interests, but which has the financial reserves to back its management's aspirations.

Unilever's post-war diversification into preserved and frozen food-stuffs was accomplished by acquisitions of this last species, which was as usual followed by expansion and concentration. The acquisition of Batchelors Foods and Birds Eye Foods by the end of World War II represents a successful recognition by Unilever management of 'the growing desire to get rid of the dreariness of war time rationing and restrictions and a willingness to pay for novelty and variety' on the part of the consumer, and also of the fact that Unilever was short of the technical knowledge required for diversification, and was fortunate in the long run in obtaining these ready made resources of technology and manufacturing experience at the time it did.¹³

Advertising and Resource wastage

Within the high seller concentration markets in which Unilever operates, the advertising to sales ratio appears to vary between 3 per cent to 12 per cent of sales, and are obviously higher when calculated as a percentage of direct costs.¹⁴ The Parallel Pricing report, to which reference has been made earlier, accepts that there are grounds for the belief that in oligopoly situations advertising is likely to be more acceptable to the industry as a less aggressive form of competition in comparison to price competition, we quote (in part):

"Advertising which expands the total demand for the product may lend to a reduction in overall unit costs, including the advertising expenditure, if the industry is characterised by economies of large scale production. But advertising which seeks to expand one seller's market share at the expense of other sellers' shares is likely to be partly self-cancelling and the overall unit cost of unchanging output is then likely to be higher than it would be with a smaller expenditure on advertising. Such an increase in unit costs would represent a waste of resources and would constitute a serious public interest issue. In addition, a high level of advertising by existing sellers will often create a significant barrier against the entry of newcomers into the market. Consequently, it is possible that high advertising may not only raise unit costs but also contribute to excessive prices and profits."¹⁵

Empirical studies suggest that brand advertising has 'a significant positive impact on market-share performance.'¹⁶ To this can be added, from Chapter 4, the results of our own attempts to estimate industry demand. These results suggest that advertising, in respect of margarine, does not significantly influence total demand either in the current period nor in the future. If the 'parallel pricing' view is accepted, the implication is that advertising represents a waste of resources.¹⁶ A view supported in another context by the Consumer Council evidence to the Monopolies Commission on Household Detergents¹⁷ even though in its report the Commission did accept 'that some expenditure on promotion may result in cost-saving elsewhere.'¹⁸

Whilst we do not necessarily accept the implication of the parallel pricing report view that a situation where $\partial Q_m / \partial A_m > 0$ does not represent a wastage of resources, particularly in view of the use to which advertising may be put, and which was outlined in our discussion in Chapter 2, at the same time the empirical results of Chapter 4 whilst confirming the difficulties of showing

the coefficient on Advertising variables in demand estimation to be significant, gives some support to the view that this might be rectified by a simultaneous equation approach. Allowing, by means of a 'Koyck' form of estimation, for the effect of advertising to build up over time, does have some remarkable effects on the value of the own price variables, both in their original and in their 'Quality adjusted' forms (see Equation XIII page 195 for example) in OLS demand estimation. It is felt that the adjustment for quality changes, and for changing advertising rates, are worth while even though the advertising term appears to remain non-significant in the bulk of our reported results.

In addition we suggest that the significance of the advertising to sales ratio in the margin studies (see table 26 page 205) provide grounds for criticism of advertising expenditure.

The most likely Unilever defences in response to official criticism of margarine advertising (taken from the Household Detergents report)¹⁹ are:

- i) advertising is not against the public interest, and that the alternative is a higher trade margin and an increase in other distribution expenses,
- ii) that advertising represents a 'transfer to media owners, television viewers, magazine and newspaper readers and the Exchequer,' also 'that a large proportion of newspaper costs and the whole of commercial television costs are borne by

advertising, and only a minority of the public do not benefit from this,'

iii) advertising is necessary to maintain brand loyalty which is weak.

We consider the transfer role claimed by Unilever²⁰ to be nothing less than extraordinary, the implication that the consumer of a particular product should finance public goods in the public interest, in our opinion merited outright condemnation at the time. Unilever appears to be silent with regard to the intrusive and offensive characteristics sometimes attributed to advertising. Such a view of the 'pollution' effects of advertising, in terms of theory, would suggest that the nuisance should be taxed by the state. As one counter to this idea of taxation Schmalensee²¹ suggests that taxation could be identified with censorship, which itself may be undesirable, and which also denies the possible benefits of the entertainment provided by advertising. The latter viewpoint would suggest advertising is an external economy which merits a subsidy.

With regard to the relationship between advertising and the media, in which effectively Unilever could claim to be providing a subsidy, it is by no means clear that a transfer from those who purchase Unilever products to media consumers, provides an equitable distribution of resources. Again, as we suggested in Chapter 2, it is doubtful whether the media behaves in an impartial manner with regard to its treatment of advertised products and relevant issues. It would appear that the only source of objective consumer information is provided by such bodies as the Consumers Union, in the USA, and the Consumers Association in the UK, who operate independently of advertisers. This type of information is available only to the educated consumer, and in general is not available at the point of purchase.

In relationship to advertising and to brand loyalty it is possible the discerning buyer will seek to purchase specific qualities of margarine with a nutritional advantage, because of the convincing nature of health propaganda in relation to fats. However, in view of the Consumer Association findings introduced on pages 55-56 above, it seems likely that consumer loyalty will be to the description of contents rather than to brands. To this end margarine should be labelled with a full and accurate specification.²² In respect of margarine the consumer is offered a choice in terms of minor price differentials and confidence in a specific brand name. Recently information in terms of product attributes concentrates on the vegetable oil and polyunsaturated fatty acid issue, which assumes the consumer can evaluate the alternatives in an objective fashion. Whilst secondary product characteristics such as ease of spreadability must be important consumer criteria, the consumer information available at the point of purchase does not amount to full disclosure. Whilst accepting that the consumer's ability to evaluate any substantial quantity of package information is likely to be limited, the health issue calls for full disclosure. Whilst labelling is not a recommendation of the Royal College of Physicians and the British Cardiac Society in 1976, it was a recommendation made by the Australian Academy of Science in an equivalent report, and in our view this represents an oversight on the part of the UK physicians.²³ It is disturbing to read that the Consumers Association appear to be unaware of the use of coppercatalysts in selective hydrogenation process. In view of the Which report findings, heavy metal content should be monitored, in addition to the specification of other additives including vitamins.²⁴

In the past few years there has been an increase in the brand shares of distributors own brands which has altered the relative brand shares in the margarine market, but which does not appear to have altered

the manufacturers share. Whilst this represents an increase in brands it does suggest that advertising is not able to function as a barrier to entry to the market for new labels. Arising out of the problems we considered in Chapter 4, we were unable to follow up the suggestion by Demsetz (equation XII) that would allow the consumer learning process to be introduced into demand estimation, and which might be expected to shed some light on the problem of brand loyalty. This is felt to be an omission we would prefer to rectify on another occasion.

The control of structure

The results of our empirical work on price cost margins give some support to the suggestion that at the industry level, increases in profit rate are significantly related to increases in the advertising to sales ratio. This can be taken to support the suggestion that policy should be aimed at controlling advertising, as well as concentration.²⁵

Given that the only independent supplier of any consequence in the UK is the co-operative sector, the main supply is 'half-Dutch' with the bulk of the balance of output being produced by firms such as Kraft and Proctor-Gamble under USA supervision. Apart from the legal problems of dissolution, a reduction of market power would not be easily accomplished, the only possibility would seem to be a split into Van den Berghs at Bromborough, and Jurgens at Purfleet. These are issues to which we have not given any serious consideration, however the creation of a 'British margarine and Oil Milling Board' provides considerable attractions, giving Unilever, which is not after all a manufacturing company, much greater freedom to develop its real interests in the direction of international industrial banking, management selection, training and consultancy and public relations on a more competitive basis.

Without complete financial data it is impossible to identify the sources of Unilever financial reserves, but the suspicion is that margarine provides a substantial proportion of the cash flow with which Unilever head office supports its banking and Public relations activities for the Unilever group.

The defence capability possessed by Unilever is formidable.²⁶ The propaganda issue has already been mentioned in Chapter 2, and undoubtedly Unilever would be capable of influencing considerable press clamour on its behalf. A double edged weapon perhaps, but one which makes most politicians nervous. Unilever's list of directors and advisory directors is impressive. A point which can be illustrated briefly as follows:

in 1976 the Annual Report lists an ex Governor of the Bank of England, and an ex Ambassador with Foreign Office experience, and a director who was secretary to the Supreme Allied Commander in the Mediterranean in World War II. Wilson notes the associations of Unilever management 'in various forms of public service believed to be of concern to their business,'²⁷ for example the Prices and Incomes Board set up in 1964, the London Graduate Business School, the Royal Institute for International Affairs.

Wilson remarked in 1968:²⁸

"..... those economists who have investigated the working of Unilever in recent years have on the whole judged it favourably."

Without doubt, quotations taken out of context ought to be treated with suspicion, our own included. Professor Wilson cites two authors who were using the soap industry as source material,²⁹ but unfortunately in our personal view does not stress the point made explicitly by Edwards for example, that the benefits if size were realised against a background of intense rivalry between two

non colluding dominant firms, this not the case for margarine. Although there are several texts on Unilever and its subsidiary activities³⁰ we are not aware of any which condemn Unilever - after all what would have happened in the absence of Unilever dominance is surmise. Nevertheless, Ruth Cohen does not view the advantages of size as being beyond question.³¹

As a final point in connection with Unilever's defence strategy, we turn to the question of Unilever's Chairman's speech to Annual General Meetings of Shareholders; these appear to be particularly apposite, and are reprinted as convenient pamphlets. For example we select the following titles in which Unilever adopts a defensive posture:

- i) 1972 : "Unilever's Role as a Multi national Business"
- ii) 1973 : "Unilever's Role in Todays Society"
- iii) 1974 : "Countering Inflation - The Unilever Contribution"
- iv) 1975 : "Profits in time of inflation"

Inflationary pressures

The treatment of Unilevers role in countering inflation is interesting, particularly as it appears to follow the Parallel Pricing report of 1973. The issues of parallel pricing⁸ in relation to inflationary pressures are discussed at length in the parallel pricing report.³²

The extension of our empirical work on margins in Chapter 5 into the price adjustment problem, given results which appear to confirm the prediction that industries with high seller concentration, even when faced with excess capacity, pass on their factor cost increases within a very short period, and presumably this implies 'a lubrication of the wages-price spiral.' Despite Unilever claims 'to be able to deal with the problems of raging inflation' by its ability to adapt to changing costs, by restructuring, and by avoiding the onset of

diseconomies generally, this does not seem to apply to its margarine operations. Taking Van den Berghs brands general Shaws Price Guide data suggests that price increases over the period 1970-1974 were higher than the equivalent General Price Index increases,³³ and that Unilever failed to absorb input cost increases. This was the period when Unilever was attempting to trade up, and during which soft margarines were introduced and distributors own brands increased their market share.

On balance it would appear reductions in butter price has put downward pressure on profit rates and the rate of price inflation in the UK margarine industry, *this* is an indirect effect of Government Policy.

Nevertheless there appears to be clear empirical evidence that benefit to the consumer would follow a reduction in the levels of advertising, and the introduction of cost control, as well as price control, in respect of parallel pricing in the margarine sector. Positive measures in relation to advertising would be preferable, for example a restricted depreciation rate on advertising treated as investment, and a tax on advertising appropriations.³⁴

With regard to the UK oil interest and structure, given there is a reluctance to establish a 'British Margarine and Oil Milling Board', one possibility is to consider the introduction of border taxes to stimulate increased UK processing of oil seeds.

In general we feel considerable scepticism on the advantages of large scale organisation, in particular we feel the advantages of scale could be realised with a larger number of specialised factories in oil processing and margarine production. In *retrospect* there seems very little evidence that large scale organisation produces beneficial

results in the direction of research and innovation, and medium sized operations would have clear benefits in avoiding unnecessary formalisation of channels of decision taking and information flow. The problem of communication receives frequent discussion in Unilever literature, and this recently seems to have come to a head in that Unilever is making a top level investigation of the problem of absenteeism throughout the Unilever enterprise.

Finally, there is good evidence that Unilever's management are skilful in selecting new investment opportunities and have an undoubted ability in forming, as well as adapting to consumers' demand. It would seem to be worth while to give serious consideration to the benefits that would follow if these skills were available over a wider market, rather than to a captive and at times unwilling subsidiary.

On the health issue; this should be a matter for public concern. The very least the Government can do is to legislate for compulsory labelling with accurate specification of contents, and possibly tax the fats industry in general to finance in part the necessary and long overdue research into heart disease in the UK.

Notes and References cited - Policy, Fats and Unilever - A Reappraisal

N.B. references are cited in full on the first occasion only

1. By Anderson Clayton, Dallas, Texas. (This company have failed to reply to our letter seeking confirmation of this point).
2. Hancock (1942); Hancock, W. K.; Survey of British Commonwealth Affairs, Vol II part 1 Problems of Economic Policy; Oxford University Press and Royal Institute of International Affairs; London; 1942; Chapter I section 5.
3. Franko (1976); Franko, L. G.; The European Multinationals; Harper and Row; 1976; page 2 and 61.
Vernon (1974); Vernon, R.; Big Business and the State; Harvard University Press; 1974; pages 14-17.
4. HMSO (1975); Food From our own Resources; HMSO Cmnd 6020; 1975 gives these recommendations of the period 1974-80 milk production to be raised from 2,916 to 3,536 million galls annually; rape seed 49,000 to 200,000 tons annually; Beef and Pig meat to be increased by 100%.
5. Wilson (1968); Wilson, C.; Unilever 1945-1965; Cassell; London; 1968; pages 163-165.
6. Lloyd (1924); Lloyd, E. M. H.; Experiments in State Control; Economic and Social History of the World War - British Series; Oxford; London; 1924; pages 211-214.
7. NBPI (1967); The Renumeration of Milk Distributors; NBP; Report No 46; HMSO Cmnd 3477; 1967; Chapter 4.
8. MMC (1973); Monopolies and Mergers Commission; Parallel Pricing; HMSO Cmnd 5330; 1973.

Parallel pricing is defined in the reference as "Practice of two or more suppliers of goods of any class or description, when effecting changes in prices at which such goods are supplied in the UK, of doing so at or about the same time and by the same or a similar amount or proportion".

The Commission took Electric Lamps; Gramophone Records; Petrol and Tyres for its case studies.

They could well have considered margarine.

9. NBPI (1970); National Board for Prices and Incomes; No 147; Margarine and Compound Cooking Fats; HMSO Cmnd 4368; 1970; paragraph 35.

Paragraph 16 gives the following breakdown of VdB costs in percentages:

Oils	43
Production costs	12
Fixed costs	<u>12</u>
	67
Distribution	7
Advertising	<u>11</u>
Total Direct	85
Central Overheads	<u>15</u>
	<u>100</u>

9. (continued)

Paragraph 30 gives the following data:

Return on capital (VdB) before tax and after depreciation
of assets on original costs

1966	1967	1968	1969
26.3	25.1	29.5	23.0

10. Unilever (1973); Unilever in Today's Society; A reprint of the Chairmens' speech to the AGM 9.5.1973; Unilever Ltd; 1973; page 10.
11. Wilson (1968); page 165.
12. MMC (1976); Monopolies and Mergers Commission; Frozen Foodstuffs; HMSO HC 574; 1976; paragraph 12.
13. Wilson (1968); pages 165 to 175.
14. See note 9 above, and also pages 64-65.
15. MMC (1973); paragraph 77 page 26.
16. Cowling et al (1975); Cowling, K. - Cable, J. - Kelly, M. - McGuinness, T.; Advertising and Economic Behaviour; Macmillan; London; 1975; Chapter 4.
17. MC (1966); Monopolies Commission; Household Detergents; HMSO HC 105; 1966; paragraph 98 in the Appendices.
18. MC (1966); paragraph 96.

This paragraph also suggests (in the Commission's view) that advertising affects market share rather than demand, and raises the point that advertising may be used by producers in a situation where brand loyalty is weak.
19. MC (1966); paragraphs 120 to 122, in the Appendices.
20. Doyle (1968); Doyle, P.; Economic Aspects of Advertising - A Survey; Economic Journal; 1968; page 596.
21. Schmalensee (1974); Schmalensee, R.; Advertising and Economic Welfare in Advertising and the Public Interest (Ed S. V. Divita); American Marketing Association; Chicago; 1974; page 96.
22. The only copies of the margarine regulations and the Food labelling regulations we have been able to trace appear to prevent the manufacturers from making health claims, and release them from any obligation to specify the constituents of margarine.
23. AAS (1975); Australian Academic of Science; Diet and Coronary Heart Disease; Report No 18; 1975; page 7.

RCP (1976); Royal College of Physicians of London; Prevention of Coronary Heart Disease; Jnl RCP; April 1976; page 19 refers in passing to labelling.
24. Which (1973); Which Magazine Report on Butter and Margarine; February 1973; page 51 also a passing reference to labelling is made on page 51.

24. (continued)

Reports of the Working Party on the Monitoring of Foodstuffs for mercury and other heavy metals, so far as we know, ignore the problem of catalyst contamination.

25. Under varying circumstances the following structure-conduct performance studies suggest the advertising variables are a significant factor in performance in cross industry studies:

Holtermann (1973); Holtermann, S. E.; Market Structure and Economic Performance in UK manufacturing industry; Jnl Industrial Economics; 1973; pages 130-131.

Khalilzadeh-Shirazi (1974); Khalilzadeh-Shirazi, J.; Market Structure and Price-Cost Margins in UK Manufacturing Industries; Review of Economics & Statistics; 1974; page 72.

Hart-Morgan (1977); Hart, P. E. and Elanor Morgan; Market Structure and Economic Performance in the UK; Jnl Industrial Economics; 1977; page 183.

26. Unilever's willingness to argue every point is demonstrated in the submissions and evidence given to investigating authorities we have quoted; e.g. MC (1966), NBPI (1967), NBPI (1970), MMC (1976).

We could add to these:

NBPI (1965); National Board for Prices and Incomes; Prices of Household and Toilet soaps etc; HMSO Cmnd 2791; 1965.

MMC (1969); Monopolies & Mergers Commission; Unilever Ltd and Allied Breweries Ltd; HMSO Hc 297; 1969.

We also note two recent occasions in which Unilever mergers were not referred to the MMC

i) Unilever & Ellis & Everard
Trade & Industry; 20th September 1973; page 598.

ii) Unilever & Kennedys (Builders Merchants)
Trade & Industry; 10th January 1974; page 44.

27. Wilson (1968); page 43-44.

28. Wilson (1968); page 142.

29. Cook-Cohen (1958); Cook, L. P. and Cohen, R.; Effects of Mergers; Allen & Unwin; London; 1958 Chapter III; The Soap Industry.

Edwards (1962); Edwards, H. R.; Competition and Monopoly in the British Soap Industry; Clarendon; Oxford; 1962.

30. See Note 8 Chapter 1, to which could be added Cook-Cohen (1958), and Kohn (1970); Kohn, R.; Palm Line - the coming of Age; (mainly the history of Unilever's shipping interests).

31. Cook-Cohen (1958); pages 268-271.

32. MMC (1973); paragraphs 88-96.

33. Details are:

	1970(I)	1974(IV)	Ratio
Cost of average fat phase in margarine (£ cwt) (section 1.1.ii in Data review of Chapter 5)	7.63	16.76	2.2
Wage index in manufacturing (1972 = 100)	76.2	147.1	1.9
General Price Index (1970 = 100)	97.1	156.1	1.6
Shaws prices : (d/lb)			
Stork	25.0	52.8	2.1
Summer County	34.6	60.0	1.9
Blue Band	37.0	70.8	1.7
Average NFS prices : (d/lb)			
Margarine	27.1	53.2	2.0
Butter	41.4	56.7	1.3

34. Doyle (1968); page 598.

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