AGRICULTURAL ECONOMICS RESEARCH UNIT

Lincoln College

THE REGIONAL PATTERN OF THE DEMAND FOR MEAT IN THE UNITED KINGDOM

by

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and

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THE AGRICULTURAL ECONOMICS RESEARCH UNIT

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P R E F A C E

With this bulletin we carry further the publication
of the results of the Unit's programme of market research
into the British meat market.

In an earlier publication (A.E.R.U. No.23) we
reported on an analysis of the retail demand for meat
in the United Kingdom in which the data used referred
to the whole country.   In the present report we go
further and investigate regional differences in demand,
especially for lamb and mutton, and beef and veal.

The results, as will be seen from the last section
of the report, have very important implications for our
meat promotion and advertising policy in Britain.

Much of the data used in the analysis which follows
came in the form of supplementary information from the
British National Food Survey Committee whose great
assistance we readily acknowledge.

<div align="right">B. P. Philpott</div>

Lincoln College,
January, 1967

SUMMARY AND CONCLUSIONS

The retail consumption and marketing data contained in the reports of the British National Food Survey have been analysed with a view to measuring differences in demand for lamb and beef as between different regions in Britain.

The results indicate that there are significant regional differences in the demand for lamb and beef and that these differences have two aspects.

(i)   There are regional differences in the levels of demand reflecting possibly a lower level of preference for lamb as one moves north from London.   The reverse is the case with beef.

(ii) There are significant regional differences in the price and income elasticities especially for lamb for which both elasticities are highest in northerly regions where the level of the demand curve is lowest. That is to say, small changes in price and income in these regions could have larger effects than in the southern regions.

These facts have important implications for meat promotion and advertising policies in Britain which are discussed in the final section.

THE REGIONAL PATTERN OF THE DEMAND

FOR MEAT IN THE UNITED KINGDOM

I.   INTRODUCTION

This paper is concerned with an analysis of the differences in demand for meat, especially lamb and beef,[1] between different regions in the United Kingdom.   It represents an extension of earlier published work[2] in which we presented an analysis of the overall retail demand for meat in that country.   It was shown that the quarterly retail demand for five types of meat (lamb and mutton, beef and veal, pork, poultry and non carcase meat) was related to prices of each type of meat and consumer incomes, and also that there were significant seasonal changes in demand which were different in their pattern for each type of meat.

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[1] In this paper lamb and mutton will be referred to as lamb and beef and veal will be referred to as beef.   We do this for the sake of convenience because the lamb and mutton group is predominantly lamb;   likewise the beef and veal group is predominantly beef.

[2] An Analysis of the Retail Demand for Meat in the United Kingdom, B.P. Philpott and M.J. Matheson, A.E.R.U. Publication No. 23.

For example, one of the models for lamb and mutton was as follows:

Log consumption of lamb and mutton per capita

$=$ constant $-b_1$ log price of lamb and mutton

$+b_2$ log index of price of other meats

$+b_3$ log real income per capita

$+ c_1 S_1 + c_2 S_2 + c_3 S_3$,

where S_1, S_2, S_3 were dummy variables for the 1st, 2nd and 3rd quarters of the year and b_1, b_2, b_3, c_1, c_2, c_3, the numerical coefficients estimated.

In the research underlying this publication we have carried matters further by attempting to measure the demand relationship for meat in each of several different regions in the United Kingdom, and establishing whether there are significant differences between regions in demand patterns.

The data we have used is the same as previously,[1] namely, the statistics of household food consumption published each year by the British National Food Survey.[2] A casual inspection of the series for household consumption of various types of meat in different regions, shows that there are very considerable differences especially marked in the case

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[1] Except that we now have a further year's observations available.

[2] "Domestic Food Consumption & Expenditure", Annual Report of the National Food Survey Committee, H.M.S.O. London.

of lamb and mutton. For example in 1963 the average consumpt-
ion of lamb and mutton per head was about 7 lb. per year in
Scotland compared with 30 lb. per year in London, and in general
it can be observed that consumption declines as one moves north
from London and the Southern counties.

It is, of course, natural to ask whether the regional
consumption difference for this and other types of meat is the
result of differences in prices charged or whether it is a
reflection of regional differences in tastes and preferences
or whether perhaps it is the result of a bit of both. It is
the purpose of this research to sort out these various influences
in a systematic way.

The question at issue is of course important for if
there are regional differences in tastes and preferences, and
even more so if there are regional differences in consumer
response to price and income, then this has an important bearing
on meat promotion and advertising policy and on the allocation
of promotion funds between different regions in the British
market.

In the two sections which follow we will break up the
problem of sorting out these regional differences in meat
demand into two stages.

In the next section we will make the assumption that
in all regions consumers have the same response to changes
in meat prices and in changes in their incomes. We will
therefore concentrate our attention on the differences in
meat demand which spring solely from differences in tastes
or preferences as between regions.

This we will call an Inter-Regional Analysis.

In Section III we will look at each region, or group
of regions, separately, in order to measure the nature of
consumer response (or price and income elasticity) specifically
for each region and the differences in elasticity between the
different regions.

This we will call an Intra-Regional Analysis.

II. INTER-REGIONAL ANALYSIS

In this analysis the question which in essence we
are seeking to answer is: "Assuming that all consumers in
all regions had the same demand reaction to changes in price
and income levels, i.e. had the same price and income
elasticities, would there be a significant difference in
the level of consumption which would prevail in each region
if prices and income were the same in all regions?" This
is to say that our concern is with the relative position of
demand curves rather than their slopes.

The regions used in the analysis were those used and
given in the National Food Survey Reports[1] as follows:

1. Wales
2. Scotland
3. Northern & East & West Ridings
4. North Western
5. North Midland & Eastern
6. Midland
7. South Western
8. South Eastern & Southern
9. London

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[1] Full details of each region are given in the 1963
National Food Survey, page 80.

The data relating to weekly per capita consumption of each meat, prices of each meat, and income for each quarter over the period 1955-63 were subjected to a combined cross section-time series analysis, the results[1] of which are given in Table I. The underlying model of the demand equation is set out in the Appendix.

Apart from yielding estimates of own prices and cross elasticities of demand and of seasonal coefficients not dissimilar from those found in earlier work, the results shown in Table I also indicate marked and significant regional differences in the level of the demand curve as distinct from its slope.

For lamb and mutton, there is a significant relationship between consumption per head and

> price of lamb and mutton;
>
> prices of non-carcase meats;
>
> the second and third quarters of the year;[2]
>
> and all regions except Wales.

In all cases, the regional coefficients are negative, indicating that consumption is always _less_ than that in London, which is taken as the norm. The extreme is reached in Scotland where the coefficient of -1.00 indicates that at a given price and

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[1] In Table I we show only those coefficients significant at the 5% level or better. Appendix Table 1 gives all the details of the complex set of equations with all coefficients significant and not significant alike included.

[2] More correctly, the second and third quarters gave levels of consumption per head significantly different from the fourth quarter, which was taken as the norm.

TABLE I — COMBINED CROSS SECTION AND TIME SERIES REGIONAL REGRESSIONS

| Type of Meat | Percentage Change in Consumption Associated with 1% Change in Deflated Price of: | | | | | Real Disp. Income | Coeffs. of Seasonal Deviations from 4th Season | | | Coeffs. of Regional Deviations from London | | | | | | | | Const. | R^2 |
	L & M	B & V	Poultry	Pork	Non Carc. Meat		S_1	S_2	S_3	R_1 Wales	R_2 Scotland	R_3 N.& E&W Ridings	R_4 North Western	R_5 N.Midlands & Eastern	R_6 Midlands	R_7 S.W.	R_8 S.E.& Southern		
Lamb & Mutton	-1.14				.65			.08	.12	-1.00	- .52	- .10	- .43		- .08	- .27	- .15	2.35	.90
Beef & Veal	.50	-1.58				.44		-.11	-.12	.46	.14	- .07	.07			.09	- .07	2.81	.73
Poultry		1.36	-1.93	1.62	-2.41	1.87		.14	.23	-.74	-.75		-.31					4.68	.72
Pork				-1.58		.93	.11	-.14	-.24	-1.11		- .40	.21		.36	.33		2.51	.87
Non Carc.Meat	- .22	.20			- .46	.24		-.02	.15	.17	.23	.14	.07	.13				3.03	.69

Note: This table contains only those coefficients significant at 5% level or better. Appendix Table 1 contains full set of coefficients.

income level consumption per head in Scotland is 0.3678 times that in London (i.e. the equations were estimated in natural logarithms and $e^{-1.00} = 0.3678$).

Similar remarks apply to the equation for beef and veal. Again there are significant regional differences in demand.

The ranking of the regions in terms of their demand level (i.e. apart from all questions of regional price and income levels) for lamb and mutton and beef and veal is as follows:

Region	Ranking for: Lamb & Mutton	Beef & Veal
London	1	5
Wales	2	7
Midlands	3	6
North Western	4	8
South Eastern & Southern	5	9
South Western	6	3
North Midland & Eastern	7	4
Northern & East and West Ridings	8	2
Scotland	9	1

Broadly speaking, as one moves from London northwards, the level of lamb and mutton demand falls. This is almost exactly reversed in the case of beef for which demand in Scotland is highest, whereas for lamb it is lowest.

These significant regional differences in demand can be shown in an alternative way which is to plot the mathematically calculated demand functions for each region and to observe their level in relation to each other.

This is done for lamb and mutton in Figure 1. Each curve on this diagram represents the demand function or equation, as given in Table I, for the appropriate region after correcting for the effect of prices of other meats and income.

Taking lamb and mutton as an example, each curve shows for each region, the relationship between prices of lamb, and consumption of lamb, with prices of other meat and income held at their mean level for the whole country.

All these curves have the same general shape or elasticity (since we have assumed right from the start that this was the case). But curve no. 1 for London is far out to the right compared with no. 9 for Scotland, indicating that, if all other things are held equal (as they have been in drawing up this diagram), consumption of lamb in Scotland would be, as indicated by the dotted lines, about 3 ounces per head per week at 40d/lb., whereas in London it would be over 8 ounces. There are similar variations between other regions.

This is the answer to the question with which this section started, viz: "Assuming that all consumers in all regions had the same demand reaction to price levels (i.e. the same price and income elasticities), would there be a significant difference in the level of consumption which would prevail in each region if prices and incomes were the same in all regions?" The answer is that there would be a very significant difference in consumption which we have been able to quantify - as being, for example, up to three times greater in the case of London compared with Scotland.

Deflated
Price

pence
per
lb.

50 —

45 —

40 —

35 —

30 —

9   8 7   6   5 43 2 1   FIGURE 1
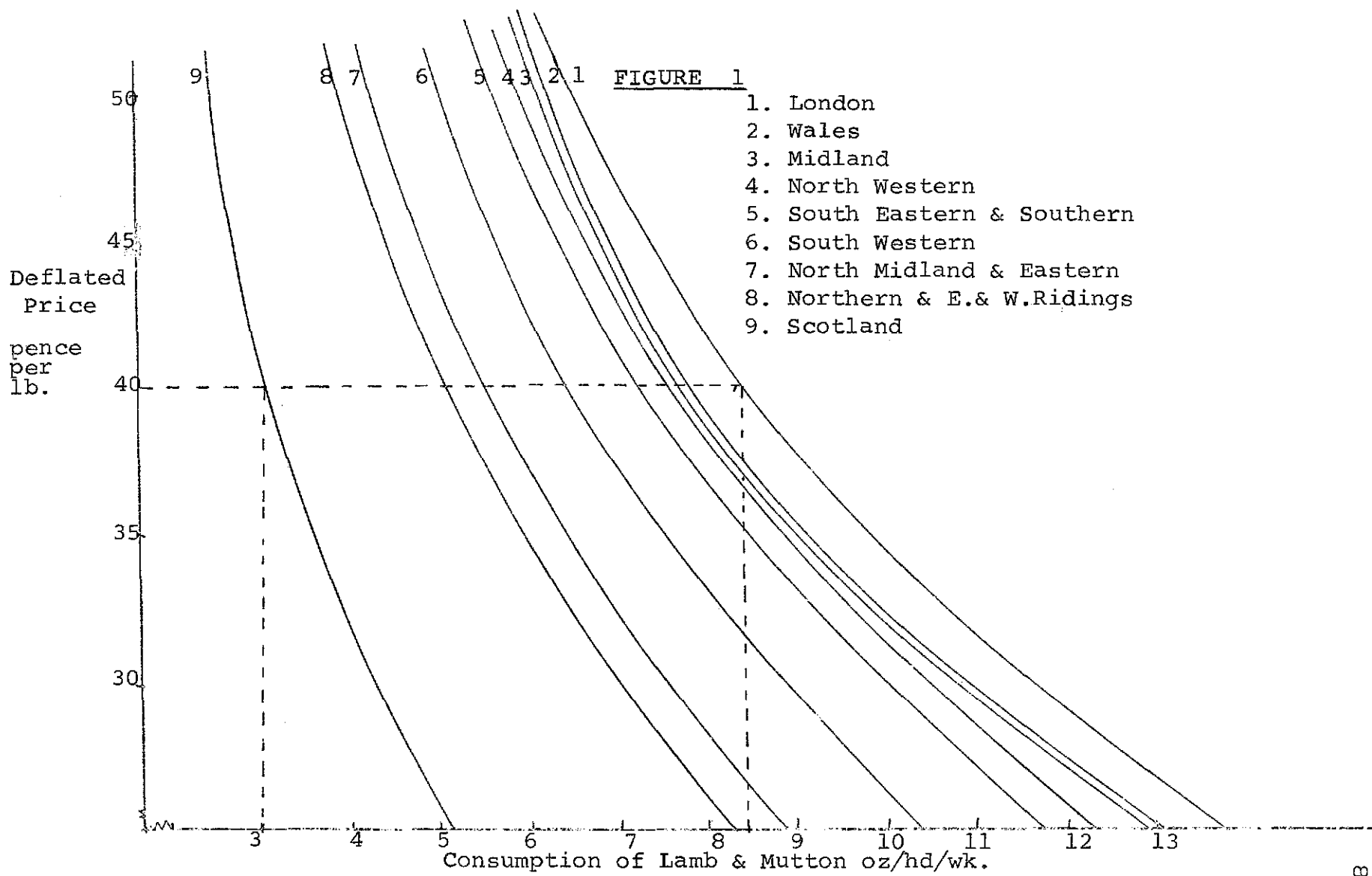
1. London
2. Wales
3. Midland
4. North Western
5. South Eastern & Southern
6. South Western
7. North Midland & Eastern
8. Northern & E.& W.Ridings
9. Scotland

3   4   5   6   7   8   9   10   11   12   13

Consumption of Lamb & Mutton oz/hd/wk.

REGIONAL DEMAND CURVES FOR LAMB AND MUTTON

(assuming prices of other meats and income held at mean level for whole country)

This is the measure of the relative level of the demand curve which we have been seeking.

The actual difference in consumption between regions is, as it happens, compounded of both the above difference in levels of demand and of the different prices and incomes which actually prevailed in each region. In the case of the Scotland - London comparison in 1963, London consumption was actually $4^2/7$ times higher than Scottish consumption. The difference represents the effect of higher prices for lamb in Scotland and lower consumer incomes in 1963, and possibly the effect of differences in the slope or elasticities of the demand functions.

So far we have assumed the latter variable to be constant right throughout the country. In the next section this assumption will be removed and we will attempt to investigate the extent of differences in elasticities between regions.

III. INTRA-REGIONAL ANALYSIS

The question we now ask is "If there were a one per cent change in price of lamb or beef or any other meat or in consumers' income, in each region, would there be a different consumer response between regions?" Our concern now is with relative slopes of demand curves rather than with their levels.

To investigate this question we ran, for each of the nine regions, an analysis of the demand for each meat, using the same variables as in Section II but (because we are now dealing with one region at a time) without the variables for regions.

The full results of this intra-regional analysis for all five types of meat are given in Appendix Table 4. There it will be seen that there are quite marked differences between the elasticities for each of the meats in different regions.

Some of the coefficients, while different in size, are however still within striking distance of each other and it is important to test whether and to what extent the differences are really statistically significant.

The results of such a test[1] indicated that there were no significant differences between the elasticities for the regions making up the following groups, but that there were significant differences between the groups:

	Lamb & Mutton		Beef & Veal
Group		Group	
1.	London	1.	Wales, North Western, North Midland & Eastern, Midland, London
2.	Wales, Midland, South Western		
3.	Northern & E. & W. Ridings, North Western, North Midland and Eastern, South Eastern & Southern.	2.	South Western, South Eastern & Southern
		3.	Northern & East & West Ridings
4.	Scotland.	4.	Scotland.

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[1] Adapted from Gregory C. Chow, "Tests of Equality between Sets of Coefficients in Two Linear Regressions", Econometrics, vol. 28, 1960.

These groups then represent areas within which there
is still regional difference in the level of demand (as
analysed before in Section II) but within which price and
income elasticity is fairly uniform. Between the groups,
however, not only is there regional difference in the level
of demand but also in the elasticity of demand.[2]

Fresh analyses were then conducted for each of these
groups to establish the size of the elasticities and the
results of these are shown in Table II for lamb and mutton.

The figures in this table should be interpreted as
follows: Taking group 3 as an example, the elasticities
of demand for lamb and mutton with respect to the prices
shown and with respect to income, are as shown by the first
four figures.   The seasonal coefficients give the deviation
of demand (from the first and fourth quarters of the year)
which occurs in the second and third quarters, and the three
regional coefficients give the deviation of demand (from
that in South Eastern & Southern) occurring in each of the
three other individual regions making up the group.

The important conclusion from Table II is that there
are quite significant differences in the own price elasticity
for lamb and mutton between these groups of regions.

The own price elasticity of demand, -0.86 in London,
rises to -1.19 in Scotland.   The income elasticity which
in the London region could not be detected and is therefore
presumed to be near zero, is as high as 1.32 in Scotland
and at an intermediate level of 0.68 in Regional Group 3.

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[1] In testing these differences we tested own price, cross
price, income elasticities, and seasonal effects.

TABLE II   DEMAND EQUATIONS FOR LAMB AND MUTTON FOR GROUPS OF REGIONS

Regional Group	Percentage Change in Consumption of Lamb and Mutton Associated with 1% Change in Deflated Price of:					Real Disp. Income	Coeffs. of Seasonal Deviations from 4th Season		Coefficients of Regional Deviation	Const.	R^2
	L & M	B & V	Poultry	Pork	Non Carc. Meat		S_2	S_3			
Regional Group											
(1) London	− .86			−.45	1.37			.06		1.60	.69
									Deviations from South Western — R_1=Wales, R_2=Midland		
(2) Wales, Midland,) South Western)	− .75	.84			.97		.10	.11	.15 .19	2.17	.58
									Deviations from South-Eastern & Southern — R_1=N.&E.&W. Ridings, R_2=N.W., R_3=N.M.&E.		
(3) Northern & E.& W.Rdgs) North Western) N.Midland & Eastern) So.Eastern & Southern)	−1.18		.30		.55	.68	.09	.16	−.29 .10 −.22	3.39	.85
(4) Scotland	−1.19					1.32				6.17	.45

Note: (i) This table contains only those coefficients significant at the 10% level or better. The full set of coefficients is contained in Appendix Table 2.

(ii) Regional variables here are deviations from the remaining region in their group.

The indication is therefore that broadly speaking, as we move north from the London region, slopes of demand or price and income elasticities for lamb rise, a conclusion which parallels, if inversely, our earlier conclusion in Section II namely that, as we move north, the level of the demand curve falls.

A similar analysis to that just presented for lamb and mutton can also be carried out for beef and veal as in Table III. In this case the greatest price response would be in the group containing South Western, and South Eastern and Southern.

Returning now to the lamb and mutton analysis the results in Table II can be presented diagrammatically by plotting the computed demand curve for each of the regional groups. This is done in Figure 2. Each curve on this diagram represents the demand equation for lamb and mutton for each of the regional groups after correcting for the effects on consumption of other prices and of income levels (by holding them at their mean value).

The demand curve for Scotland lamb and mutton has a greater slope than that for London, indicating that a given percentage change in price in both regions would lead to a greater percentage response in the former compared with the latter region.

This, then, is the answer to the question with which we introduced this section. There are significant differences in elasticities particularly with respect to income but also with respect to price.

FIGURE 2

1. London
2. Midland
3. Wales
4. North Western
5. South Western
6. South Eastern & Southern
7. N.Midland & Eastern
8. Northern & E.& W.Ridings
9. Scotland

Consumption of Lamb & Mutton oz/hd/wk
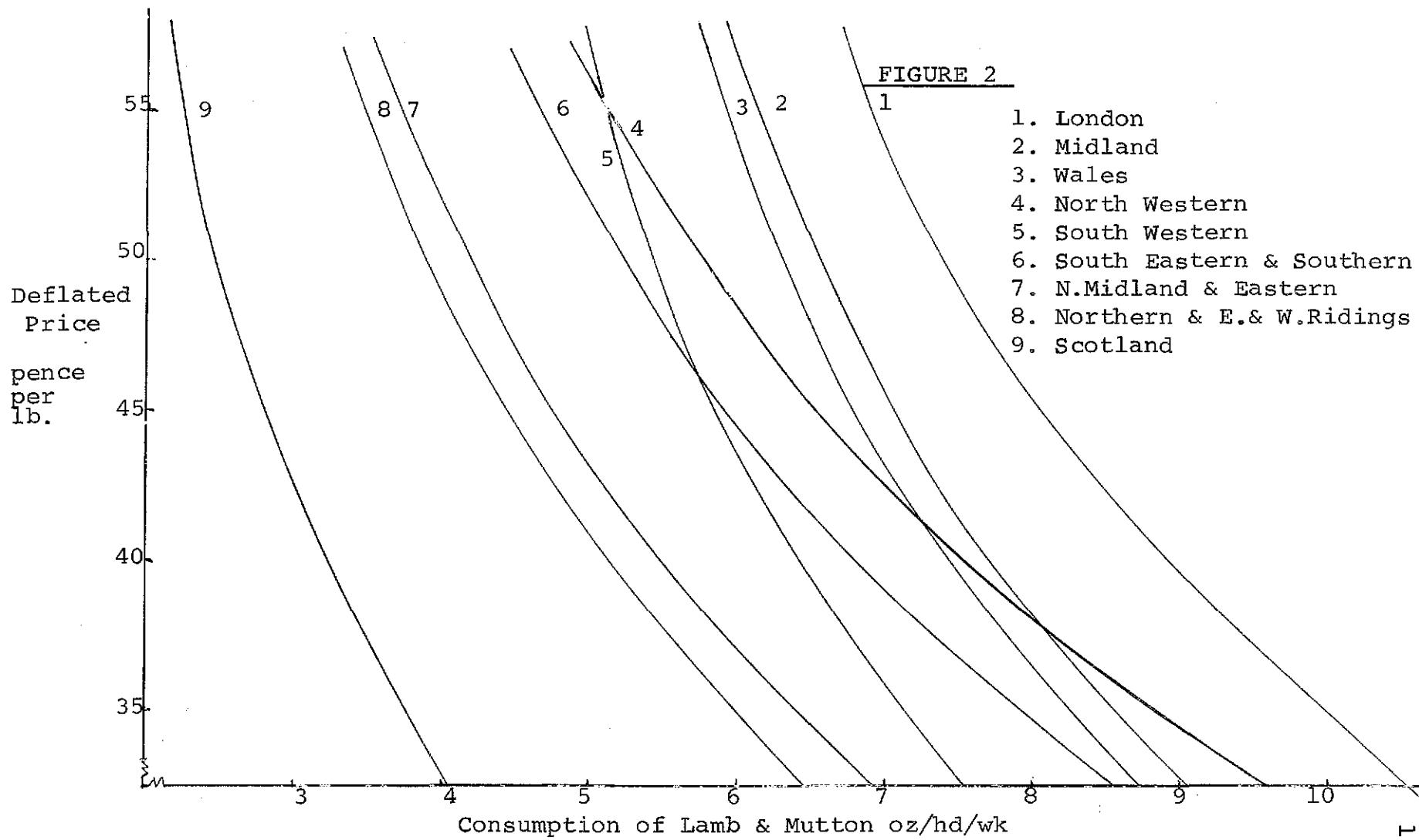
REGIONAL DEMAND CURVES FOR LAMB AND MUTTON

(These demand curves are calculated from the equations shown in Table II.)

TABLE III   DEMAND EQUATIONS FOR BEEF AND VEAL FOR GROUPS OF REGIONS

	Percentage Change in Consumption of Beef and Veal Associated with a 1% Change in Deflated Price of:-				Real Disp. Income	Coeffs. of Seasonal Deviations from 4th Season			Coeffs. of Regional Deviations	Const.	R^2
	L & M	B & V	Poultry	Non Carc. Meat		S_1	S_2	S_3			
Regional Groups									R_3=Deviations of N.Midland & Eastern from London		
(1) Wales, North Western N.Midland & Eastern Midland, London	.50	-1.62			.65	.03	-.11	-.12	.11	3.36	.70
(2) South Western, S.E. & Southern		-2.14					-.13	-.14	Deviations of S.W. from S.E.& S. .17	1.66	.64
(3) Northern & East & West Ridings		-1.31	.41							3.14	.67
(4) Scotland		-1.51		.80	.65		-.09	-.06		4.31	.69

Note: This table includes only those coefficients significant at the 5% level or better.
The full set of coefficients is given in Appendix Table 3.

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IV. SUMMARY AND IMPLICATIONS

The foregoing analysis leads to the following general conclusions:

(i)   There appear to be significant regional differences in the demand functions for lamb and mutton and for beef, in the United Kingdom and these differences have two aspects.

(ii)   In the first place there is a difference in the level of the function reflecting possibly differences in tastes and preferences and these differences are such that the demand curve for lamb and mutton is at a lower level in regions further north of London; for beef and veal the reverse is the case.

(iii)   Secondly, there are significant regional differences in price and income elasticities of demand with the highest elasticities appearing in regions where the level of demand (as in (ii)) is lowest, especially for lamb and mutton.

These facts have three important implications. Firstly, in formulating long-term demand projections for meat in Britain more accurate results will be achieved by building up the national picture from specific regional projections which take account of different regional income elasticities and different regional rates of population and income growth.

Secondly, the higher price elasticities in low demand regions suggest that anything which can be done (say by reducing marketing costs and margins) to reduce prices for lamb and mutton in these regions will have a greater proportionate effect on per capita consumption of lamb than a similar reduction in price in other (usually Southern) regions.

Thirdly, the results bear on the question of advertising and promotion policy for New Zealand meat in Britain. It is generally recognised that the effectiveness of advertising and promotion of a commodity is usually greatest in areas where the elasticities are highest. Moreover, it is possibly also more profitable to concentrate advertising in areas where preferences are low, and so raise them, rather than where they are already high and can only be raised further by inordinately high advertising expenditures or efforts.

In devising optimum regional allocation of advertising expenditures for meat in Britain, some allowance should possibly be made for these factors. Maybe it would pay to shift some of the expenditure and effort at present devoted to the high demand southern parts of Britain to the low demand northern parts.

Of course, in devising such optimal regional programmes account would need to be taken of the differences in the total size of the market in each region reflecting differences in population, as well as, of course, the differences in growth rates of population and income in each region, but such matters are outside the scope of the present publication.

A P P E N D I X

The basic equation which was used to estimate the coefficients used in this paper was of the form:

$$C_L = b_1 P_L + b_2 P_B + b_3 P_{Py} + b_4 P_{Pk} + b_5 P_{NCM} + b_6 RDY$$
$$+ c_1 S_1 \ .. \ c_3 S_3 + .. \ d_i R_i + .. + a$$

where C indicates Log Consumption

P indicates Log Price

with subscripts

L	:	Lamb and mutton
B	:	Beef and veal
Py	:	Poultry
Pk	:	Pork
NCM	:	Non-carcase meat
RDY	:	indicates log real disposable income

S_i is a seasonal dummy variable

= 1 in season i   ;   = 0 elsewhere

R_i is a regional dummy variable

= 1 in region i   ;   = 0 elsewhere

The b's, c's and d's are the coefficients that we are estimating and a is the constant term.

The coefficients were estimated using multiple regression.

Type of Meat	Percentage Change in Consumption Associated with 1% Change in Deflated Price of:					Real Disp. Income	Coeffs. of Seasonal Deviations from 4th Season			Coeffs. of Regional Deviations from London								Const.	R^2
	L & M	B & V	Poultry	Pork	Non Carc. Meat		S_1	S_2	S_3	R_1 Wales	R_2 Scotland	R_3 N.& E. Ridings	R_4 North Western	R_5 N.Midlands & Eastern	R_6 Midlands	R_7 S.W.	R_8 S.E.& Southern		
Lamb & Mutton	-1.14 (.17) **	.17 (.19)	.08 (.05)	.16 (.13)	.65 (.18) **	.15 (.14)	- .02 (.02)	.08 (.02) **	.12 (.02) **	- .06 (.05)	-1.00 (.07) **	- .52 (.05) **	- .10 (.04) **	- .43 (.04) **	- .08 (.04) *	- .27 (.05) **	- .15 (.04) **	2.35	.90
Beef & Veal	.50 (.13) **	-1.58 (.14) **	.05 (.04)	- .00 (.10)	- .05 (.14)	.44 (.11) **	.02 (.02)	- .11 (02) **	- .12 (.02) **	- .06 (.04)	.46 (.05) **	.14 (.04) **	- .07 (.03) *	.07 (.03) *	- .02 (.03)	.09 (.04) *	- .07 (.03) *	2.81	.73
Poultry	- .33 (.55)	1.36 (.60) *	-1.93 (.17) **	1.62 (.43) **	-2.41 (.59) **	1.87 (.45) **	.04 (.07)	.14 (.07) *	.23 (.08) **	.03 (.17)	- .74 (.23) **	- .75 (.15) **	.03 (.14)	- .31 (.14) *	- .24 (.13)	- .01 (.17)	- .14 (.12)	4.68	.72
Pork	.22 (.28)	.27 (.31)	.09 (.09)	-1.58 (.22) **	- .51 (.30)	.93 (.23) **	.11 (.04) **	- .14 (.04) **	- .24 (.04) **	.14 (.09)	-1.11 (.19) **	- .05 (.08)	- .40 (.07) **	.21 (.07) **	.36 (.07) **	.33 (.09) **	- .08 (.06)	2.51	.87
Non Carcase Meat	- .22 (.07) **	.20 (.07) **	.01 (.02)	.01 (.05)	- .46 (.07) **	.24 (.06) **	- .01 (.01)	- .02 (.01) *	.00 (.01)	.15 (.02) **	.17 (.03) **	.23 (.02) **	.14 (.02) **	.07 (.02) **	.13 (.02) **	.02 (.02)	.01 (.02)	3.03	.69

Notes: * Significantly different from 0 at 5% level

** Significantly different from 0 at 1% level

Standard errors are given in brackets.

APPENDIX TABLE 2   DEMAND EQUATIONS FOR LAMB AND MUTTON FOR GROUPS OF REGIONS

| Regional Group | Percentage Change in Consumption of Lamb and Mutton Associated with 1% Change in Deflated Price of: | | | | | Real Disp. Income | Coeffs. of Seasonal Deviations from 4th Season | | | Coefficients of Deviation | | | Const. | R^2 |
	$L \& M$	$B \& V$	Poultry	Pork	Non Carc. Meat		S_1	S_2	S_3					
(1) London	− .86 (.25) **	.44 (.28)	− .16 (.11)	− .45 (.18) **	1.37 (.42) **	− .26 (.18)	.02 (.03)	.03 (.03)	.06 (.03) *				1.60	.69
										Coefficients of Deviation from South Western				
										R_1=Wales	R_2=Midland			
(2) Wales / Midland / South Western	− .75 (.26) **	.84 (.31) **	.06 (.08)	.05 (.27)	.97 (.27) **	− .15 (.22)	.04 (.04)	.10 (.04) **	.11 (.04) **	.15 (.04) **	.19 (.04) **		2.17	.58
										Coefficients of Deviation from South Eastern & Southern				
										R_1= N&E&W.	R_2=NW	R_3=NM&E		
(3) Northern & E.& W.Rdgs / North Western / N.Midland & Eastern / South-East & Southern	−1.18 (.21) **	− .28 (.22)	.30 (.07) **	.04 (.15)	.55 (.24) *	.68 (.15) **	− .02 (.02)	.09 (.02) **	.16 (.02) **	− .29 (.03) **	.10 (.03) **	− .22 (.03) **	3.39	.85
(4) Scotland	−1.19 (.61) o	1.04 (1.45)	− .06 (.21)	.32 (.40)	1.10 (1.07)	1.32 (.57) *	.06 (.10)	− .16 (.10)	− .07 (.10)				6.17	.45

Notes: o Significantly different from 0 at the 10% level

*   "   "   " 0 " "   5% level

**   "   "   " 0 " "   1% level

Standard errors are given in brackets.

APPENDIX TABLE 3   DEMAND EQUATIONS FOR BEEF AND VEAL FOR GROUPS OF REGIONS

	Percentage Change in Consumption of Beef and Veal Associated with a 1% Change in Deflated Price of:-					Real Disp. Income	Coeffs. of Seasonal Deviations from 4th Season			Coefficients of Regional Deviation from London				Const.	R^2
	L & M	B & V	Poultry	Pork	Non Carc. Meat		S_1	S_2	S_3	R_1 Wales	R_2 N.Western	R_3 N.Mid.&E.	R_4 Midland		
Regional Groups															
(1) Wales, North Western, North Midland & Eastern, Midland, London	.50 (.15) **	−1.62 (.18) **	.05 (.05)	.14 (.13)	− .27 (.20)	.65 (.13) **	.03 (.02) *	− .11 (.02) **	− .12 (.02) **	− .01 (.04)	− .04 (.03)	.11 (.04) **	.02 (.03)	3.36	.70
										Coeff.of Deviation of S.W. from S.E.&S.					
(2) South Western, South Eastern & Southern	.41 (.30)	−2.14 (.35)	− .10 (.09)	− .09 (.28)	.04 (.26)	.28 (.23)	− .02 (.04)	− .13 (.04) **	− .14 (.04) **	.17 (.04) **				1.66	.64
(3) Northern and East & West Ridings	.50 (.38)	−1.31 (.34) **	.41 (.12) **	.03 (.22)	− .14 (.37)	.38 (.21)	.05 (.04)	− .04 (.04)	− .05 (.04)					3.14	.67
(4) Scotland	.18 (.15)	−1.51 (.36) **	.03 (.05)	− .18 (.10)	.80 (.27) **	.65 (.14) **	.03 (.02)	− .09 (.02) **	− .06 (.02) **					4.31	.69

Notes: * Significantly different from 0 at 5% level

** " "   "   " 0 " 1% level

Standard errors are given in brackets.

LAMB AND MUTTON

| Region | Percentage Change in Consumption of Lamb & Mutton Associated with a 1% Change in: Deflated Price of: | | | | | Real Disp. Income | Coeffs. of Seasonal Deviation from 4th Season | | | Const. | R^2 | |
	L & M	B & V	Poultry	Pork	Non Carc. Meat		S_1	S_2	S_3			
Wales	-1.00 (.47) *	.30 (.60)	- .03 (.14)	.73 (.48)	.66 (.81)	- .44 (.42)	- .06 (.07)	.07 (.08)	.04 (.08)	1.01	.32	No autocorrelation
Scotland	-1.19 (.61) *	1.04 (1.46)	- .06 (.21)	.32 (.40)	1.10 (1.06)	1.32 (.57)	.06 (.10)	- .16 (.10)	- .07 (.10)	6.17	.45	"
Northern & E & W Rdgs	-1.38 (.57) *	- .43 (.51)	.24 (.18)	.58 (.33)	.21 (.56)	.81 (.31) *	- .03 (.05)	.12 (.06) *	.21 (.06) **	3.26	.58	"
North Western	-1.33 (.32) **	.26 (.48)	.44 (.17) *	- .03 (.22)	.10 (.46)	.41 (.30)	- .02 (.04)	.11 (.04) **	.16 (.04) **	2.61	.72	"
North Midlands & Eastern	- .92 (.47) **	-1.11 (.59)	.07 (.15)	- .57 (.37)	1.89 (.57) **	.64 (.45)	- .00 (.05)	.08 (.05)	.15 (.05) **	3.14	.62	"
Midland	- .90 (.55)	1.02 (.45) *	.16 (.15)	- .34 (.43)	.79 (.47) **	- .40 (.37)	- .02 (.05)	.16 (.06) **	.16 (.06) **	1.19	.57	"
South Western	- .84 (.49)	2.58 (.65) **	.18 (.14)	- .57 (.52)	1.55 (.42) **	- .58 (.40)	- .12 (.07)	.02 (.08)	.05 (.09)	2.22	.66	Positive autocorrelation
South Eastern & Southern	-1.27 (.45) **	.60 (.45)	.37 (.14) **	.17 (.38)	.04 (.48)	.20 (.35)	- .04 (.05)	.04 (.05)	.11 (.05) *	2.26	.51	No autocorrelation
London	- .86 (.25) **	.44 (.28)	- .16 (.11)	- .46 (.18) **	1.37 (.42) **	- .26 (.18)	.02 (.03)	.03 (.03)	.06 (.03) *	1.60	.69	"

In this and the following tables: * Significantly different from 0 at 5% level
** " " " 0 " 1% level
Standard errors are given in brackets.

BEEF AND VEAL

Region	Percentage Change in Consumption of Beef and Veal Associated with a 1% Change in: Deflated Price of:					Real Disp. Income	Coeffs. of Seasonal Deviation from 4th Season			Const.	R^2
	L & M	B & V	Poultry	Pork	Non Carc. Meat		S_1	S_2	S_3		
Wales	.94 (.42) *	-1.94 (.53) **	.13 (.12)	.30 (.42)	- .77 (.72)	.98 (.37) *	.06 (.06)	- .04 (.07)	- .12 (.07)	4.27	.69
Scotland	.18 (.15)	-1.50 (.36) **	.03 (.05)	- .18 (.10)	.80 (.27) **	.65 (.14) **	.03 (.02)	- .09 (.02) **	- .06 (.02) **	4.31	.69
Northern & E & W Rdgs	.50 (.38)	-1.31 (.34) **	.41 (.12) **	.03 (.22)	- .14 (.37)	.38 (.21)	.05 (.04)	- .04 (.04)	- .05 (.04)	3.14	.67
North Western	.55 (.31)	-1.44 (.47) **	- .13 (.16)	- .35 (.21)	- .24 (.44)	.40 (.29)	.02 (.04)	- .14 (.04) **	- .13 (.04) **	2.27	.70
North Midland & Eastern	- .19 (.29)	- .68 (.37)	.25 (.10) *	- .38 (.23)	.04 (.35)	.82 (.28) **	.04 (.03)	- .07 (.03) *	- .09 (.03) **	4.06	.68
Midland	.65 (.50)	-1.34 (.41) **	- .12 (.13)	.36 (.39)	- .41 (.43)	.30 (.34)	- .01 (.05)	- .16 (.05) **	- .18 (.05) **	2.60	.64
South Western	.71 (.41)	-3.35 (.55) **	- .20 (.12)	- .16 (.44)	- .52 (.36)	.62 (.34)	.04 (.06)	- .08 (.06)	- .06 (.07)	1.60	.72
South Eastern & Southern	.05 (.36)	-1.32 (.36) **	.03 (.11)	- .12 (.31)	.39 (.38)	.19 (.28)	- .03 (.04)	- .14 (.04) **	- .16 (.04) **	2.05	.68
London	- .09 (.35)	-2.10 (.40) **	.11 (.15)	.49 (.26)	- .25 (.60)	.67 (.25) *	.00 (.04)	- .09 (.04) *	- .08 (.04) *	2.78	.72

POULTRY

| Region | Percentage Change on Consumption of Poultry Associated with a 1% Change in: Deflated Price of: | | | | | Real Disp. Income | Coeffs. of Seasonal Deviation from 4th Season | | | Const. | R^2 |
	L & M	B & V	Poultry	Pork	Non Carc. Meat		S_1	S_2	S_3		
Wales	-.02 (1.72)	-2.99 (2.18)	-2.86 (.50) **	-.09 (1.74)	2.43 (2.95)	1.96 (1.51)	-.39 (.26)	-.24 (.28)	.01 (.29)	4.57	.75
Scotland	-1.74 (1.40)	3.65 (3.36)	-.93 (.49)	1.71 (.91)	-3.20 (2.46)	2.38 (1.32)	.12 (.23)	.17 (.23)	.42 (.22)	6.66	.64
Northern & E & W Rdgs	-3.06 (1.85)	4.28 (1.64) *	-2.79 (.57) **	2.54 (1.07) *	-2.61 (1.81)	2.35 (1.00) *	-.04 (.18)	-.02 (.18)	.21 (.20)	5.31	.88
North Western	-1.02 (.87)	3.51 (1.30) *	-.97 (.45) *	2.00 (.59) **	-4.59 (1.23) **	2.02 (.81) *	.18 (.10)	.32 (.10) **	.20 (.10) *	5.36	.92
North Midland & Eastern	-.97 (1.44)	3.75 (1.81) *	-1.47 (.47) **	2.48 (1.14) *	-4.79 (1.74) *	2.75 (1.40) *	.12 (.16)	.18 (.15)	.26 (.17)	7.36	.85
Midland	.45 (2.35)	-.01 (1.95)	-2.09 (.63) **	1.99 (1.83)	-2.01 (2.03)	3.19 (1.58) *	.25 (.23)	.42 (.24) *	.44 (.25)	8.55	.70
South Western	.35 (1.70)	2.19 (2.25)	-1.98 (.49) **	-1.43 (1.80)	-2.67 (1.46)	.04 (1.39)	.13 (.26)	.30 (.26)	.33 (.30)	-2.61	.60
South Eastern & Southern	-1.99 (1.60)	1.76 (1.60)	-1.81 (.50) **	2.30 (1.35)	-.34 (1.68)	1.00 (1.22)	-.12 (.17)	.16 (.18)	.12 (.17)	3.08	.84
London	.01 (1.11)	1.66 (1.26)	-1.34 (.49) **	2.98 (.82) **	-5.38 (1.90) **	2.87 (.80) **	.01 (.13)	.24 (.14)	.12 (.13)	7.31	.91

APPENDIX TABLE 4(D)   DEMAND EQUATIONS FOR SEPARATE REGIONS

PORK

	Percentage Change on Consumption of Pork Associated with a 1% Change in: Deflated Price of:					Real	Coeffs. of Seasonal Deviation from 4th Season			Const.	R^2
	L & M	B & V	Poultry	Pork	Non Carc. Meat	Disp. Income	S_1	S_2	S_3		
Wales	.27 (.94)	2.28 (1.19)	.48 (.27)	- .63 (.95)	-3.00 (1.61)	1.88 (.82) *	.13 (.14)	- .14 (.15)	- .09 (.16)	6.06	.50
Scotland	.61 (.97)	-2.65 (2.31)	- .47 (.34)	-1.86 (.63) **	.17 (1.70)	.44 (.91)	.11 (.16)	- .07 (.16)	- .10 (.15)	-1.83	.41
Northern & E & W Rdgs	- .84 (.96)	1.15 (.85)	.09 (.29)	-1.53 (.55) **	- .02 (.94)	.31 (.52)	.18 (.09)	- .12 (.09)	- .35 (.10) **	.71	.64
North Western	.45 (1.15)	.15 (1.73)	- .40 (.60)	-1.52 (.79)	- .92 (1.65)	.40 (1.08)	.15 (.13)	- .29 (.13) *	- .38 (.13) **	.02	.51
North Midland & Eastern	1.90 (.72) *	.14 (.91)	- .21 (.24)	-2.01 (.57) **	- .04 (.87)	.28 (.70)	.06 (.08)	- .16 (.07) *	- .37 (.08) **	2.02	.60
Midland	.18 (.76)	.47 (.63)	.07 (.21)	- .81 (.59)	-1.35 (.66) *	.51 (.51)	.06 (.08)	- .16 (.08) *	- .26 (.08) **	1.61	.61
South Western	.11 (.69)	-1.52 (.92)	.10 (.20)	-2.04 (.73) **	- .74 (.60)	1.69 (.57) **	.26 (.10) *	.13 (.11)	.12 (.12)	3.07	.46
South Eastern & Southern	-1.25 (.75)	1.25 (.75)	.43 (.24)	-1.49 (.63) *	-1.60 (.78) *	.32 (.57)	- .03 (.08)	- .27 (.08) **	- .27 (.08) **	-.62	.70
London	- .20 (.55)	.23 (.62)	- .07 (.24)	-1.67 (.40) **	-1.44 (.93)	.40 (.39)	.03 (.06)	- .10 (.07)	- .18 (.06) **	-.44	.80

NON-CARCASE MEAT

| Region | Percentage Change on Consumption of Non-Carcase Meat Associated with a 1% Change in: Deflated Price of: | | | | | Real Disp. Income | Coeffs. of Seasonal Deviation from 4th Season | | | Const. | R^2 |
	L & M	B & V	Poultry	Pork	Non Carc. Meat		S_1	S_2	S_3		
Wales	-.76 (.16) **	.28 (.20)	.03 (.05)	.06 (.16)	.24 (.27)	.19 (.14)	.02 (.02)	-.07 (.03) *	-.03 (.03)	3.23	.73
Scotland	.02 (.21)	1.15 (.50) *	.02 (.07)	-.13 (.14)	-1.58 (.37) **	.00 (.20)	-.05 (.03)	-.02 (.03)	.03 (.03)	2.18	.61
Northern & E & W Rdgs	-.10 (.19)	-.03 (.17)	.14 (.06) *	.38 (.11) **	-.47 (.18) *	.21 (.10) *	-.02 (.02)	-.02 (.02)	-.01 (.02)	3.46	.58
North Western	-.13 (.20)	.04 (.30)	-.02 (.10)	.11 (.14)	-.67 (.29) *	-.02 (.19)	-.01 (.02)	.03 (.02)	.01 (.02)	2.17	.41
North Midland & Eastern	.15 (.20)	-.05 (.26)	-.05 (.07)	-.46 (.16) **	-.33 (.25)	.36 (.20)	-.03 (.02)	-.06 (.02) **	-.05 (.02) **	3.34	.64
Midland	-.15 (.25)	.20 (.21)	-.03 (.07)	-.07 (.19)	-.38 (.21)	.29 (.17)	-.01 (.02)	-.05 (.02) **	-.06 (.03) *	3.39	.65
South Western	-.33 (.20)	.41 (.26)	-.01 (.06)	.11 (.21)	-.25 (.17)	.29 (.16)	-.02 (.03)	-.02 (.03)	-.01 (.04)	3.52	.57
South Eastern & Southern	-.01 (.19)	.18 (.19)	-.04 (.06)	.37 (.16) *	-.93 (.20) **	.05 (.15)	-.02 (.02)	-.00 (.02)	.04 (.02) *	2.47	.71
London	-.07 (.15)	.18 (.17)	-.04 (.07)	.09 (.11)	-.85 (.26) **	.09 (.11)	.01 (.02)	.06 (.02) **	.08 (.02) **	2.37	.76

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