

AGRICULTURAL
ECONOMICS
RESEARCH UNIT



Lincoln College

FACTORS AFFECTING DEMAND
FOR WOOL TEXTILES
IN NEW ZEALAND

by

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*

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THE AGRICULTURAL ECONOMICS RESEARCH UNIT

THE Unit was established in 1962 at Lincoln College with an annual grant from the Department of Scientific and Industrial Research. This general grant has been supplemented by grants from the Wool Research Organisation, the Nuffield Foundation and the New Zealand Forest Service for specific research projects.

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IN NEW ZEALAND

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C O N T E N T S

	Page
I. INTRODUCTION	1
II. TRENDS IN PER CAPITA WOOL CONSUMPTION	2
III. A POSSIBLE EXPLANATION OF WOOL CONSUMPTION TRENDS	5
IV. A DEMAND FUNCTION FOR WOOL TEXTILES	7
V. THE RISE IN WOOL TEXTILE PRICES	11
VI. FACTORS AFFECTING THE PRICES OF LOCALLY PRODUCED WOOL TEXTILES	13
VII. IMPLICATIONS FOR NEW ZEALAND	22
APPENDIX TABLES	24

P R E F A C E

With the aid of a grant from the Wool Research Organisation of New Zealand, the Agricultural Economics Research Unit is carrying out a programme of research into the factors affecting the world demand for wool. One aspect of this programme is concerned with measuring factors affecting retail consumption of wool textiles in major wool consuming countries, commencing with New Zealand. The results form the substance of this publication.

Part of the paper was presented as evidence by the writer to the enquiry into the Wool Textile Industry conducted in early 1964 by the Tariff and Development Board.

I am grateful to Mr D.M. Beggs, Research Officer in the Unit for assistance in computing and drawing diagrams.

Lincoln College
March 1965

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FACTORS AFFECTING CONSUMPTION OF WOOL TEXTILES
IN NEW ZEALAND

I. INTRODUCTION

This paper is concerned with the results of some research on the factors affecting the consumption of wool textiles in New Zealand. Such a study, while of national importance, in a country as dependent on wool as New Zealand, has special significance at the present time because of the downward trend in consumption which has developed in recent years. This is in marked contrast to the trends which we have studied in each of the 22 major wool consuming countries, where, in the aggregate, consumption per head rose about 1.2 per cent per annum over the last decade. The comparative position of New Zealand is highlighted by the following figures which give the percentage change in per capita wool consumption between 1954/55 and 1959/60:

	<u>Average Per Capita Wool Consumption</u>		<u>Percentage</u>
	<u>1954/55</u>	<u>1959/60</u>	<u>Change</u>
	lbs		
Japan	1.2	2.3	+91
Italy	1.2	2.3	+91
West Germany	4.3	4.9	+15
U.S.A.	2.6	2.8	+ 6
U.K.	5.5	5.6	+ 3
Belgium	3.9	3.9	+ 1
Australia	5.7	5.7	-
France	3.5	3.1	-10
NEW ZEALAND	8.6	6.0	-30

Source: Submissions of N.Z. Wool Board to Tariff Board Enquiry into wool textiles. Derived from F.A.O. figures.

In dealing with this question we shall proceed as follows. In Section II we give a description of post-war trends in wool and other fibre consumption in New Zealand. Sections III and IV are devoted to explaining these trends. And in Sections V and VI we present the preliminary results of an analysis of price changes for wool textiles, at wholesale and retail level.

As far as possible research results are presented in the form of diagrams for which all the supporting notes as to sources and methods are given in statistical appendices.

II. TRENDS IN PER CAPITA WOOL CONSUMPTION

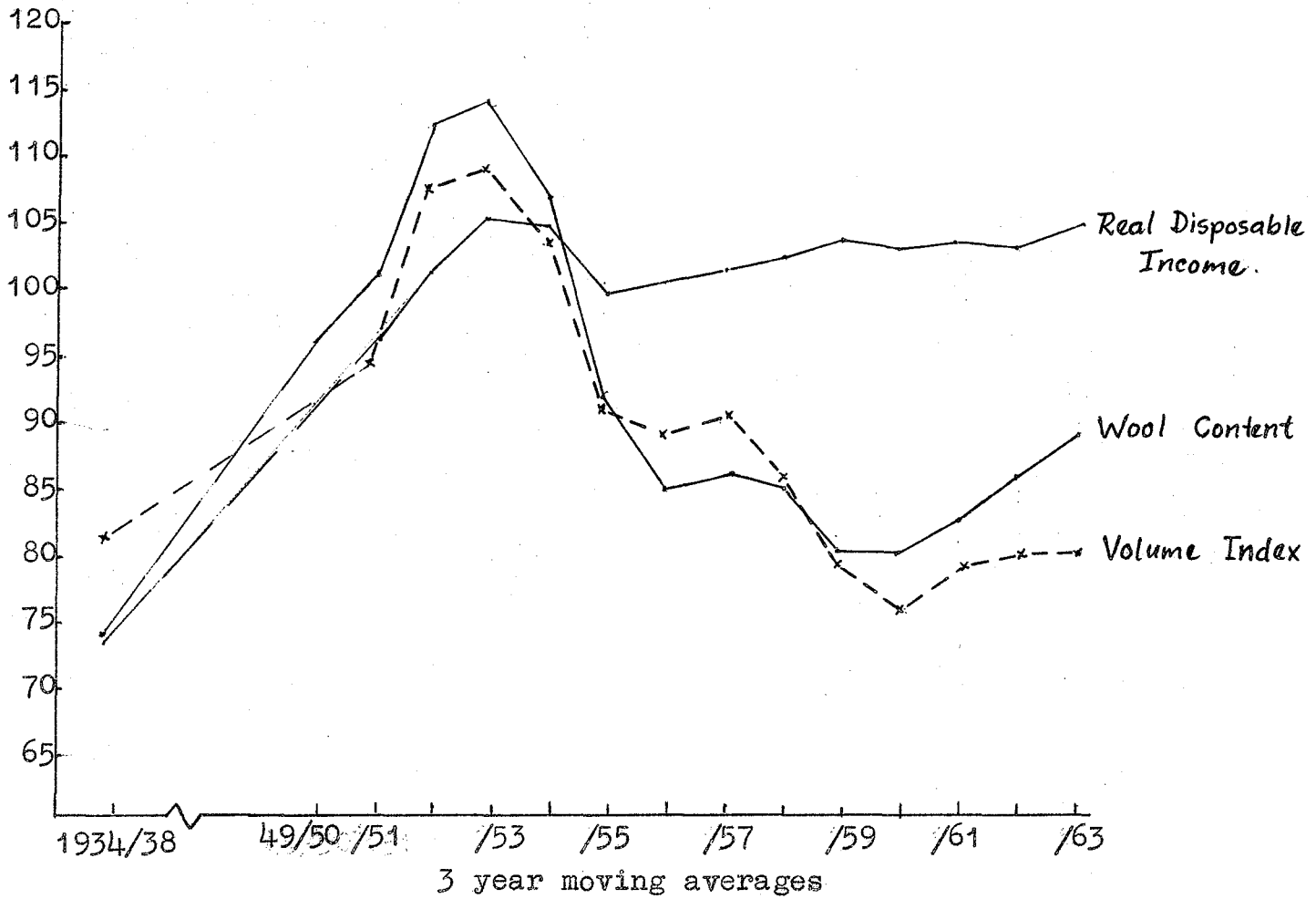
In Diagram I there are plotted (as three year moving averages) two indices on the base 1949/50=100, of New Zealand

DIAGRAM I

WOOL TEXTILES AVAILABLE FOR CONSUMPTION

(Index Numbers - 1949/50 = 100)

Index
1949/50=100



post-war per capita wool textile consumption or more strictly of wool textiles per capita available for consumption. These figures are derived, as mentioned below and as described in detail in Table 1, from the official New Zealand statistics of wool textile production and wool textile imports and the figures therefore measure the flow of wool textiles to the wholesale and retail trade year by year. This flow would only exactly equal retail consumption in the absence of any significant changes in stocks held at wholesale and retail level - a matter on which unfortunately we have no information. To take account of such possible stock changes and to indicate general trends in consumption, the figures have been shown as three year moving averages on the diagram.

Two approaches, represented on Diagram I by two indices, have been adopted to measuring consumption. In the first place we give an index of fibre content of wool textile consumption, excluding carpets, as shown in diagram. The methods used to construct this index are fully described in Table 1 where the basic data are also given, but essentially the method consists of calculating and aggregating each year the fibre content of each and every item of wool textiles locally produced and imported. The method is broadly similar and in some respects superior to that adopted by F.A.O. in their published fibre consumption

figures with which our figures broadly agree.¹

The alternative measure, shown in the Diagram, is an index of the volume of wool textiles again excluding carpets. This volume index has been constructed by conventional methods, described in Appendix I. Essentially it is a measure of the value at constant base year prices of all wool textiles produced and imported. The index was developed as an alternative to the first fibre content measure, because it was thought that the latter could give a biased picture of the situation especially if there had been a very significant reduction in the average weight of wool per yard of cloth etc., over the period of our analysis.

In the event, however, the volume index, when compared with the fibre content index, gives much the same results up to about 1960 after which measurement by volume gives an even lower figure than measurement by fibre content.

Whichever index we choose, however, the significant fact is that up to the early fifties consumption increased

¹ The essential difference is that F.A.O.'s basic starting point is mill consumption of wool rather than the fibre content of output, for the very good reason that detailed output figures are not as easily obtainable as wool input figures.

New Zealand is fortunate in possessing a very good series of wool textile output figures which we have been able to use and which are likely to have resulted in improved accuracy in the results.

quite rapidly, but for the last decade there has been a steady decline to consumption levels around those pertaining to pre-war years.

As mentioned, in the introduction, this declining consumption trend is in marked contrast to the experience in other countries. Moreover it is not matched by the consumption figures for other non-wool fibres. Per capita consumption figures for cotton and synthetic textiles have been calculated on a fibre content basis by the same methods as for wool, and the results plotted in Diagram II, based also on calculations given in Appendix Table 1.* By 1962/63 the consumption of cotton and synthetic textiles, was more than a third higher than pre-war and the consumption of all textiles (wool, cotton and synthetic as a total), were only slightly less than a third higher. Wool has, therefore, severely lost ground in terms of its share of the market for reasons to which we give consideration in the next section.

III.A POSSIBLE EXPLANATION OF WOOL CONSUMPTION TRENDS

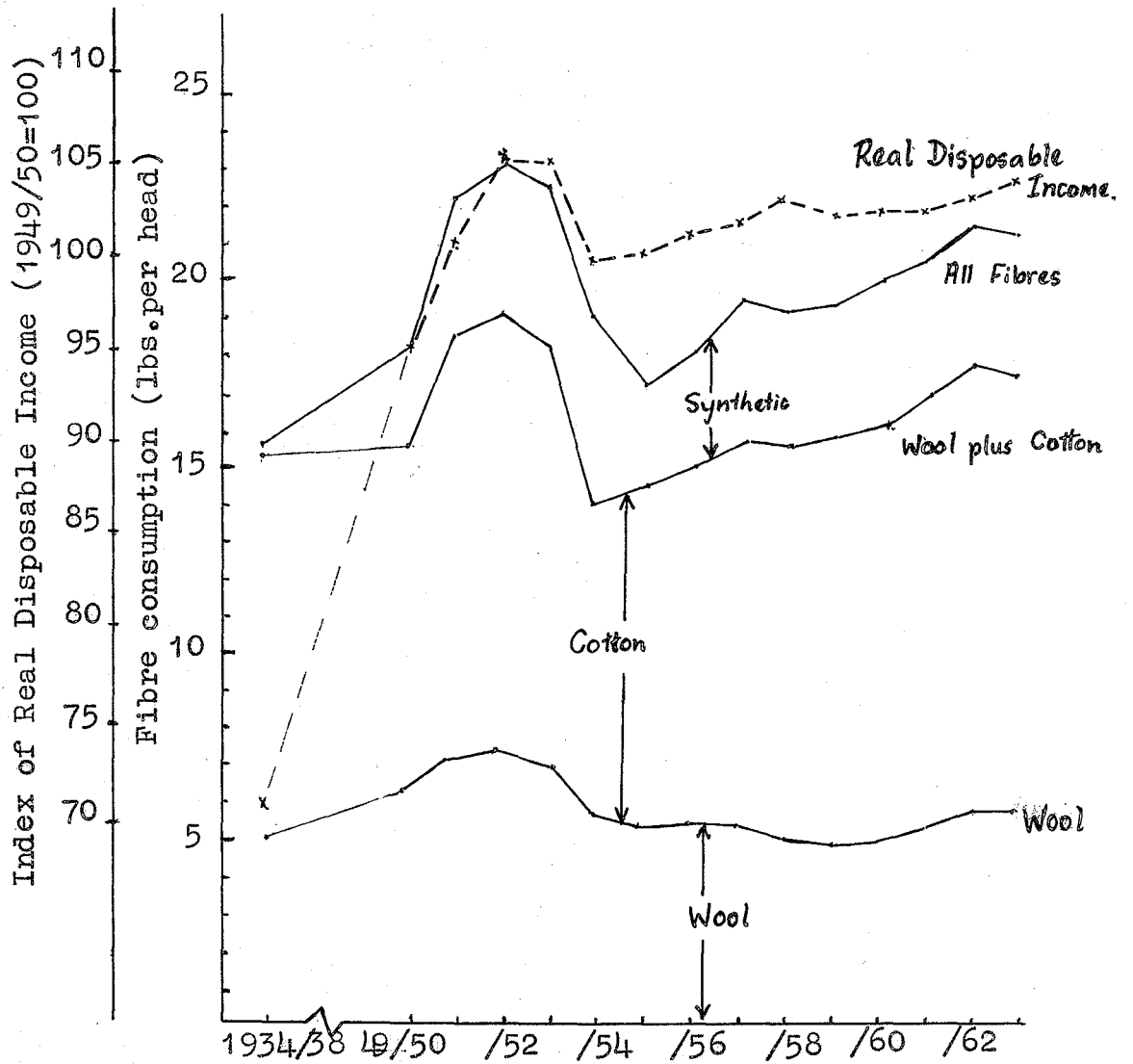
The expansion in per capita consumption of all fibres in the post-war period has roughly corresponded, as we would expect, to the changes in real consumer spending power. Changes in spending power are indicated on Diagram II (and Diagram I) by an index of per capita real

* All Tables will be found in the Appendix.

DIAGRAM II

PER CAPITA FIBRE CONSUMPTION

(3 year moving averages)

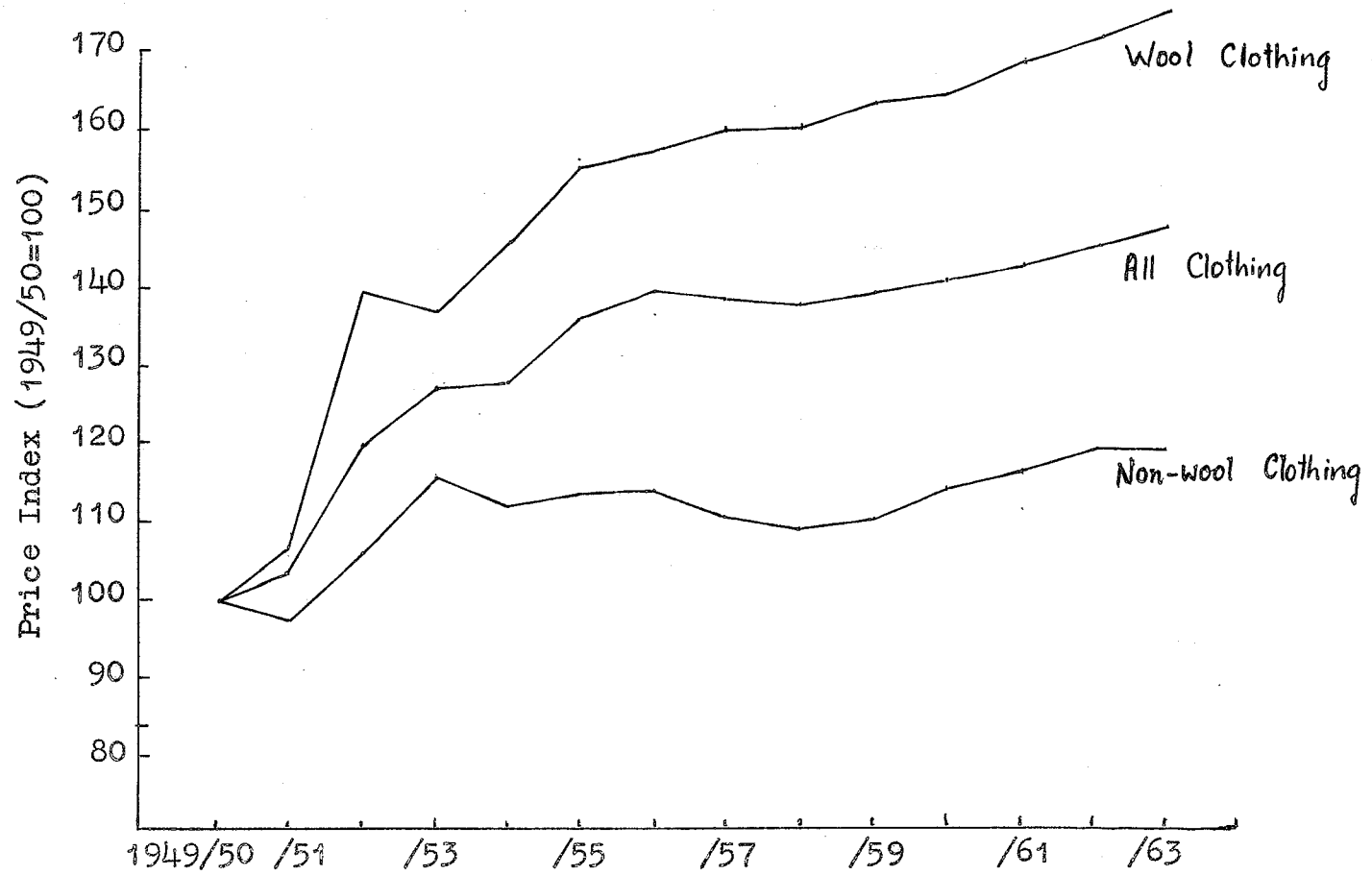


disposable income and it can be seen that the level of all fibre consumption moved in broad sympathy with the index of real income. As far as wool consumption is concerned this too, as shown in Diagrams I and II, matched the expansion of income up to the early fifties but since then there has developed a wide disparity between the series.

In seeking an explanation for this divergent experience for wool compared with other fibres we naturally turn to a consideration of the prices charged for different textile products, since it is known from research work relating to textile consumption in other countries that this is quite responsive to changes in price.

There are unfortunately no official New Zealand wholesale or retail price indices for individual textile products such as wool, cotton or synthetic and a considerable amount of research time has been devoted to building up such indices from the raw data which are available. For retail prices these were mainly the Government Statistician's quarterly collection of prices for individual items of clothing. The methods we used are described in Table 2. . . Our retail price indices for wool textiles, non wool textiles, and all textiles, are shown on Diagram III. The latter index is simply the Statistics Department's official index of all clothing prices as included in the cost of living index. Compared with

DIAGRAM III
RETAIL CLOTHING PRICES



1949/50, Diagram III shows that wool textile prices were 70 per cent higher than in 1949/50 compared with a rise of only 18 per cent for non wool textiles. These retail price trends are confirmed by the movements in similar indices of wholesale prices shown in Diagram IV (and described in Appendix Table 2.).

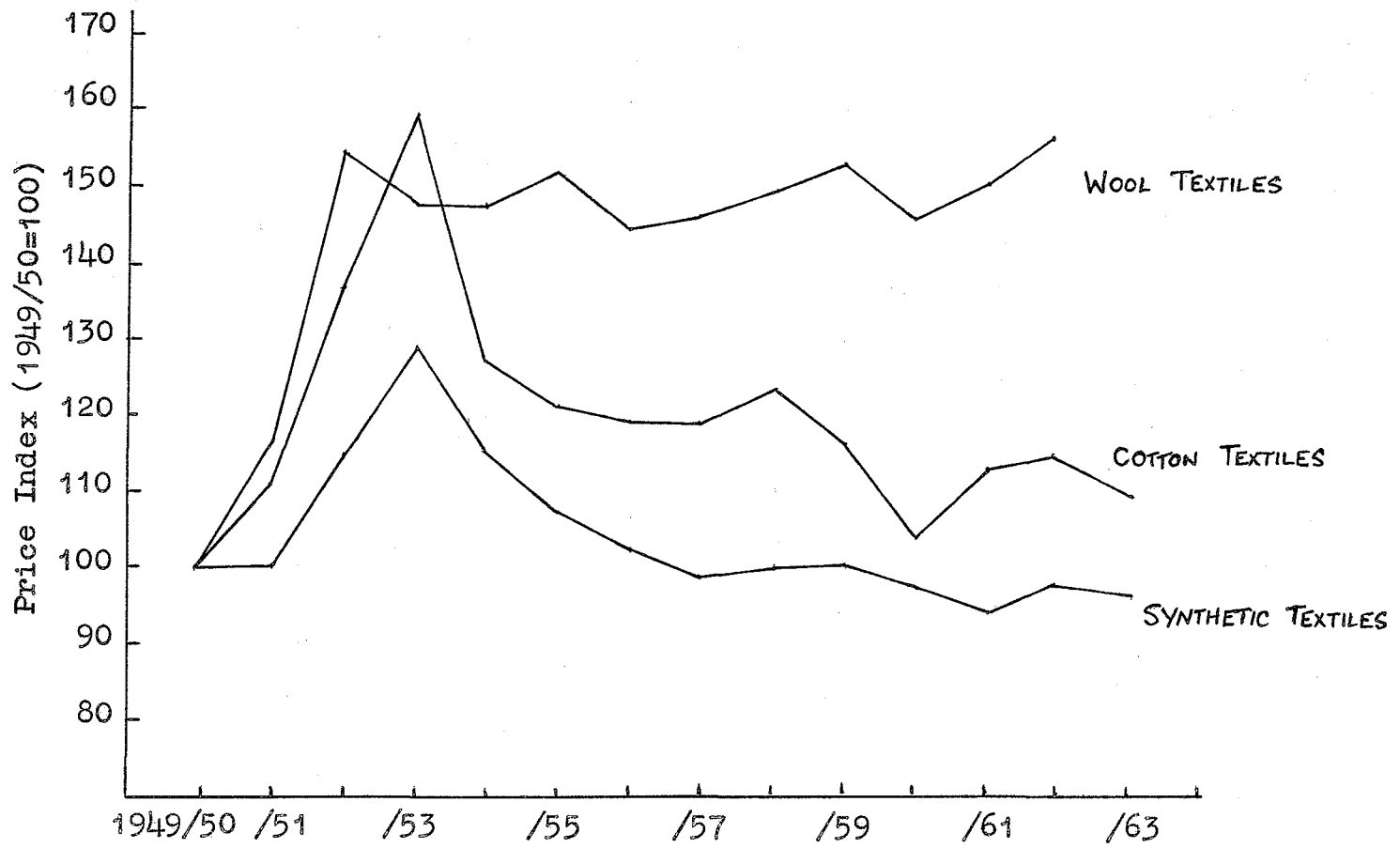
The upshot of these calculations is that at wholesale and retail level wool textiles have become relatively a much more expensive item of clothing and, on the basis of visual impressions, this appears to be possibly the reason for the declining trend in consumption noted earlier. To ensure that this possibility, or hypothesis, is a satisfactory explanation of the current trends in consumption in a way that is consistent with experience in earlier pre-war years, requires a statistical analysis of the data over a fairly long period of time, the results of which are given in the next section.

IV. A DEMAND FUNCTION FOR WOOL TEXTILES

The particular questions which we tried to answer by subjecting our data to a statistical demand analysis were as follows:

- a) Over the pre-war and post-war period is there a consistent mathematical relationship between changes

DIAGRAM IV
WHOLESALE PRICES OF TEXTILES



in wool textile consumption and changes in prices, incomes and any other variables, or has the variation in consumption been quite random and capricious?

- b) If there is such a demand function, what is its quantitative nature? By how much on the average has consumption changed for every unit change in price or income?
- c) Given these quantitative relationships, i.e. price and income elasticities of demand, is the observed decline in wool consumption since 1950 what we would expect it to be in the light of this demand function, and given the values at which prices and incomes stood in the period 1950 to 1963?

The data on consumption prices etc., were, wherever possible, calculated for as far back as possible, in fact to 1925/26, in order to secure a long series for analysis and various demand functions were tested by regression analysis. The variations in the functions tested consisted of different combinations of variables, different time periods and different functional forms¹ but little improve-

¹ A more detailed description of these demand functions will follow in a later Bulletin.

was found on the simple linear demand function given in Appendix Table 3 and described below. With this function 96 per cent of the variation in wool textile consumption over the period 1926-62 was explained by changes in real income, in deflated retail prices of wool textiles, in deflated prices of all textiles,¹ and by a time trend. The result of this analysis is shown in Diagram V and full details of data used and results are given in Appendix Table 3. In this Diagram the actual levels of per capita consumption are shown by a continuous line and the consumption levels estimated from the demand function, shown by a broken line, as an indication of the explanatory ability of the demand function.

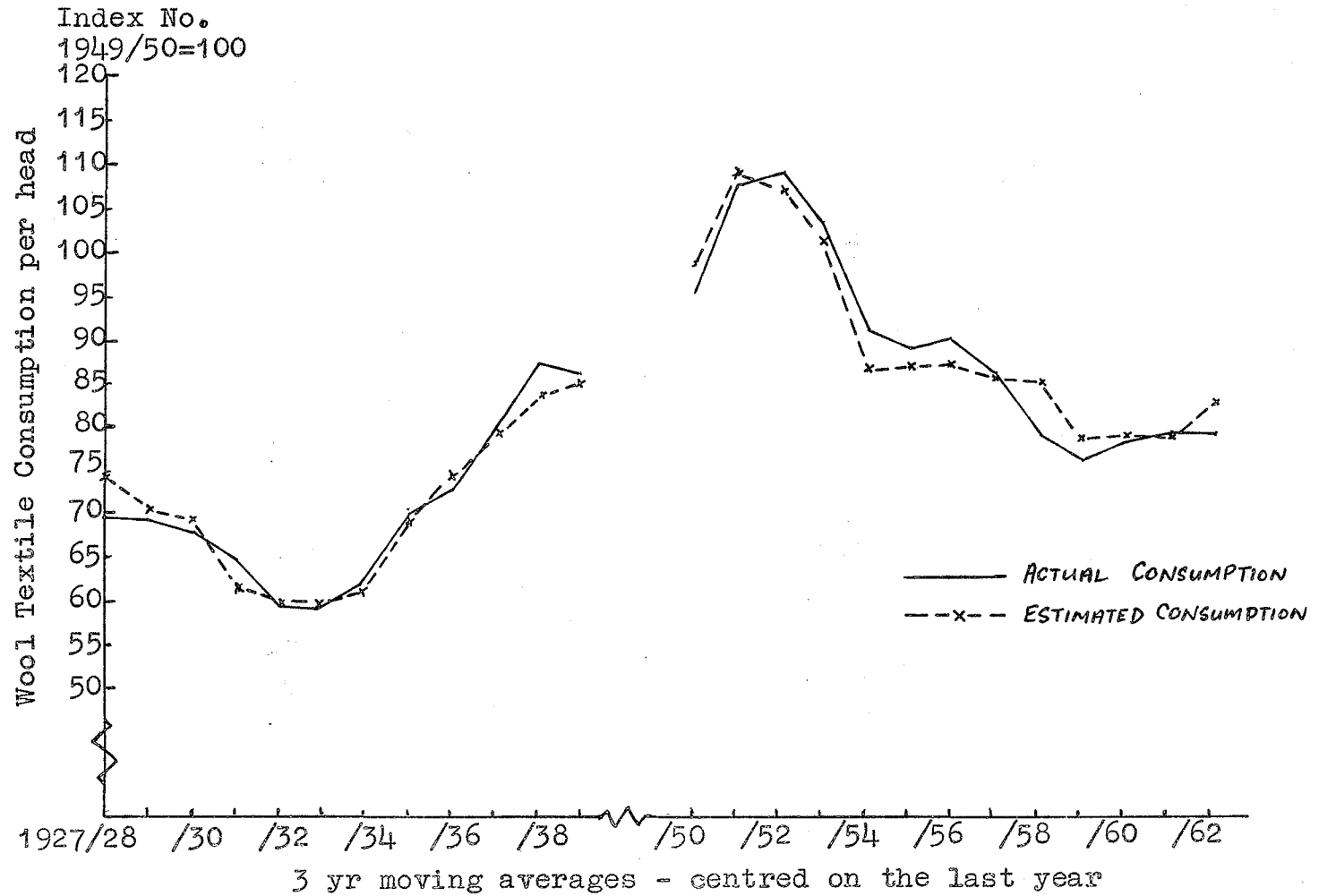
The quantitative nature of this demand function can best be expressed in terms of elasticities (calculated at levels of the variables in 1949/50) on the average over the period 1926-62:-

- a) A 1 per cent change in real income was associated with a 1.7 per cent change in wool textile consumption in the same direction.

¹ It was not possible, due to lack of data, to calculate the retail price of non wool clothing for the pre-war years and as a substitute the price of all clothing was used.

DIAGRAM V

NEW ZEALAND WOOL TEXTILE DEMAND FUNCTION (No.36)



- b) A 1 per cent change in deflated retail price of wool textiles was associated with a 1.3 per cent change in wool textile consumption in the opposite direction.
- c) A 1 per cent change in deflated retail price of all textiles was associated with a 1.5 per cent change in wool consumption in the same direction.
- d) Each year there was a significant downward trend in wool textile consumption amounting to about 1.3 per cent per annum.

The first three of these relationships are consistent with our a priori expectations. The fourth factor, i.e. the time trend, requires further detailed investigation, but is possibly connected with general factors mentioned earlier viz the decline in the quantity of wool used due to fashion trends towards lighter garments, two piece instead of three piece suits, the decline in the use of wool overcoats and other changes in consumer tastes.¹

These results are broadly similar whether we use as our index of wool textile consumption the fibre content index or the volume index and a broadly similar result was found for an analysis confined to the post-war years only

¹ To some extent of course these changes are not only a reflection of autonomous shifts in consumer taste and fashion but are themselves a normal result of consumer reaction to higher wool textile prices.

which was conducted in case there had been some significant structural shift in the demand relationships over the war years.

These relationships between consumption income and price are also broadly in line with those found for other countries, in our own work, and by other investigators. In Appendix Table 4 are given, for comparison, a range of estimates of wool textile income elasticities for other countries.

From Diagram V we can now give an affirmative answer to the third question posed above. The recent decline in wool textile consumption is what we would have expected in the light of the demand function adduced and given the values for income and especially for price which have prevailed in recent years. A large part of the decline in wool textile consumption in recent years can therefore be attributed, as suggested in Section III, to the inordinate rise in wool textile prices relative to other textile prices.

Our next step then is to ask why this movement in wool textile prices has occurred?

V. THE RISE IN WOOL TEXTILE PRICES

A host of possible reasons could be suggested to account for the relatively greater rise in wool textile prices compared with the prices of cotton and synthetic

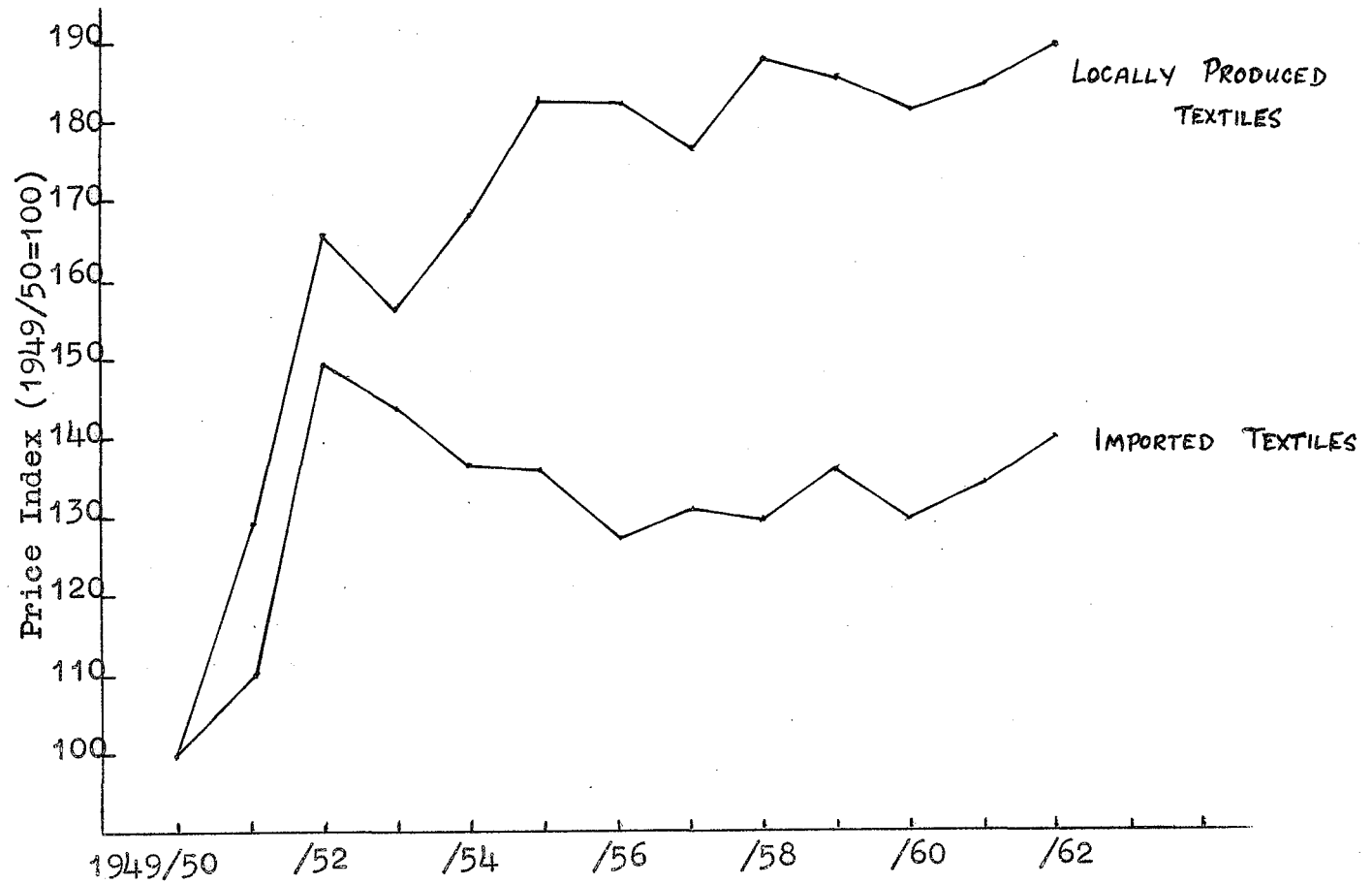
products. There are two which are of major importance. The first reason is the relatively greater rise since 1950 in raw wool prices compared with raw cotton and synthetic fibre. This matter will be looked at in the next section. Here we are more concerned with the second reason, which is the substitution of higher priced locally produced wool textiles for cheaper imported items. Separate wholesale price indices for locally produced and imported wool textiles have been calculated and are given in Appendix Table 5. The results are graphed in Diagram VI. Since 1949/50 the price index of locally produced items has risen 89.6 per cent against a rise of only 40.4 per cent for imported items. A major contributing factor to the overall rise in wool textile prices of about 57 per cent has therefore been the steep rise in prices of locally produced items.

To establish the reasons for this requires further detailed investigation involving a comparative analysis of the overseas and New Zealand wool textile industries.¹ Nevertheless, even at this stage, it is possible to suggest some of the reasons from the results of an analysis of factors affecting local wool textile prices in the next section.

¹ Such an investigation has now been initiated by the Agricultural Economics Research Unit but some time will elapse before results come to hand.

DIAGRAM VI

WHOLESALE PRICES OF LOCALLY PRODUCED AND IMPORTED WOOL TEXTILES



VI FACTORS AFFECTING THE PRICES OF LOCALLY PRODUCED WOOL TEXTILES

While a detailed analysis of the cost components of locally produced wool textiles at both wholesale and retail level presents considerable difficulties (especially because of the non-availability of data relating to trading margins at various stages of wool textile processing), it is however possible to secure a rough idea of changes in the price structure from official published statistics.

Wholesale Prices of Locally Produced Wool Textiles

To secure some idea of the ingredients in the rise in prices of wool textiles ex factory we have calculated from the official production statistics the value of output (or selling price) and the components of cost per lb. of clean wool processed in the New Zealand wool textile industry for each year from 1949/50 to 1961/62. The value of wool textile output per lb. of clean wool processed rose 107 per cent over the period and this is an approximate¹ measure of the rise in ex factory prices. However it is adequate as

¹ It is approximate because of the imperfect nature of the the unit "lb. of wool processed" as an indicator of a representative unit of output. For one thing it ignores any change in the degree of fabrication which may have occurred over the period and it does not allow for the substitution of other fibres for wool. We have however used alternative measures of output which allow for these and other factors in analysing cost ingredients, with very little difference in the final result.

a first indication of broad trends in cost components. The factors contributing to the rise in value of output per lb. of wool processed from 1949/50 to 1961/62 were as follows.

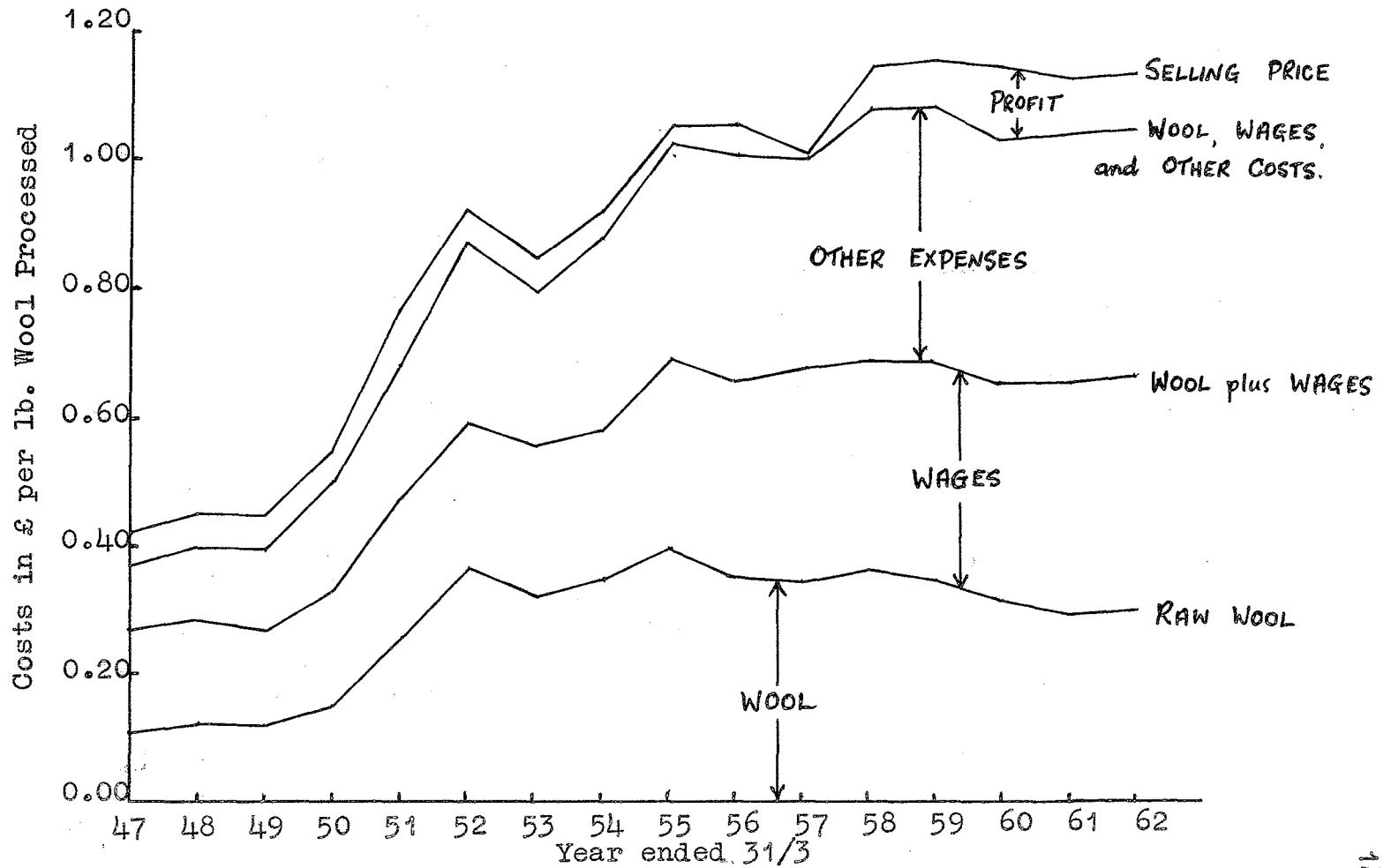
Cost of raw wool per lb. wool processed	rose	£0.156	or	109%
Wages & salaries	" " "	" "	" "	£0.189 or 99%
Other expenses	" " "	" "	" "	£0.203 or 117%
<u>Profit</u>	" " "	" "	" "	<u>£0.043</u> or <u>100%</u>
<u>Total value of Output</u>	" " "	" "	" "	<u>£0.591</u> or <u>107%</u>

Diagram VII gives the trend in these main components of cost over the period. It will be noted that while rising wool prices had a very significant influence on selling price in the early fifties, if anything since then costs of wool have been declining and wages, expenses and profit margins have exerted the major influence on price.

While the method of analysis adopted above is valuable in that the cost components can be dissected as finely as desired it suffers from the disadvantage (associated with using lbs. of wool processed as a measure of output) of overstating the rise in wholesale prices which did actually occur - about 90 per cent. An alternative approach is therefore to attempt to explain by a regression equation the wholesale price of wool textiles in terms of possible explanatory variables. Diagram VIII, using data given in Table 8 gives the results (in terms of a comparison of

DIAGRAM - VII

PRODUCTION COSTS OF N.Z. WOOLLEN MILLS PER LB. WOOL PROCESSED



actual and estimated values of wholesale prices) of a regression analysis in which the wholesale prices of locally produced wool textiles are explained by the following equation:-

$$Y = 0.23X_1 + 0.28X_2 + 0.55X_3 - 9.1 \quad R^2 = 0.992$$

where

Y = wholesale price index of locally produced wool textiles
(as in Diagram VI)

X₁ = cost per lb. of raw wool used by woollen mills

X₂ = earnings per man hour in wool textile industry

X₃ = price of all other inputs used in wool textile industry

(All variables expressed as Index Numbers 1949/50=100)

This equation, which, as the diagram shows, explains fairly well¹ the price changes which have occurred, indicates that, other things equal, at base year values

a 10% rise in wool prices led to a 2.3% rise in wholesale price

a 10% rise in earnings per man hour led to a 2.8% rise in
wholesale prices

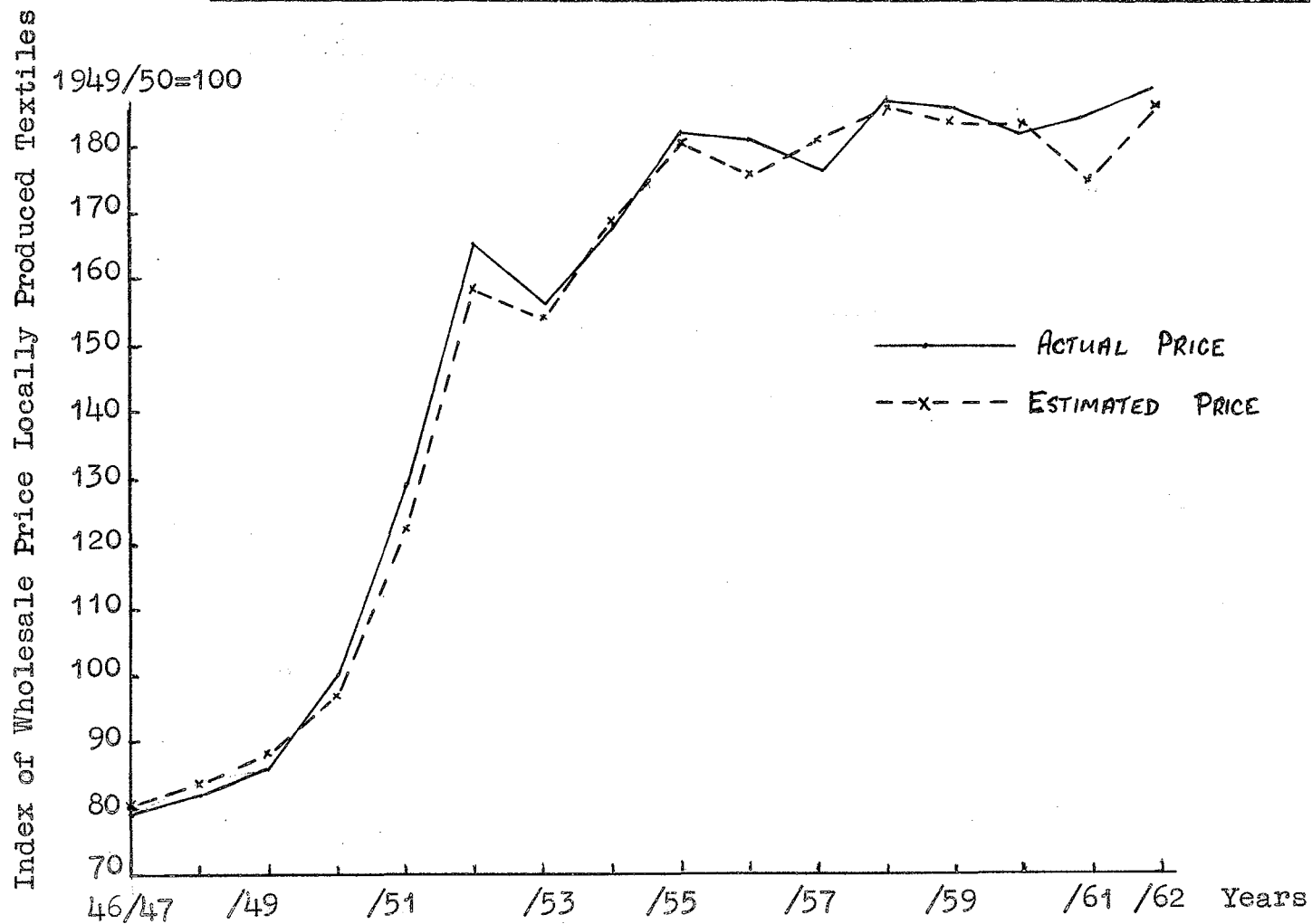
a 10% rise in prices of other inputs led to a 5.5% rise in
wholesale prices.

Since 1949/50 wholesale prices of locally produced wool textiles rose 90 per cent and the quantitative contribution of

¹ Though a high R² was secured and the predictive ability of the equation is quite good it should be noted that the standard errors of X₂ and X₃ as given in Table 7 are high and not too much reliance can be placed on the separate quantitative influence of these two variables.

DIAGRAM VIII

WHOLESALE PRICE LOCAL WOOL TEXTILES (ESTIMATED FROM REGRESSION)



significance of each factor to this rise as indicated by the above equation is as follows:-

Rise in Wool Costs:	$126\% \times 0.23 = 29\%$
Rise in Earnings per head:	$88\% \times 0.28 = 24\%$
Rise in Price of Other Inputs:	$67\% \times 0.55 = \underline{37\%}$
Total Rise in Wholesale Prices	<u>90%</u>

It is evident then that the rise in wool prices, though significant, was not nearly as important in raising wool textile prices as were wage and other costs, and, as shown in Diagram VII, the rise in profit margins. These points will be referred to again, after we have looked at a similar analysis for retail prices.

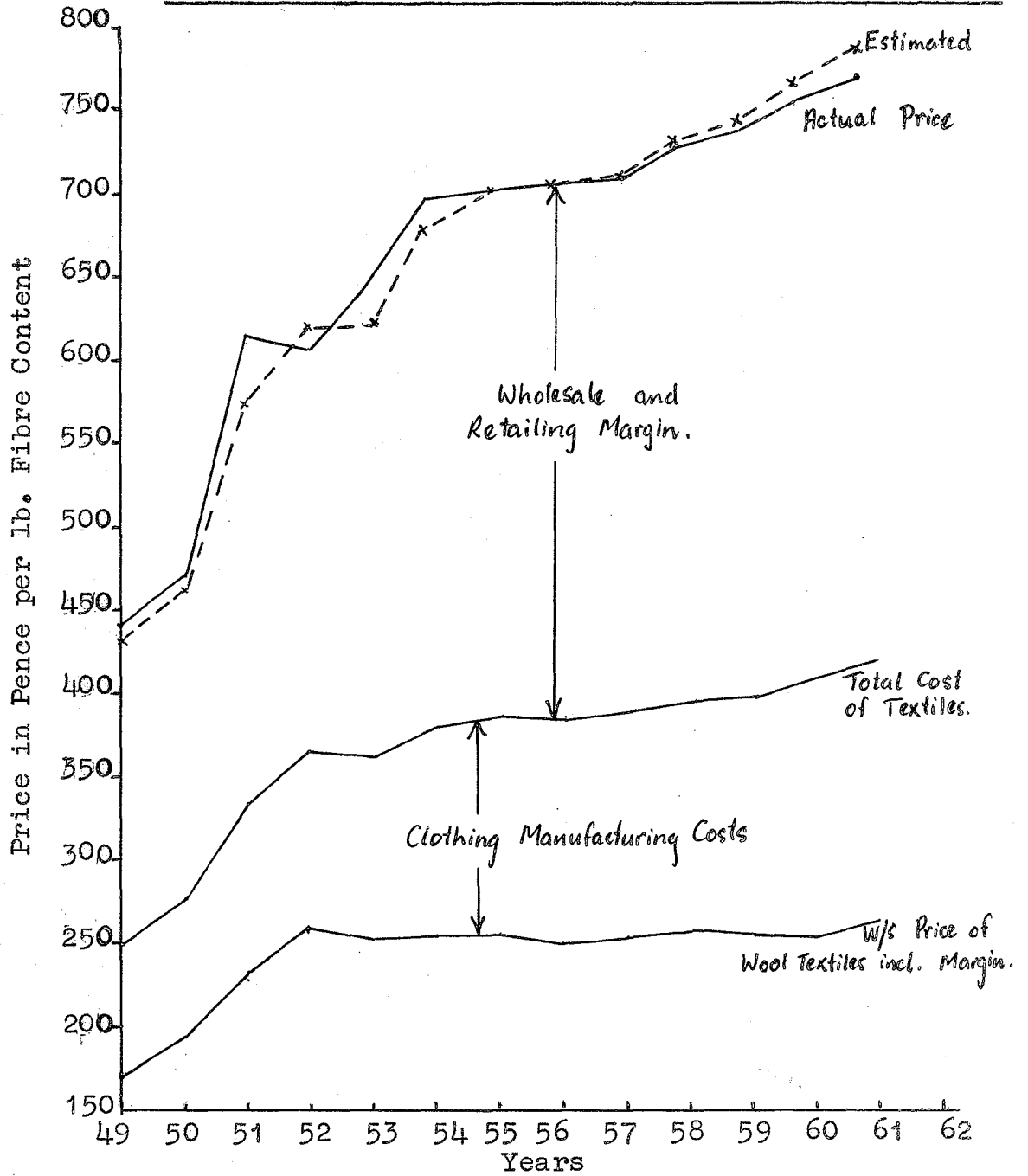
Retail Prices of Wool Textiles

As with the explanation of changes in wholesale prices, here too two alternative methods of analysis have been adopted namely an attempt to estimate the separate components of changes in retail prices, and the use of regression analysis to derive an estimating formula.

Diagram IX gives our estimate of changes in the components of retail price of wool textiles - taking as our unit the price of an average unit of product containing one pound of fibre. The method adopted in this analysis and the data used are described in detail in Table 8. In broad terms the procedure consisted of building up an estimate of the retail price from data on cost structures

DIAGRAM IX

ESTIMATED BREAKUP OF RETAIL PRICE OF WOOL TEXTILES



and margins for 1955/56 adjusted for preceding and following years by changes in wholesale prices, wage rates etc. As Diagram IX shows, this synthesised retail price corresponds closely with the actual retail price over the period. The important conclusion from this analysis is that since 1952 the major contribution to the rise in wool textile retail prices were clothing manufacturing costs, wholesale and retail margins.

The second, and probably more reliable approach to the problem of explaining retail price changes, involves a regression analysis leading to the following estimating equation:-

$$Y = 0.48X_1 + 0.47X_2 + 6.9 \quad R^2 = 0.99$$

where

Y = retail price index of wool textiles

X₁ = index of wholesale price of wool textiles (all types)

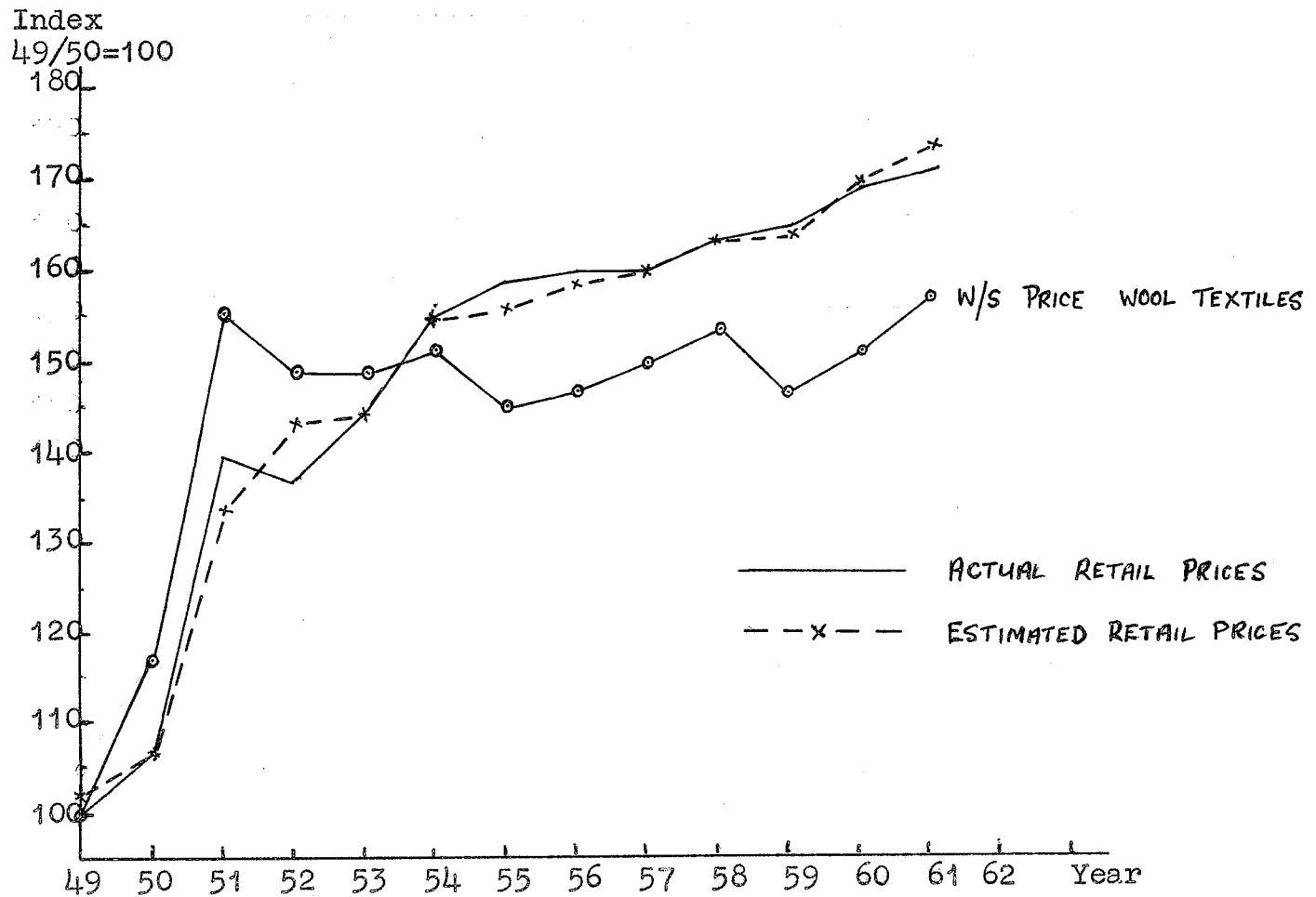
X₂ = index of earnings per man in clothing industry

(All variables expressed as Index Numbers 1949/50=100)
(Data used for this equation are given in Appendix Table 9.)

The explanatory ability of this estimating equation is shown in Diagram X on which is also graphed the wholesale price index for comparison. Again it is evident, from the widening gap between wholesale and retail prices, that clothing manufacturing costs and trading margins have been a major factor in pushing up retail prices. Had the data been available we would have included in this equation a

DIAGRAM X

RETAIL PRICE WOOL TEXTILES ESTIMATED FROM REGRESSION



variable for wholesale and retail margins; in the absence of such a variable it is likely that part of the effect of variable X_2 is due to changes in profit margins and not solely due to changes in wage rates.

The equation indicates that, other things equal, at base year values

A 10% rise in Wholesale Price of Wool Textiles led to a 4.8% rise in Retail Wool Textile Prices

A 10% rise in Earnings per Head in Clothing Industries led to a 4.7% rise in Retail Wool Textile Prices.

In absolute terms (and using the figures of Diagram 9) this analysis suggests that, other things equal, a rise in wholesale prices of 2/- per lb. of fibre content leads to a rise at retail level of 3/- per lb. of fibre content.

By 1962 retail prices of wool clothing had risen 72 per cent above their 1949/50 level. The proportionate contributing factors to this rise as indicated by the estimating equation were:-

Rise in Wholesale Price of Wool Textiles: $54\% \times 0.48 = 26\%$

Rise in Earnings per head in Clothing Industry: $99\% \times 0.47 = 46\%$

Total Rise in Retail Prices 72%

Summary

The aim of the foregoing analysis of price determination was to throw some light on the question, posed at the beginning of this section, as to the reasons for the relatively greater rise in wool textile prices in New Zealand compared with the price of other textiles.

In the first place, the analysis suggests that part of the rise can be attributed to rising costs and margins in clothing manufacturing, wholesaling and retailing. But did such margins rise relatively more than for other non wool textiles? There is a presumption that this was the case, particularly for imported wool textiles, since these have, for a long time, been restricted in supply^(a) due to import control and it would be most unusual for such a seller's market not to have led to an upward creep in profit margins.

A second factor pushing up retail prices of wool textiles has been shown to be the much greater rise in wholesale prices of locally produced wool textiles compared with prices of imported wool textiles. Consequently wool textile prices have risen more than the prices of cotton

(a) For evidence of this see the results of a wool textile consumer Survey conducted by the N.Z. Wool Board and included in the Board's submission to the Tariff and Development Board's Enquiry into Wool Textiles, 1964.

and synthetic textiles where supplies have been drawn mainly from imports, the prices of which, if anything, have been declining.

Thirdly, the preceding analysis suggests that the reason for the greater rise in locally produced, compared with imported, wool textile prices lies in rising costs and margins in the wool textile industry - other than the cost of wool. If anything, the cost of wool in recent years has been in a downward direction but in any case, since the abolition of the subsidy on wool bought by the New Zealand mills, changes in the price of wool have been common to both local and overseas wool textile producers and cannot therefore be regarded as a special factor influencing the prices of the New Zealand product.

To explain the rise in costs and margins in the New Zealand mills would require, as mentioned before, a special analysis of recent trends in costs and productivity in the New Zealand wool textile industry compared with overseas. Again however it is a reasonable presumption that these rises are due to the effects of import control, which has provided local producers complete shelter against import competition in many lines and thereby favoured an increase in profit margins. Moreover, import control has undoubtedly allowed the New Zealand wool textile industry to produce a much wider range of products than it was formerly

accustomed to, and such diversification of products over too wide a range, taking into account the small size of the New Zealand market, has meant losing economies of scale compared with overseas producers and this has adversely affected productivity growth. The evidence shows that labour productivity in the New Zealand wool textile industry has barely risen at all in the last decade⁽¹⁾ - even with a very rapid rise in the rate of real investment which has occurred. This suggests that the benefits of new capital investment have been dissipated in under-utilisation of equipment through undue diversification of products, compared with the fairly considerable specialisation which characterised the industry in former years - when incidentally the industry was competitive with imports.

A further implication of the stagnation in labour productivity is that all wage increases (which do not appear to have been any greater than in overseas countries) have been necessarily passed on in the form of higher prices instead of being partially absorbed through higher labour productivity as has been the case overseas.

(1) From unpublished work at the Agricultural Economics Research Unit and also in C.A. Blyth and P. Hamer "Output Employment and Productivity Growth in New Zealand Manufacturing", N.Z. Inst. of Ec. Research, Research Paper No.4, 1963.

VII. THE IMPLICATIONS FOR NEW ZEALAND

For a country whose economy is as vitally dependent on wool as is New Zealand, a high and growing level of wool consumption is most desirable. The evidence presented in this paper suggests that the reverse is occurring and consumption has been declining due to import control and the higher prices for locally produced wool textiles which this has caused. If all wool textile prices were to fall to equality or near equality with imported prices, it can be shown, using the demand function presented in section IV, that consumption per capita would rise about 17%. In terms of fibre content this amounts to about four million lb. of greasy wool which can be regarded as the extra world-wide demand for wool generated by cheaper wool textiles in New Zealand.

But over and above this, the long term health of the world wool economy depends vitally on ensuring the greatest possible freedom in world trade for wool and wool textiles and we should want to encourage the rapid development of thriving wool textile exporting industries in countries which, because of low costs, can effectively compete on world markets. Restrictions on world trade in wool textiles and the building up of high cost protected wool textile industries can only impede the

competitive power of wool in relation to synthetic fibres.

New Zealand's chances of successfully pressing for abolition of such trade restrictions are fairly remote while we ourselves persist in being perhaps the most restrictionist.

It would of course be quite unrealistic to suggest that all protection should be immediately removed from the New Zealand wool textile industry any more than it should from a whole host of other basic New Zealand industries. A desirable move would however be to replace import control with a moderate tariff. Time was when the wool textile industry stood on its own feet with only a modicum of protection by means of a moderate tariff; but, as a basic New Zealand industry, it has suffered, as have all basic industries, from higher costs, caused partly by indiscriminate protection granted to a whole range of new high cost industries.

There is a major case therefore for a return to protection of this, and all other, industries. A moderate tariff would ensure, as it did in earlier years, that the New Zealand wool textile industry concentrates on making those products in which individual firms are competitive with imports; or in which a competitive position can be secured by some desirable rationalisation and concentration of production.

APPENDIX TABLE 1
(As used in Diagrams I and II)

PER CAPITA AVAILABILITY OF TEXTILES IN NEW ZEALAND AND REAL INCOME

Year	(1) <u>WOOL</u> Volume Index of Local Production Plus Imports Per Capita	(2) Wool Content of Available Wool Textiles Per Capita	(3) <u>COTTON</u> Per Capita	(4) <u>SYNTHETIC</u> Per Capita	(5) <u>ALL TEXTILES</u> Per Capita	(6) <u>REAL DISPOSABLE INCOME PER HEAD</u>
	1949/50 = 100	lbs	lbs	lbs	lbs	1949/50 = 100
1934/38	81.8	4.8	10.3	0.9	16.0	73.6
1946/47	88.0	5.5	10.3	1.0	16.0	89.1
1947/48	87.0	6.1	5.8	2.6	14.5	97.8
1948/49	100.8	7.1	10.1	2.6	19.8	89.3
1949/50	100.0	6.5	11.8	2.7	21.0	100.0
1950/51	124.2	8.1	12.5	4.5	25.1	117.7
1951/52	104.2	7.4	12.0	5.0	24.4	101.4
1952/53	83.5	5.4	9.5	3.3	18.2	96.8
1953/54	85.9	5.1	7.3	2.3	14.7	101.4
1954/55	98.0	6.1	10.7	3.6	20.4	102.8
1955/56	88.2	5.7	10.2	4.1	20.0	103.7
1956/57	71.9	4.8	10.0	3.5	18.3	103.4
1957/58	76.5	5.2	10.9	3.3	19.4	106.6
1958/59	81.6	5.6	11.3	3.7	20.6	99.0
1959/60	77.3	5.3	11.1	3.4	19.8	105.7
1960/61	80.5	5.8	12.5	3.7	22.0	107.6
1961/62	83.4	6.2	13.0	3.4	22.6	105.6
1962/63	88.0	5.1	9.9	3.3	18.3	110.5

Sources and Notes for Table 1

Column (1) Volume Index of Local Production and Imported Wool Textiles:

This index was constructed from the data given in the Report on Industrial Production Statistics and the Official Trade Statistics and it represents the value of each year's production and imports of wool textiles excluding carpets valued at constant 1949/50 base year prices. Allowance was made for changes in classification of data and of industries in particular the separation in the statistics of the hosiery industry as from 1951/52. The index of total availability was then divided by an index of population to derive per capita availability.

Column (2) Wool Content of Available Wool Textiles per Capita:

Wool content of quantities of wool textiles imported and locally produced, excluding carpets using data on quantities as for column (1) above.

Weights used as follows:

Piece Goods	0.57 lb sq.yard
Blankets	9.8 lb pair
Rugs	5 lb each
Yarn, etc.	as given

Other products given in value terms only were given a wool weight of 2 lb of wool content per £1 of value in 1949/50 prices.

Column (3) Cotton Textiles per Capita:

Imports of Cotton textiles as reported in Official Trade Statistics converted to a cotton-content basis as follows:-

Woven clothing piece goods, woven furnishing piece goods, woven household piece goods, woven other piece goods, unbleached piece goods, curtain net, at 0.25 lb per square yard. Blankets at 21.6 lb per dozen, sheets at 10.4 lb a dozen, tablecloths at 10.4 lb a dozen, tea towels at 1.0 lb a dozen, towels at 3.9 lb a dozen, yarn, cheese bandages and meat wraps, thread and knitted piece goods, weight as given.

Column (4) Synthetic Textiles per Capita:

Imports of woven and synthetic fabrics at 0.25 lb per square yard plus imports of knitted synthetic piece goods, nylon yarn and rayon yarn all given by weight in Trade Statistics.

Column (5) All Textiles per Capita:

Sum of columns 2, 3 and 4.

APPENDIX TABLE 2
(As used in Diagrams III and IV)

RETAIL AND WHOLESALE PRICES OF TEXTILES IN NEW ZEALAND

Year	(1) Retail Price of Wool Textiles	(2) Retail Price of Non Wool Textiles	(3) Retail Price of all Textiles	(4) Wholesale Price of Wool Textiles	(5) Wholesale Price of Cotton Textiles	(6) Wholesale Price of Synthetic Textiles
	Index Numbers 1949/50 = 100					
1934/38	..	..	52.5	42.9	32.9	..
1946/47	..	..	..	88.2	..	..
1947/48	..	..	..	93.8	..	..
1948/49	..	..	..	99.9	..	..
1949/50	100.0	100.0	100.0	100.0	100.0	100.0
1950/51	106.9	97.3	102.7	116.6	111.1	100.5
1951/52	139.0	106.1	119.0	154.6	137.1	114.1
1952/53	136.5	115.1	127.0	147.9	159.4	129.0
1953/54	144.2	111.3	127.6	147.8	127.5	115.2
1954/55	154.8	112.0	135.9	152.0	121.1	107.1
1955/56	157.6	112.3	139.0	145.4	119.0	102.3
1956/57	159.6	109.6	137.9	146.9	118.9	98.9
1957/58	160.2	108.3	137.9	150.0	123.0	100.3
1958/59	163.4	110.3	139.7	153.0	116.8	100.6
1959/60	164.9	113.9	141.5	147.4	104.8	98.2
1960/61	169.0	116.6	143.2	151.4	113.3	94.1
1961/62	172.4	119.2	146.1	157.2	114.7	98.6
1962/63	175.3	118.4	148.2	..	109.6	96.4

Sources and Notes for Table 2

Column (1) Retail Prices of Wool Textiles:

Prices of 29 individual items of wool clothing given in the Statistics Department's quarterly surveys of consumer prices were averaged to give an annual average price for each item. Prices were combined into a weighted index using as weights quantities purchased in 1955 as reported and used by the Statistics Department in compiling the official cost-of-living index. This index for 1955-63 was then linked to a similar index for 1949-55 using similar data but 1949 weights.

Index is given for first calendar year.

Column (2) Retail Prices of Non-Wool Textiles:

Prices of 25 items of non-wool clothing from same source and using same basis for weighting as Column (1).

Index is given for first calendar year.

Column (3) Retail Prices of all Textiles:

Clothing component of official retail prices index.
Index is given for first calendar year.

Column (4) Wholesale Prices of Wool Textiles:

For sources and methods see notes to Table 5.

Column (5) Wholesale Price of Cotton Textiles:

Unit values of imports of cotton textiles weighted by 1949 import quantities. Figures refer to 1st calendar year.

1962/63 value refers to first half of 1962 only.

Column (6) Wholesale Price of Synthetic Textiles:

Unit values of imports weighted by 1954 quantities.

APPENDIX TABLE 3
 (As used in Diagram V)
DATA USED FOR REGRESSION ANALYSIS

Year	(1) Index of Per Capita Volume of Available Wool Textiles	(2) Real Disposable Income Per Capita	(3) Price of Wool Textiles Deflated by Cost-of- Living Index	Price of All Textiles Deflated by Cost-of- Living Index
Index Numbers 1949/50 = 100				
1925/26	71.2	58.5	68.4	89.1
1926/27	69.8	57.0	67.5	84.4
1927/28	66.4	61.5	68.1	81.7
1928/29	70.4	63.6	69.5	79.5
1929/30	65.3	61.5	68.6	78.6
1930/31	57.8	55.5	68.3	77.7
1931/32	53.0	52.7	58.6	76.9
1932/33	65.3	54.4	58.5	78.1
1933/34	67.6	64.8	66.6	82.5
1934/35	75.9	65.7	67.9	84.1
1935/36	74.6	69.3	64.1	79.6
1936/37	90.2	76.9	64.0	77.9
1937/38	97.3	77.3	64.5	79.7
1938/39	71.1	78.6	66.4	79.1
1947/48	87.0	97.8	103.0	98.4
1948/49	100.8	89.3	101.6	100.2
1949/50	100.0	100.0	100.0	100.0
1950/51	124.2	117.7	101.5	97.3
1951/52	104.2	101.4	118.9	101.6
1952/53	83.5	96.8	108.3	100.4
1953/54	85.9	101.4	109.8	95.4
1954/55	98.0	102.8	112.4	98.3
1955/56	88.2	103.7	111.9	98.1
1956/57	71.9	103.4	110.0	94.0
1957/58	76.5	106.6	108.2	92.1
1958/59	81.6	99.0	105.6	89.4
1959/60	77.3	105.7	102.9	87.2
1960/61	80.5	107.6	100.4	87.7
1961/62	83.4	105.6	100.5	87.8

Sources and Notes for Table 3

Column (1) Index of Per Capita Volume of Available Wool Textiles:

From Column (1) of Table 1. Pre-war years calculated by same methods as described in Table 1.

Column (2) Real Disposable Income Per Head:

From column (6) Table 1.

Column (3) Price of Wool Textiles Deflated by Cost-of-Living Index:

1925/26-1938/39 Wholesale wool price index as in Column (4) Table 2.

1947/48-1961/62 Retail wool price index as in Column (1) Table 2.

Both series deflated by official cost-of-living index.

Column (4) Price of all Textiles deflated by Cost-of-Living Index:

Clothing component of official cost-of-living index deflated.

1. For the purposes of the regression analysis described in Section IV the above data were all expressed as three year moving averages.

2. The regression equation derived is as follows:-

$$Y = 1.7 X_1 - 1.3 X_2 + 1.5 X_3 - 1.3 X_4 - 65.5$$

(0.18) (0.15) (0.32) (0.36)

Where Y is Index of Per Capita Volume of Wool Textiles available - Column (1) above.

X_1 is Real Disposable Income Per Capita - Column (2) above.

X_2 is Price of Wool Textiles deflated by Cost-of-Living Index - Column (3) above.

X_3 is Price of all Textiles deflated by Cost-of-Living Index - Column (4) above.

X_5 is Time 1925/26 = 1
1926/27 = 2
etc.

$$R^2 = 0.96$$

Figures in brackets under coefficients indicate Standard errors.

APPENDIX TABLE 4
INCOME ELASTICITIES OF DEMAND FOR CLOTHING
FROM PUBLISHED DEMAND STUDIES

<u>Author & Title of Article</u>	<u>Country & Product</u>	<u>Income Elasticity of Demand</u>
F.B.Horner "The Demand for Wool" Economic Record, 1952	U.K.: All Clothing	0.8
	U.S.A.: All Clothing	1.1
	U.S.A.: Wool Clothing	1.3
(Price Elasticity of Demand for U.K. -1.11)		
R.Stone & D.A.Rowe "Market Demand for Durable Goods" Econometrica, 1957	U.K.: All clothing	1.5
M.Fraenkel "International Review of Cotton and Allied Textile Industries" Vol.18 No.110	Western Countries: Cotton	0.4
	Wool	0.9
	Less Developed Countries: Cotton	0.8
	Wool	2.2
H.S.Houthakker "International Comparison of Household Expenditure Patterns" Econometrica 1957. This article gives income elasticities for 33 countries and in all cases the estimates are significantly greater than 1.	33 countries: All clothing	greater than 1
	U.S.A.	1.3
	U.K.	1.3
United States Department of Agriculture: "The Demand for Textile Fibres in U.S.A." Technical Bulletin 1301 1963 by F. Lowenstein et al.	U.S.A.: Wool	
	Short Run	1.8
	Long Run	0.7
B.P.Philpott: "Wool in the New Zealand Economy" Economic Record 1957	World : Wool	1.0
	"Economic Implications of Increased Wool Production" in Proceedings of N.Z. Society of An.Prodn. 1964	21 countries wool type fibre	1.5

TABLE 4 (Cont'd)

B.P. Philpott:		
Unpublished Analyses based on Statistics Dept. Quarterly Surveys of Retail Trade	N.Z. all clothing	1.4
Unpublished Analyses based on "U.K. Family Expenditure Report 1957/59"	U.K.: All clothing U.K.: Mens-Boys Outer clothing mainly wool	1.0 1.3

APPENDIX TABLE 5
(As used in Diagram VI)
WHOLESALE PRICES OF LOCALLY PRODUCED AND IMPORTED
WOOL TEXTILES

Index of Wholesale Price of:

Year	Locally Produced Wool Textiles (1)	Imported Wool Textiles (2)	All Types of Wool Textiles (3)
	1949/50 = 100		
1934/38	52.8	36.3	42.9
1946/47	79.2	93.1	88.2
1947/48	82.6	101.7	93.8
1948/49	86.2	109.4	99.9
1949/50	100.0	100.0	100.0
1950/51	129.0	110.1	116.6
1951/52	166.1	148.6	154.6
1952/53	157.0	143.1	147.9
1953/54	168.2	137.2	147.8
1954/55	182.5	136.2	152.0
1955/56	181.8	126.6	145.4
1956/57	176.9	131.4	146.9
1957/58	188.3	130.1	150.0
1958/59	186.3	135.8	153.0
1959/60	182.2	129.4	147.4
1960/61	184.9	134.1	151.4
1961/62	189.6	140.4	157.2

Sources and Notes to Table 5.

Column (1) Index of Wholesale Price of Locally Produced Wool Textiles:

This is a weighted index of unit values of different products ex factory using the quantities and values reported in the Industrial Production Statistics. The weights used equal the quantities produced in 1949/50.

Column (2) Index of Wholesale Price of Imported Wool Textiles:

Weighted index of c.d.v. unit values of imported wool textiles calculated from quantities and values as reported in External Trade Statistics. Weights equal the 1949 quantities of each item imported.

Column (3) Index of Wholesale Price of All Types of Woollen Textiles:

Average of column (1) and (2) - weights equal value of local production and imports in 1949.

The index thus represents the cost of supplying each year at that year's prices the 1949/50 mix of products locally produced and imported.

APPENDIX TABLE-6
(As for Diagram VII)

COMPONENTS OF COST OF N.Z. WOOL TEXTILE OUTPUT
PER LB WOOL PROCESSED

Year	Cost of Raw Wool	Wages and Salaries	Other Expenses	Profit	Total Selling Price
£ per lb of Clean Wool Processed					
1946/47	0.111	0.155	0.097	0.052	0.415
1947/48	0.124	0.168	0.114	0.047	0.453
1948/49	0.118	0.168	0.117	0.048	0.451
1949/50	0.144	0.192	0.174	0.043	0.553
1950/51	0.253	0.224	0.212	0.081	0.770
1951/52	0.371	0.232	0.274	0.048	0.926
1952/53	0.320	0.248	0.226	0.047	0.841
1953/54	0.339	0.256	0.294	0.037	0.926
1954/55	0.404	0.293	0.334	0.029	1.060
1955/56	0.362	0.305	0.344	0.045	1.056
1956/57	0.347	0.341	0.322	0.003	1.013
1957/58	0.366	0.347	0.382	0.065	1.159
1958/59	0.353	0.356	0.385	0.072	1.166
1959/60	0.315	0.367	0.368	0.107	1.157
1960/61	0.293	0.368	0.377	0.090	1.128
1961/62	0.300	0.381	0.377	0.086	1.144

Source - Calculations based on statistics given in
Industrial Production Statistics.

APPENDIX TABLE 7
(As for Diagram VIII)

DATA USED FOR REGRESSION ANALYSIS OF FACTORS
AFFECTING WHOLESALE PRICES OF LOCALLY PRODUCED
WOOL TEXTILES

Year	(1) Purchase Cost of Raw Wool per lb	(2) Earnings Per Man Hour in Wool Textiles	(3) Index of Prices of Other Inputs Entering in- to Expenses	(4) Wholesale Prices of Locally Produced Wool Textiles Estimated from Regression	(5) Actual
Index Numbers 1949/50 = 100					
1946/47	76.8	76.7	91.0	80.1	79.2
1947/48	86.6	85.3	89.7	84.1	82.6
1948/49	81.7	90.6	94.9	87.3	86.2
1949/50	100.0	100.0	100.0	96.9	100.0
1950/51	175.6	109.6	109.4	122.2	129.0
1951/52	270.7	129.9	124.1	157.8	166.1
1952/53	232.9	128.3	134.6	154.5	157.0
1953/54	263.4	143.0	141.5	169.4	168.2
1954/55	303.7	150.3	142.0	181.0	182.5
1955/56	279.3	151.3	144.0	176.7	181.8
1956/57	274.4	161.2	149.4	181.4	176.9
1957/58	281.7	165.8	153.5	186.6	188.3
1958/59	261.0	167.9	157.1	184.4	186.3
1959/60	235.4	180.5	160.8	184.1	182.2
1960/61	191.5	177.8	165.0	175.5	184.9
1961/62	225.6	188.0	167.0	187.3	189.6

Notes: Column (1) From Industrial Production Statistics
 (2) " " " "
 (3) Price deflator as used in Lincoln College study on productivity in wool textile industry - forthcoming publication.
 (4) Prices estimated from regression equation $Y = 0.23X_1 + 0.28X_2 + 0.55X_3 - 9.1$
 (.02) (.24) (.33)
 (5) Actual Wholesale Price Index of Locally Produced Wool Textiles as in Table 4 of Original Submissions

APPENDIX TABLE 8
(As for Diagram IX)

A SYNTHESIS OF FACTORS AFFECTING RETAIL PRICE OF WOOL TEXTILES

Year	(1) Estimated Wholesale Price of Wool Textiles Ex Mill and Ex Imports	(2) Estimated Clothing Manufacturing Costs	(3) Estimated Wholesaling & Retailing Margin for Wool Clothing	(4) Estimated Total Retail Cost of Wool Clothing	(5) Index Number of Column 4	(6) Actual Index Number of Retail Cost of Wool Clothing
					1955=157.6	1949=100
					<u>Pence per lb. of Fibre Content</u>	
1949	172	78	184	434	98.0	100.0
1950	186	82	199	467	105.9	106.9
1951	233	101	236	570	128.4	139.0
1952	260	106	258	624	141.1	136.5
1953	254	110	261	625	141.1	144.2
1954	257	125	293	675	152.9	154.8
1955	256	130	312	698	157.6	157.6
1956	250	135	322	707	159.8	159.6
1957	255	136	320	711	160.7	160.2
1958	260	139	327	726	163.7	163.4
1959	257	142	335	734	165.6	164.9
1960	256	153	351	760	171.5	169.0
1961	264	155	364	783	176.4	172.4

General Note on Derivation of Table 8

These calculations represent an attempt to build up synthetically an estimate of the retail cost of wool clothing, from the rather fragmentary data available on cost components and margins. The starting point was an indication of the cost break-up for various items of wool textile consumption given in the Submissions to the 1957 Board of Trade Enquiry into the wool textile industry, made by the Department of Industries and Commerce.

This information which was given for one year only viz 1955, was then used, together with data from the Industrial Production Statistics relating to the clothing industry, to build up an average cost profile from woollen mill to retail.

Because we are not dealing with one single item of wool clothing but with a heterogeneous mixture of wool textiles which are sold at retail, we need to secure some representative unit of consumption and all calculations have been carried out in terms of pence per lb. of fibre content. Thus the 1955 figures given in the above table represent an estimate of the cost break-up from mill to retail of a representative unit of retail wool textile consumption, per lb. of fibre content.

This 1955 base figure was then adjusted backwards to 1949 and forwards to 1961, by using various indicators of the changes in the cost components - details of which are given in the notes which follow. The final figure of total retail cost as an index was then compared with the actual index of retail price of wool textiles with which, as Diagram IX shows, it is in fairly close agreement.

Column (1) The 1955 figure of wholesale price of wool cloth of 255d lb. fibre content was adjusted for each year according to the wholesale price index of wool textiles (Table 21) taking in each case the average of the two production years spanning the calendar year shown. A wholesale cloth margin of 17½% was also allowed.

Column (2) The 1955 figure of clothing manufacturing costs of 130d lb. of fibre content was adjusted each year by an index of earnings per head in the clothing industry.

Column (3) The 1955 wholesale and retail margin of 312d per lb. of fibre content was adjusted each year by an index of earnings per head in wholesale and retail distribution.

Column (4) is the sum of columns (1) (2) and (3).

Column (5) is column (4) expressed as an index number on base 1955 = 157.6 which was the actual retail price index (1949=100) for wool clothing for the year 1955 as in column (6).

Column (6) From Appendix Table 2.

APPENDIX TABLE 9
(As for Diagram X)

DATA USED FOR REGRESSION ANALYSIS OF FACTORS AFFECTING
RETAIL PRICES OF WOOL TEXTILES

Year	(1) Wholesale Price of all Wool Textiles	(2) Earnings Per Man in Clothing Industry	(3) Retail Price of Wool Textiles Estimated from Regression	(4) Actual
1949 = 100				
1949	100	100	102	100
1950	108	104	107	107
1951	136	130	133	139
1952	151	135	143	137
1953	148	141	144	144
1954	150	160	154	155
1955	149	166	156	158
1956	146	173	158	160
1957	148	174	160	160
1958	152	178	163	163
1959	150	182	164	165
1960	149	196	170	169
1961	154	199	174	172

Notes Column (1) Average of wholesale price of wool textiles (as in Table 5) for production year preceding and following calendar year shown.
E.g. for 1950 the wholesale price index is the average of 1949/50 and 1950/51.

Column (2) Index of earnings as reported in Labour and Employment Department Gazette.

Column (3) From Regression Equation

$$Y = 6.9 + 0.48X_1 + 0.47X_2$$
(.09) (.05)

Column (4) From Table 8, Column (6).

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