

AGRICULTURAL
ECONOMICS
RESEARCH UNIT



**TRENDS IN RURAL LAND PRICES
IN NEW ZEALAND 1954-1969**

By
R.W.M. Johnson

Technical Paper No. **4**

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 and other bodies for specific research projects.

The Unit has on hand a long-term. programme of research in the fields of agricultural marketing and agricultural production, resource economics, and the relationship between agriculture and the general economy. The results of these research studies will in the future be published as Research Reports as projects are completed. In addition, technical papers, discussion papers, and reprints of papers published or delivered elsewhere will be available on request. For a list of previous publications see inside back cover.

RESEARCH STAFF : 1971

Director

J.D. Stewart, M.A.(NZ), Ph.d.(Rd'g), Dip. V.F.M.

Deputy-Director

R.W.M. Johnson, M.Agr.Sc., B. Litt(Oxon), Ph.D.(Lond.)

Research Economists

G.W. Kitson, B.Hort.Sc.

G.W. Lill, B.Agr.Sc.

UNIVERSITY LECTURING STAFF

W.O. McCarthy, M.Agr.Sc. Ph.D.(Iowa)

B.J. Ross, M.Agr.Sc.

A.T.G. McArthur, B.Sc.(Agr.)(Lond.) M.Agr.Sc.

R.G. Pilling, B.Comm.(N.Z.), Dip.Tchg., A.C.I.S.

L.D. Woods, B.Agr.Sc.

A.D. Meister, B.Agr.Sc.

TRENDS IN RURAL LAND PRICES
IN NEW ZEALAND 1954 - 1969

by

R. W. M. Johnson

Agricultural Economics Research Unit Technical Paper No. 4

P R E F A C E

This paper examines post-war trends in rural land prices. New Zealand has a freehold system of land tenure and a land registration system based on the Torrens system first used in South Australia. As a result, reliable records are available of all rural land transactions for some considerable period of time.

The paper examines an entirely new representative series of rural land market values for the period 1954 to 1969, based on official records and explores in detail, economic changes in the aggregate rural land market over this period.

Readers will be interested particularly in the relationship between the market price of land and expected income. Land buyers are shown to discount increases in income at a relatively high interest rate and thus hedge against possible future fluctuations in farming income, while at the same time accepting lower average returns than in the immediate post-war years.

CONTENTS

	Page
1. Introduction	1
2. Land Registration and Land Purchase Prices in New Zealand	3
3. The Aggregate Market Value of Rural Land	5
4. Aggregate Market Value and County Valuations	19
5. The Net Return to Land	22
6. Changes in Average Purchase Price 1954-69	24
7. The Average Return on the Land Investment	26
8. The Marginal Return to Land	30
9. The Return to Management	34
10. Discussion	42

TRENDS IN RURAL LAND PRICES
IN NEW ZEALAND 1954 - 1969

Introduction

Land sale prices for farm land in New Zealand have shown a marked tendency in the past to fluctuate with farm income and prosperity. In the inter-war period high purchase prices for land were based on temporary increases in export prices and prospects, and large sums of money were often borrowed to finance these transactions. With any marked decline in export prices, the assumed "value" of the land was soon found to be illusory, and serious financial losses resulted.* During the war years, land sales control was introduced for all farm land in the country, partly to avoid the excesses of the previous two decades and partly to stabilise prices for the course of the war. Land sales control was lifted in 1951 and a free market in rural land has operated since. Again, market values have risen and fallen in line with farm income and prosperity but to date no marked depreciation of the land asset has been required.

* Some of this confidence in "permanent" increases in farm income must be related to the long period of improving farm incomes from 1895 to 1914. See, for example, J.B. Condliffe, "New Zealand in the Making" 1959 edition, p.228 et seq., and pp.246-7.

In any one year, only about 10 per cent of all rural holdings are transferred to new owners. Published statistics of rural land prices are based on these transactions, and are calculated from the total dollar "consideration" at transfer. As a free market in land has operated in New Zealand since 1951, average annual prices for rural land can be interpreted as the current market assessment of the capital value of the land asset.

The purpose of the analysis in this report is to relate the estimated "market value" of rural freehold land to aggregate net income. The net farm income accruing to land is derived from national income statistics by making appropriate adjustments for returns to other factors of production. In New Zealand, the market value of land is usually considered as the bare land plus all permanent improvements to it such as fences, pastures and farm buildings. Livestock and mobile plant are not included.

It can be generally expected that the land market value/annual income relationship reflects in some way the rate at which farmers capitalise expected net returns to land. Over the time period from 1954 to 1969, this basic relationship is partly obscured by the fairly systematic inflationary trend in prices. While deflation of both sets of data by a product price index is possible, the basic relationship between capital value and income remains unchanged by such deflation and is not explored further here.

In the long run, buyers of land will raise or lower their expectations of future changes in farm returns in relation to their own experience. It seems reasonable to assume that stabilised farm incomes and a virtual freedom from overseas fluctuations in product prices would be soon reflected in a lower rate of discounting of expected returns. On the other hand, more fluctuating overseas product prices would show up in a heavier discounting of year to year

changes in farm income, and a gradual shift to lower land purchase prices.

In general, the results of the analysis in this report show that net income to land is capitalised at close to a 7 per cent rate of interest, and that extra income accruing to land each year is discounted more heavily than this, possibly at rates up to 12 per cent. In this case, buyers of farm land are evidently fairly careful in capitalising chance or windfall increases in farm income and are mindful of the lessons of the past. At the same time, the average return to the land asset has been declining reflecting a rising level of confidence in the permanency of net farm income.

Land Registration and Land Purchase Prices in New Zealand

The land registration system of New Zealand is based on the Torrens system of registration of title, first devised for South Australia in the 1860s. Under this system "the title to land is not secured or effected by the mere execution of deeds or of documents" but by registration of title with the appropriate authority. Apart from the legal aspect of providing a practically indefeasible title to the person named in the register, the system provides an accurate and up-to-date set of records of all land transactions in the country.

Statistics of land transfers record only transfers of land on sale and do not include transfer from trustees to beneficiaries or to new trustees, transfers of mortgages etc. Nevertheless, the records do include transfers from father to son and other family transfers and the money consideration recorded at the time may not be based on a truly economic or market valuation of the assets concerned.

It should therefore be stated at the outset of this study that average money consideration per acre of rural freehold land, suitably weighted, is taken as the main measure of current market value of rural land. This measure does include an unknown proportion of non-economic valuations of consideration which will probably lower the resulting market value, but it has the advantage, on the other hand, of representing the community's current valuation of the land asset, whether it be willing seller to willing buyer or a favoured transaction from father to son. Provided the proportions of different types of transfers stays roughly the same, the year to year change in weighted sale prices is a good measure of changes in the community's market valuation of the land asset.

The basic objective of the study is to relate aggregate market value of agricultural land to its aggregate income producing capacity. In theory, the individual purchaser of land has some notion of the future stream of income that the land asset will earn; the discounted value of all such future income represents the capital sum that the purchaser can afford to pay for the asset. Where this future stream of income and the asset price can be measured it is possible to estimate the purchaser's rate of discounting future income. This is the reverse of the more common situation where the net income to land is capitalised at some conventional rate of interest to obtain a buying price ("capital value") of the asset.

Clearly, it is not possible to estimate the future stream of income from the rural land asset for the whole of New Zealand. Trends in productivity are not at all clear, and future changes in product prices would make any such estimates subject to wide errors. Market prices for land merely represent the collective view of buyers at the time of purchase and this naturally includes some allowance for these uncertainties. For the purposes of analysis, past trends

in income and land prices must serve instead.

Net income to agricultural land is derived from national income statistics of personal income from farming. Company income from farming, and interest and rents need to be added to personal income, and interest on other capital and rates and non-income taxes need to be deducted so as to isolate the residual return to land and fixed improvements. Net income to land thus defined includes the "return to management". It is also assumed that wool retention income is part of the income of land in the year in which the funds were finally received in line with national income conventions.

Land market value is the weighted average of all transactions in a given year according to the proportions of each size group of farmers found in the national population of farmers. Details of these calculations are discussed before the analysis of the land market is presented.

The period of analysis is for the March 31st years from 1954 to 1969. From 1942 to 1950 all land sales in New Zealand were controlled at fixed prices and hence do not reflect economic relationships between price of asset and expected income. Decontrol of rural land took place on November 1st 1950 so that the starting observation of the analysis for the March year ending in 1954 is well clear of this period of price control.

The Aggregate Market Value of Rural Land*

This section sets out the procedures which can be used to derive a national rural market price of land that is representative

* Most of the material in this section has already been published in R. W. M. Johnson, "A New Index of Rural Land Prices", The N. Z. Valuer, Vol. 21, No. 6, Dec. 1970.

of all farming areas in the country. The resulting series of land prices can be carried back as far as 1954 with present data available. Some difficulties in using existing records of rural land transfers and this new series are also discussed.

After land transfers are registered at the Land Registry Office, they are passed to the Department of Statistics to be recorded and summarised in the Monthly Abstract of Statistics and the New Zealand Year Book. The transfer statistics only relate to transfers of land on sale, and do not include transfers of land from trustees to beneficiaries, transfers of mortgages and so on. It is understood that rural transfers are classified as such on the basis of properties over one acre in size, except in the case of the urban counties where 10 acres is accepted as the minimum area or other obvious discrepancies exist.

A total of seven to nine thousand rural freehold transfers and six to nine hundred rural leasehold transfers have been recorded in recent years. Table I shows the number of transfers, the total area involved and the total money consideration for the last six years.

One measure of land price is based on the calculation of average money consideration per acre. This may simply be the national total consideration divided by total area transferred or refer to a definite size group of transfers and the like. It has been apparent for a number of years that the national consideration per acre of freehold tends to fluctuate with changes in the size of blocks of land being transferred. As larger blocks tend to be more cheaply priced (on a per acre basis), an unusually large number of such blocks being transferred in any one year would tend to show a lower consideration per acre than would otherwise be the case. To counteract this effect, the Government Statistician calculates and publishes in the Monthly Abstract a weighted consideration per acre

for freehold land for each year, where the weights are based on the total acreages transferred within given size categories for the period from April 1st 1953 to March 31st 1966. The average size of transfer, the unweighted consideration per acre and the weighted consideration per acre for freehold land for the last six years are shown in Table 2.

TABLE 1

Recent Trends in Rural Land Transfers

<u>March Years</u>	<u>Number</u>	<u>Area</u> (th. acs)	<u>Consideration</u> (\$m.)
<u>Freehold</u>			
1964-65	8642	1589	156.6
1965-66	9281	1560	185.3
1966-67	8914	1592	184.0
1967-68	7566	1115	141.2
1968-69	7329	1247	141.2
1969-70	8480	1419	184.1
<u>Leasehold</u>			
1964-65	923	426	16.9
1965-66	646	306	13.4
1966-67	574	321	11.2
1967-68	472	222	8.9
1969-70	416	-	9.6

TABLE 2

Average Size of Rural Freehold Transfers and
Weighted Price per Acre

<u>March Years</u>	<u>Average</u> <u>Size</u>	<u>Unweighted</u> <u>Price per Acre</u>	<u>Weighted</u> <u>Price per Acre</u>
1964-65	183.9 ac.	\$ 98.52	\$ 97.02
1965-66	168.1	118.74	109.70
1966-67	178.6	115.58	112.24
1967-68	147.4	126.62	110.24
1968-69	170.2	113.26	110.16
1969-70	167.3	129.72	121.84

It can be seen in Table 2 that the downward correction to the unweighted consideration per acre gets greater as the average size of transfer gets smaller.

Over the years, a number of other criticisms have been made of these particular statistics as far as interpreting them for trends in farm land prices per acre. It is useful to summarise them at this point.

1. The recorded transfers include family transactions where the consideration may not be a true market value.
2. Many so-called rural transfers in the less than 30 acre category may consist of building sites, industrial sites, and other small blocks not used for farming.
3. The consideration per acre could be influenced by changes in the proportion of sheep farms and dairy farms being transferred.
4. The consideration per acre could be influenced by delays in completing sales - non-family transfers are held over while family transfers continue in periods of low net farm incomes.
5. The size distribution of freehold transfers in any year is not representative of the farming community as a whole, nor representative of all freehold and leasehold land taken together.

It is convenient to take this last point first and then to work back to the remaining four when the representativeness problem has been overcome. If it is possible to make the assumption that whole farms tend to be transferred as one block, then it is appropriate to examine the relationship between rural

land transfer price and the national distribution of farm sizes of holding. Table 3 shows the size distribution of all farms in New Zealand from the World Census of Agriculture for 1960.

TABLE 3

Size Distribution of New Zealand Farms 1960

<u>Size Group</u> (acres)	<u>Numbers</u>	<u>Per Cent</u>	<u>Total Acreage</u>	<u>Average Acreage</u>
10 - 29	7,447	9.7	130,877	17.6
30 - 49	4,274	5.5	168,889	39.5
50 - 99	12,353	16.0	918,596	74.4
100 - 149	11,068	14.4	1,343,984	121.4
150 - 249	12,696	16.5	2,452,385	193.2
250 - 499	13,585	17.6	4,814,925	354.4
500 and over	15,504	20.1	34,189,241	2,205.2
Total	76,928	100.0	44,018,897	572.2

In the 1960 Census of Agriculture farm holdings greater than 10 acres only were included, so that some adjustment of this data is required when comparing it with land transfer statistics which include all rural transactions less than 30 acres. The 1950 Census of Agriculture indicates that a further 56,000 acres is held on rural holdings less than 10 acres in that year. It is assumed below that 50,000 acres is the appropriate area for 1960.

There are two problems in getting a representative index of land prices from the available data. For all rural land transfers, small blocks of land tend to change hands very much more often than large blocks. This can be seen in Table 4, where the average national size distribution for 1950 is compared with

the size distribution of rural freehold transfers for the nearest available year, 1953-54.

TABLE 4

Comparison of 1950 National Farm Size Distribution and
Size Distribution of Transfers in 1953-54

<u>Size Group</u> (acres)	<u>1950 Census</u> Per Cent	<u>1953-54 Transfers</u> Per Cent
1 - 29	23.9	47.8
30 - 49	5.6	6.8
50 - 99	15.0	12.1
100 - 149	12.2) 17.5
150 - 249	13.5	
250 - 499	13.6	8.5
500 and over	16.2	7.3
Total	<u>100.0</u>	<u>100.0</u>

Secondly, although rural freehold transactions for more than 90 per cent of the transactions in land, rural freehold only covers about half of the area of total occupied farm land in New Zealand, the rest being in various forms of leasehold.

Thus to obtain a representative land price for the whole of New Zealand, the various size groups of transfers should be represented in their national proportions and not in the proportions in which they occur, and it must be assumed that leasehold properties would sell for the same price as freehold properties of the same size.

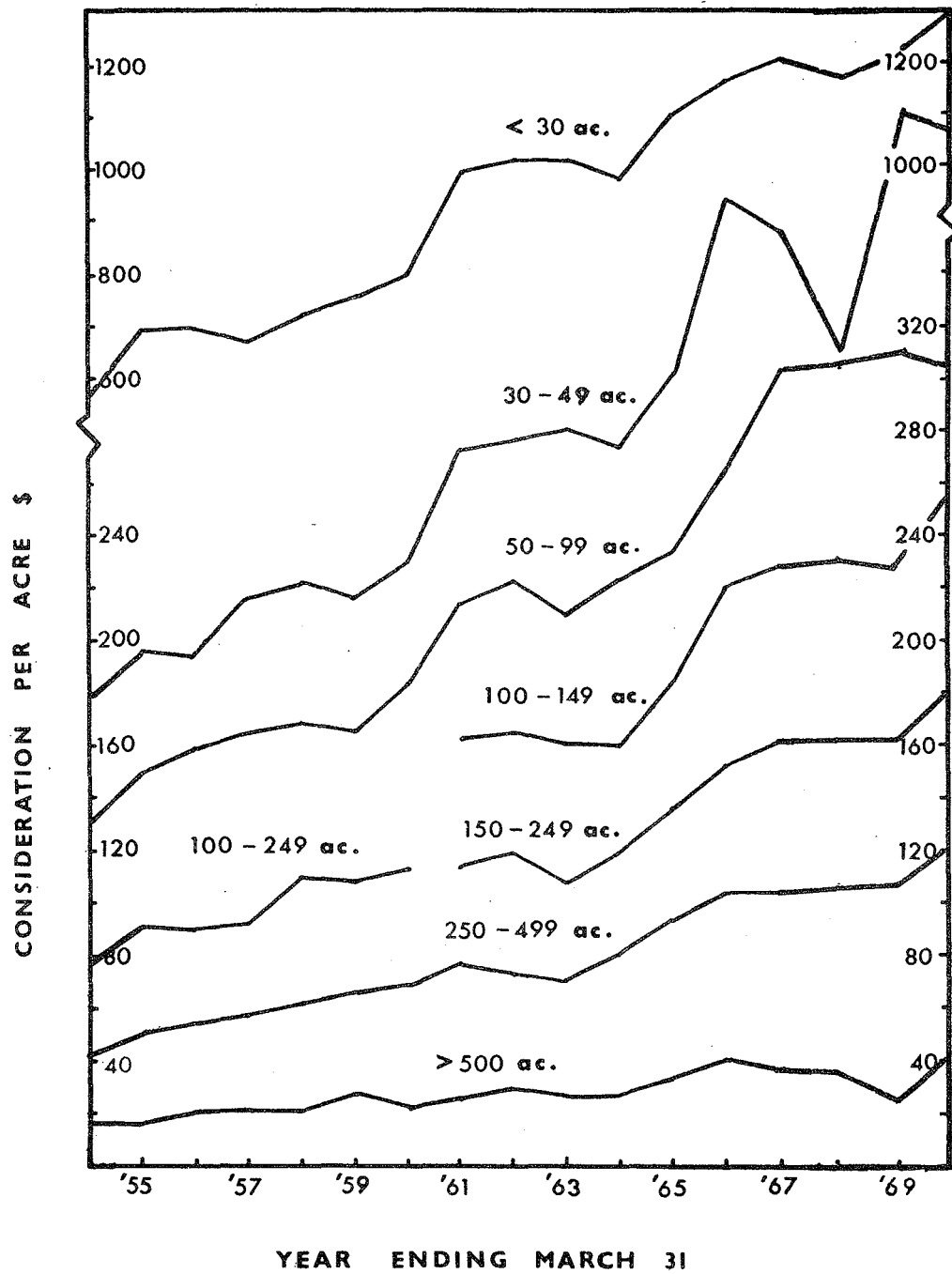
Since 1954, the Government Statistician has published details of annual consideration and area involved for each of the size groups of freehold transfers shown in Table 4. From these records, consideration per acre can be obtained for each size

group and these can be appropriately combined to give a national consideration per acre which is representative of all the rural land in New Zealand. Figure I shows trends in price per acre for these size groups. The procedure to be adopted is to weight each class by the proportion that the area in each group bears to total acreage in the 1960 Census of Agriculture (Table 3). The information on leasehold transfers cannot be used in the calculation at all as the consideration recorded is for the lessee's interest only and is therefore not equivalent to what would have been paid if these were freehold.

There are two further problems to discuss before the procedure can be set out. The transfer data clearly includes many transfers of blocks less than 10 acres as the mean size of block transferred in the less than 30 acre category is about $7\frac{1}{2}$ acres. Such transfers include many orchards and market gardens as well as some non-farming transfers believed to be included. In terms of the 1950 Census of Agriculture, some 56,000 acres of rural land was found on holdings less than 10 acres. If it can be assumed that some 50,000 acres were still in this category in 1960, then a total area of 180,000 acres of rural land is found on this size of holding in the whole of New Zealand.

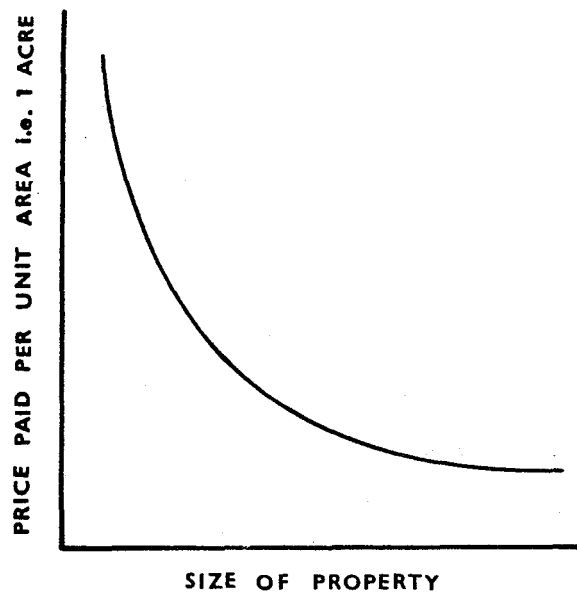
The second problem which arises in the weighting procedure is that the average size of holding transferred in the over 500 acre group fluctuates quite markedly. Fluctuations in average size of holding cause related year to year fluctuations in consideration per acre for the reasons outlined earlier. Over the last 16 years the average size of holding in this group has fluctuated from 1141 acres to 1657 acres, with a mean of 1329 acres.

A procedure is therefore needed for adjusting consideration



per acre in each year for this size group to the consideration that would have been obtained if the average area of 2205 acres in Table 3 had been transferred every year. An important assumption has to be made that leasehold blocks of the same size as freehold blocks would have sold for the same price per acre in the same year.

The calculation of this adjustment factor is based on the general relationship between unit land prices and size shown in Figure II. By and large, bigger blocks of land are used for extensive farming so that unit prices per acre of land get smaller as the blocks get bigger.



The nature of this relationship for all freehold transfers over 500 acres can be obtained by a detailed examination of every sale which was recorded in 1968-69.* In this period 462 transfers were registered.

Let Y = price per acre of each transfer,
and X = size of block in each transfer,

then the following regression relationship fits the data,

$$\log \bar{Y} = 9.119 - 0.8299 \log X,$$

(0.0761)

that is to say, for every one per cent increase in size of block price per acre will fall by 0.83 per cent. The standard error of the regression coefficient shows that this relationship is highly significant in the statistical sense.

To take an example, the average price of all freehold transfers over 500 acres in 1968-69 was \$28.90 acre, when the average size of block transferred was 1657 acres. Now in the national sample of farms, both leasehold and freehold, the average size of holding (from Table 3) is 2205 acres. According to the above formula, blocks of 2205 acres were selling on average for \$22.76 per acre in 1968-69.

Since the objective of this analysis is to obtain a nationally representative market value of land, all data for the over 500 acre group of transfers must be adjusted to the price that buyers were paying for 2205 acre blocks. The same formula

* Data kindly provided by the Government Statistician, Wellington.

is used, and the following equation expresses how the adjustment is calculated.

$$\begin{aligned}\log \text{ adjusted } Y &= \log Y - 0.83 (\log \bar{X}_p - \log \bar{X}_y) \\ \text{i.e. } \log \text{ adjusted } Y_{68-69} &= \log 28.90 - 0.83 (\log 2205 - \log 1657) \\ &= 1.3572 \\ \therefore \text{ adjusted } Y_{68-69} &= \$22.76\end{aligned}$$

Each year from 1953-54 to 1968-69 is adjusted in this manner. Table 5 shows the published data for this size group for each year since 1953-54 and the estimated price per acre if all land is represented.

To show how the final weighted market value and market value per acre is obtained, the data for 1968-69 is examined in detail. Total dollar value for all rural sales is obtained by multiplying each freehold size group price per acre by the acreage of farms in each size group shown in the 1960 Census of Agriculture, with the necessary adjustment to the area in the under 30 acres group. Total area of farm land involved on a national basis is the national area reported in the 1960 Census plus 50,000 acres and this area remains the basis of calculation for all years. Market value per acre is simply total market value divided by total area of farm land.

Table 6 shows the calculations for 1968/69.

TABLE 5

Adjusted Land Prices for Farms over 500 Acres
(\$ per acre)

	<u>Crude Price per acre</u>	<u>Adjusted Price per acre</u>
1953-54	17.72	10.82
1954-55	16.04	11.73
1955-56	20.12	12.84
1956-57	20.66	13.50
1957-58	21.20	14.14
1958-59	26.94	16.23
1959-60	22.08	15.17
1960-61	24.78	17.97
1961-62	28.82	18.32
1962-63	26.30	16.85
1963-64	26.64	17.82
1964-65	32.92	20.48
1965-66	39.96	23.18
1966-67	36.68	22.77
1967-68	35.20	22.94
1968-69	28.80	22.76
1969-70	39.15	25.36

Note: The adjustment is based on the relationship between price per acre and size of transfer for all transfers greater than 500 acres in 1968-69.

If this calculation is carried out for each year back to 1953-54, which is the earliest year for which the appropriate data is available, then a new representative national index of market value and farm land prices is obtained. Table 7 shows the aggregate market value of all farm land in New Zealand from 1953-54 to 1969-70 and the value or price per acre in each year based on the method described.

TABLE 6

Example Calculation of National Price per Acre
for 1968-69

<u>Size</u> <u>Group</u> <u>(acres)</u>	<u>Consideration</u> <u>per acre</u> <u>(\$)</u>	<u>Acres in</u> <u>National Farm</u>	<u>Total</u> <u>Consideration</u> <u>(\$th)</u>
1 - 29	1,238.20	180,800	223,866
30 - 49	418.20	168,900	70,634
50 - 99	315.20	918,600	289,543
100 - 249	189.22	3,796,400	718,354
250 - 499	107.20	4,814,900	516,157
500 and over	22.76	34,189,200	778,146
Totals		44,068,800	2,596,700

Consideration per acre = \$58.92

Returning now to the five points made earlier, this new index of rural land prices can be examined in the light of each point set out.

1. Family transactions. No improvement has been made in this respect as there is no published information on such transfers. It is likely that the presence of family transfers depresses the weighted average slightly.
2. Industrial and building sites. The influence of non-farm uses of land has been minimised, but not excluded altogether, as this would mean the loss of some genuine small rural holdings in the aggregate.
3. Changes in type of farm. Changes in the proportion of sheep and dairy farms from year to year should

TABLE 7

National Market Value of Rural Land and Prices 1954-70

<u>March Years</u>	<u>Market Value</u>	<u>Price per acre</u>
1953-54	1121.3	25.44
1954-55	1283.3	29.12
1955-56	1359.2	30.84
1956-57	1397.2	31.70
1957-58	1525.9	34.62
1958-59	1613.4	36.61
1959-60	1629.1	36.97
1960-61	1908.4	43.30
1961-62	1937.8	43.97
1962-63	1832.1	41.57
1963-64	1937.3	43.96
1964-65	2215.8	50.28
1965-66	2483.9	56.36
1966-67	2549.7	57.86
1967-68	2560.2	58.10
1968-69	2596.7	58.92
1969-70	2820.6	64.00

largely be eliminated with the constant size weights. Since sheep and dairy farms tend to have distinct size characteristics, the procedure adequately gives each its due importance.

4. Delays in different types of sale. This phenomenon is not measurable with the data available, and must be assumed to always be present to some degree.
5. Representativeness. The whole procedure gives proper weighting to the number of farms in each size group in the national population of farms. Some adjustment in the procedure may be required in due course, when the distribution of the national size population of farms is next calculated.

Aggregate Market Value and County Valuations

Aggregate market value is given the meaning in this report as the national selling price of all land as if it could all be sold in a single year. In fact about 10 per cent of holdings are sold every year, and these are used as an index of the sale value of the remainder which do not come on the market in a given year.

The Valuation Department also makes valuations of all rural land, usually in periods of five years. According to the Year Book "Valuers are enjoined not to strain after high values, nor to accept special prices paid for land in exceptional circumstances, but to determine the value neither above nor below the fair selling value in view of the many and diverse purposes for which the values are used".

It can therefore be seen that the Valuation rolls should approximate to market value as defined above, if it were possible to bring all the rolls up to date at once. In recent years in fact the Valuation Department has had to carry out such up-datings with the growth of ad hoc authorities with rating power over several constituent local authorities. Equity of apportionment of rates and levies requires estimates of capital values to be made on the same basis on the same date. In practice, the total value of property in a local authority is re-valued as a whole in years between detailed individual property re-valuations.

The Department has also made a national equalised valuation of all property in New Zealand as at 31 March 1966. The methodology used is described by the Department as follows:

"The technique involved in adjusting the values shown on the many district rolls to a uniform economic level as at 31 March 1966 depended upon obtaining from each of 41 district valuers a considered opinion of the change in values to that date from the time when each of the rolls for the districts under his control was last revalued. To assist in forming his opinion each district valuer made use of detailed records of property sub-divisions, buildings erected or in course of erection, land development, sales, leases and other transactions in property. These indicators of market activity were interpreted by him to forecast the likely new levels of property values that would be ascertained if a full inspection and valuation of each individual property could have been made. It is these forecasts that are used in this appraisal to enable an indication of the total value of the landed estate of the Dominion to again be available after a lapse of 68 years."*

* "The Valuation of Real Estate, A National Appraisal as at 31 March 1966", Research Paper 664, Valuation Dept. Wellington, Nov. 1966.

The value of all property in New Zealand at the date chosen was found to be \$10,508 million. Of this total, \$4,267 million or 40.6 per cent was located in the county districts of New Zealand.

This latter total includes all property within county boundaries and thus includes rural townships, seaside subdivisions, and housing in the heavily urbanised counties. The market value estimate in earlier pages of this report refers, on the other hand, to farm land used for productive purposes only.

Account of the heavily urbanised counties can be taken by excluding their revaluations from the total. If Waitemata, Hutt, Paparua, Waimairi, Heathcote, Peninsula and Taieri are excluded, the balance of the counties have a valuation of \$3,562 million. Some small farm holdings are also excluded in doing this, but many other small urbanised areas remain in the balance of counties chosen.

It is difficult to estimate the valuation of property used for non-agricultural purposes. Detailed examination of a number of representative rolls would be required to establish this accurately. There is evidence, however, from another recent publication of the Valuation Department on the incidence of rating under different methods of valuation.* In this report it is established that in Rangiora County 29.55 per cent of capital value arises from properties not used for farming, and 3.35 per cent from miscellaneous property not elsewhere included.

* "Land Value and Rating Incidence" Research Paper 68-5, Valuation Department, Wellington, November 1968.

For Rodney County the corresponding proportions are 18.30 per cent and 0.47 per cent. Both these counties have a considerable proportion of seaside accommodation and hence may not be entirely representative of all county rolls.

If it can be assumed that the national average is midway between these two estimates, then 26 per cent of all county property value is non-agricultural. Subtracting this proportion from \$3562 million gives an estimate of the market value of all agricultural land in New Zealand of \$2636 million. Table 7 shows that the sale price method of calculation gives a 1965-66 national market value of \$2484 m, some \$152 m. short of the above total. If the proportion on non-agricultural property was as high as 30 per cent of the total, the two estimates of market value would coincide.

It is therefore fairly plausible that the market values shown in Table 7 of this report reflect not only the year to year changes in real market value of the rural land asset in New Zealand consistently, but also reflect the absolute magnitude of market value reasonably accurately as well.

The Net Return to Land

The starting point for this calculation is Personal Income derived from farming in the National Income Statistics.* This is a measure of income received by non-company farmers after all factor payments have been made, including wages of employees. It is a return to owners of farms for their efforts and capital resources

* "Report on National Income and Expenditure", Department of Statistics, Wellington, New Zealand, various years.

they provide. As company income is included in a different part of the national accounts, details of company income from farming must be ascertained from income tax statistics and added to farming personal income, so as to encompass all land ownership in the country.

Next, local authority rates and land tax in the farm sector must be deducted from net income, as national income convention includes these items in the definition of personal income. Personal income is also calculated net of any interest and rent payments actually made by farmers. Since the net return to the land factor should include such payments as part of the residual return to land, all rural interest payments on land mortgages and rural rental payments are added on to the net income estimate.

Finally it is necessary to distinguish between "land" capital used by the farm sector and "other" capital, such as machinery and livestock. With a knowledge of the amount of this other capital employed in New Zealand agriculture a conventional rate of return (5 per cent) is deducted from the net income estimate as the reward to non-land capital included in the aggregate amount of capital provided by farmers and companies to the industry.

Statistics of personal income, company income and rates and land taxes are shown in Table VI of Research Report No. 59.* Table 8 of this report shows the further calculations

* "Productivity and Income of New Zealand Agriculture 1921-67", Agricultural Economics Research Unit Research Report No. 59, Lincoln College, 1969.

needed to estimate the net return to the land factor in the farm sector.

It will be observed that net income to the land factor as derived in this report also includes the so-called wages of management of farmers. The view taken here is that the farmers are owners of the land asset and they make their living out of its productive use. As the analysis develops it will be possible to disaggregate net income (as defined) into the true return to land and the residual return to management. As is well known, if clear-cut methods exist to calculate the return to management, the return to land can be calculated as the residual.

Changes in Average Purchase Price 1954-69

The post-war period has been characterised by steadily rising levels of land prices, increased productivity in agriculture, but stable product prices. Increases in land purchase prices cannot therefore be ascribed to the general level of inflation in the economy, but must be explained by productivity changes and land buyers' attitudes to future changes in land productivity. Even with rising levels of input prices, farm productivity has risen fast enough to pay for the extra cost of non-land inputs and to increase the basic return to land.

Year-to-year changes in land prices and certain other relevant factors are shown in Table 9. It is clear that big changes in land prices have followed good export price years such as 1956-57, 1959-60 and 1963-64. Farm production has shown a steady increase in most years and it is the export price element (mainly) which causes surges in land purchase prices.

TABLE 8

Net Income to the Land Factor
(\$m in current prices)

<u>Year March 31st</u>	<u>Adjusted Personal¹ Income</u>	<u>Rents and Interest²</u>	<u>Other³ Interest</u>	<u>Net⁴ Income</u>
1947-48	+113.8	+15.0	-16.0	+112.8
1948-49	123.7	16.0	16.9	122.8
1949-50	161.7	16.7	20.3	158.1
1950-51	230.3	16.6	32.9	214.0
1951-52	200.8	17.4	25.7	192.5
1952-53	223.6	19.9	30.4	213.1
1953-54	250.3	21.2	33.1	238.4
1954-55	254.0	23.1	35.2	241.9
1955-56	247.0	25.4	35.1	237.3
1956-57	280.9	27.8	39.2	269.5
1957-58	275.9	29.0	35.9	269.0
1958-59	236.9	32.8	34.1	235.6
1959-60	268.0	35.9	37.6	266.3
1960-61	278.7	39.1	35.4	282.4
1961-62	237.6	43.1	35.0	245.7
1962-63	259.5	46.1	37.0	268.6
1963-64	302.1	50.1	42.4	309.8
1964-65	305.6	55.2	43.4	317.4
1965-66	316.2	60.1	45.1	331.2
1966-67	289.6	65.8	44.8	310.6
1967-68	274.5	66.1*	45.0*	295.6*
1968-69	309.5*	67.0*	46.0*	330.5*

* Provisional

1. "Personal Income in Farming" plus income of farm companies less rates and land tax.
2. Rents on all leased land plus interest on outstanding land debt.
3. Interest calculated at 5 per cent of investment in machinery and livestock.
4. Return to owner of land.

The number of properties transferred in each year also responds sharply to the economic situation. A sharp fall in product prices brings about a contraction in sales in the same year. At the same time, however, land prices tend to stabilise rather than fall drastically in response to falling product prices. This phenomenon could well be related to a qualitative change in the type of sales negotiated in these years. As mentioned earlier there is some evidence to suggest that non-family sales tend to be held over in periods of low incomes and prices, while family sales tend to continue. The reverse probably holds true in periods of rising incomes and prices.

Net income to land tends to follow closely changes in product prices, but it should be remembered that marked changes in non-factor prices and volumes can also influence the level of net income. In terms of the income earned by the land asset, land buyers are most clearly guided by the levels of net income in the farming sector in the immediate past as sales recorded in a given March year in the transfer statistics closely reflect income changes in the previous March year. Further development of this relationship is discussed below in the section on marginal returns to land.

The Average Return on the Land Investment

In previous sections the current market value of the land asset in New Zealand agriculture and the net return to the land factor have been determined. It will be recalled that land value is estimated as if all the land asset in the whole country were revalued at current sale prices each year.

TABLE 9

Factors Affecting Changes in Purchase Prices
- Percentage Change per year -

	<u>Purchase Price</u> ¹	<u>Number of Transfers</u> ²	<u>Volume of Production</u> ³	<u>Product Prices</u> ⁴	<u>Net Return</u> ⁵
1953-54	+14.4	+ 1.5	+ 0.0	+ 4.3	+11.8
1954-55	+14.4	+ 4.4	+ 2.2	+ 1.0	+ 1.4
1955-56	+ 5.9	-24.3	+ 2.3	- 3.7	- 1.9
1956-57	+ 2.8	- 6.2	+ 1.4	+ 9.2	+13.5
1957-58	+ 9.2	+15.4	+ 7.1	-10.9	- 0.2
1958-59	+ 5.7	-14.9	+ 3.9	- 9.2	-14.1
1959-60	+ 1.0	+ 5.9	+ 1.3	+ 9.1	+13.0
1960-61	+17.1	+18.7	+ 4.4	- 6.1	+ 6.0
1961-62	+ 1.5	- 8.5	+ 1.8	- 5.0	-14.9
1962-63	- 5.7	-16.0	+ 5.3	+ 4.4	+ 9.3
1963-64	+ 5.7	+ 8.3	+ 3.4	+12.8	+15.3
1964-65	+14.4	+21.2	+ 2.7	+ 1.0	+ 2.4
1965-66	+12.1	+ 3.8	+ 5.8	+ 1.7	+ 4.3
1966-67	+ 2.6	- 4.6	+ 3.5	- 6.9	- 6.6
1967-68	+ 0.4	-17.1	+ 2.9	- 3.7	- 5.1
1968-69	+ 1.4	- 3.9	+ 2.4	+ 5.6	+13.0
1969-70	+ 8.6	+14.0			

1. Price per acre from Table 7.

2. Total number of freehold and leasehold transfers from
Monthly Abstract.

3. Volume index of total farm production from Monthly Abstract.

4. Implicit product price index for all farm production from
Research Report No. 59.

5. Net return to the land factor from Table 8.

In the same year the level of net income to land measures the net return to land as factor of production plus a "wages of management" element.

Table 10 shows the average return on the market value of the land asset for the years from 1953-54 to 1968-69. The average net return for this period has been 15.5 per cent of market value, but there has been a definite trend downwards in recent years. Expressed another way, market values of rural land in New Zealand have tended to rise faster than the net income derived from the land in the period under review. Evidently buyers of land are bidding against each other more than they used to or their expectations with regard to future incomes have changed in the period. A further factor in their buying attitudes might be a changed attitude to the wages of management element vis à vis paying the true opportunity cost of the land factor.

It might be thought that the income data in Table 10 does not reflect land buyers' attitudes depending as it does on a fairly refined residual imputation technique. Buyers might possibly be thought to be guided by changes in gross farm income i.e. they tend to confuse net productivity and gross productivity concepts of return. However, an examination of market value in relation to gross farm income reveals a similar relationship to that exhibited in Table 10. Gross income averaged some 44 per cent of market value in the mid 1950s and by the late 1960s this had declined to an average 33 per cent of market value. Other explanations of this relationship are clearly needed and further discussion is presented below after marginal returns to land have been analysed.

TABLE 10

Average Return on Aggregate Land Investment
(\$m in current prices)

	<u>Market Value of Land</u>	<u>Realised Income to Land and Management</u>	<u>Percentage Return</u>
1953-54	1121.3	238.4	21.3
1954-55	1283.3	241.9	18.8
1955-56	1359.2	237.3	17.5
1956-57	1397.2	269.5	19.3
1957-58	1525.9	269.0	17.6
1958-59	1613.4	235.6	14.6
1959-60	1629.1	266.3	16.3
1960-61	1908.4	282.4	14.8
1961-62	1937.8	245.7	12.7
1962-63	1832.1	268.6	14.7
1963-64	1937.3	309.8	16.0
1964-65	2215.8	317.4	14.3
1965-66	2438.9	331.2	13.3
1966-67	2549.7	310.6	12.2
1967-68	2560.2	295.6	11.5
1968-69	2596.7	334.0	12.9

The Marginal Return to Land

In this section, a more refined model of buyer behaviour is explored. Individual land purchasers presumably have in mind the future level of incomes that a property can be made to achieve and are likely to make an offer accordingly. The offer will be related to future income expected through the individual buyers' discount rate on that future income. In the aggregate, the market value of land will be determined in roughly the same way. Several thousand buyers make their assessment of future incomes on the evidence available, and aggregate market value will be related to income expectations through the average discount rate of all the buyers in the land market.

Other factors affecting market values of land at any given time will be credit supply, market pessimism, and attitudes to capital appreciation. Credit supply is important in that over 50 per cent of land purchases are financed with loans. As financial control is usually absent in the upswing of the balance of payments cycle in New Zealand, credit supply is probably more restricting only in times when the market is fairly distressed or in a consolidating frame of mind.

Market pessimism (or optimism) affects the market through the prospect of marked changes in the institutional framework of agriculture. The threat of EEC can be seen in this light. Such factors cause an abrupt realisation that the future is not as rosy as hitherto thought, and is not unrelated to the buyers' view of expected income to land at any one time.

Some land is undoubtedly bought for capital appreciation purposes. This is tantamount to betting on a continuation of past trends in land prices in the hope that they will continue.

It seems likely that the longer land prices continue to rise the more confident land buyers will be that prices will be maintained if not increased further. If sharp fluctuations in export income can be avoided by Government action, then buyers do not have to be so cautious in capitalising each gain in productivity into capital values. Such a change in attitude would be reflected in a lower discount rate for evaluating future income. Capital appreciation must be expressed in terms of changes in expectations of the sort discussed above to make any sense at all.

The basic hypothesis advanced in this paper is that at any one time, buyers have a notion of "expected income" to the land asset which determines through their social discount rate the market value of land. Expected income, Y^* , is a weighted average of past annual incomes to the land factor, such as,

$$(1) \quad Y_t^* = \frac{\alpha_1 Y_t + \alpha_2 Y_{t-1} + \alpha_3 Y_{t-2} + \alpha_4 Y_{t-3}}{\alpha_1 + \alpha_2 + \alpha_3 + \alpha_4}$$

where Y_t = actual net income to land in year t ,

α = weight of each year in expected income.

The sum of the weights is unity hence α_1 measures the proportional effect that the most recent income data has on buyer expectations of future income changes.

Expected income is related to market value of land (or land price), M_t , through a capitalisation equation,

$$(2) \quad M_t = a + B Y_t^*$$

where a = a constant representing residual income, i.e. wages of management,

and $B = \frac{1}{r}$ = the capitalisation ratio or inverse of the discount rate in perpetuity r .

Since "a" represents a constant level of wages of management, the coefficient B measures marginal returns to the land factor. Every unit increase in expected income is capitalised at \$B into market value.

For the purposes of estimation, the following equation is employed,

$$(3) \quad M_t = a + b_1 Y_{t-1} + b_2 Y_{t-2} + b_3 Y_{t-3} + b_4 Y_{t-4}$$

$$\text{where } b_1 = \frac{\alpha_1 B}{\alpha_1 + \alpha_2 + \alpha_3 + \alpha_4}$$

$$b_4 = \frac{\alpha_4 B}{\alpha_1 + \alpha_2 + \alpha_3 + \alpha_4}$$

Since $\alpha_1 + \alpha_2 + \alpha_3 + \alpha_4 = 1$, the ratio $\frac{\alpha_1}{\alpha_1 + \alpha_2 + \alpha_3 + \alpha_4}$

measures the percentage influence of Y_{t-1} on expected annual income to the land factor. By the same rule, the sum of the b coefficients will equal B, the long-term capitalisation rate. It should be noted that the income of year t-1 is the most recent information available to land buyers in current land buying year t.

The following equation has been fitted to the data from Tables 7 and 8, for the period 1954-69,

$$(4) \quad M_t = -1921.6 + 7.04 Y_{t-1} + 2.05 Y_{t-2} + 4.01 Y_{t-3} + 1.22 Y_{t-4}$$

(1.65) (1.65) (1.53) (1.42)

$$R^2 = 0.9607$$

D. W. = 1.050 (Durbin-Watson statistic)

Thus buyers appear to give marked weight to income in the immediate past and to a lesser extent to income of 3 years earlier.

The actual values of α or weights implied by this equation are as follows,

$$\begin{array}{rcl}
 \alpha_1 & = & 0.49 \\
 \alpha_2 & = & 0.14 \\
 \alpha_3 & = & 0.28 \\
 \alpha_4 & = & 0.09 \\
 & & \hline
 & & 1.00
 \end{array}$$

The sum of the α coefficients is 1.00. This represents the long-run capitalisation rate of land buyers and is equivalent to a discount rate in perpetuity of 6.98 per cent per year. In the short run, buyers adjust expected income in terms of the most recent information available. In this case, previous years' income to the land factor is capitalised at \$7 per \$ of income, which is equivalent to a discount rate of 14 per cent per year.*

The measurement of these relationships in this section has important policy implications. Even though a previous section indicated that market values of land were rising faster than net incomes, the rate of return to land is still commendably high at the margin. Budget studies have indicated that farmers have seldom been able to obtain a return of greater than 5 per cent if farm capital is valued at market prices. The estimated return of

* Investigation of weighted averages of two, three, four, five and six years of past income indicated that four years averaging was a long enough period for measurable effects to emerge. The capitalisation rates for different averaging periods do not differ markedly.

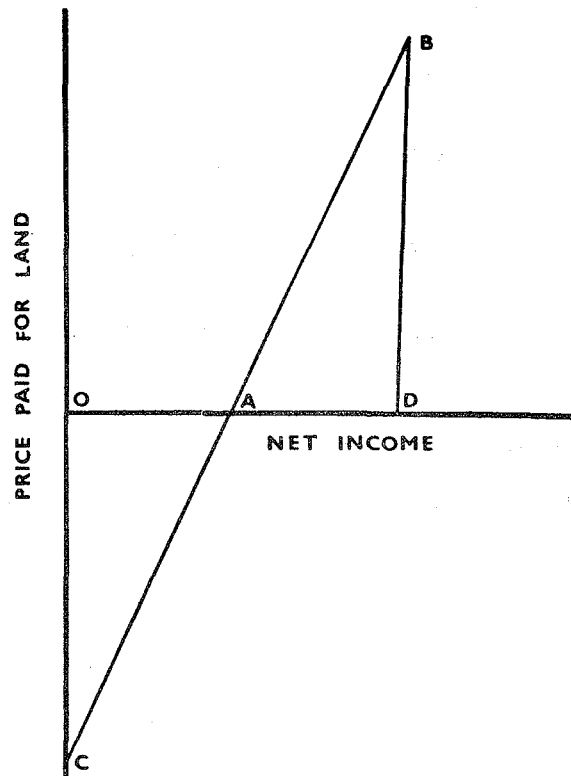
7 per cent derived above therefore suggests considerable caution on the part of land buyers in buying farms. In the short run, buyers are extremely cautious and recent changes in income are apparently capitalised at rates up to 14 per cent.

These results are based on an analysis of the period 1954-69 as a whole, which assumes that the rate of return was constant throughout the period, and the return to management can be calculated as the residual. The next section analyses the return to management in further detail on these assumptions, and suggests further hypotheses for testing.

The Return to Management

In this section, the return to management is calculated in two ways; first as residual income after "paying" land its marginal return, and second, as a direct charge on net income by assuming wages equal to paid employees. In the latter case, the return to land can then be calculated from residual income.

In the first calculation, it is assumed that the "true" marginal return to land is 7 per cent of market value as estimated in the previous section of this report. If buyers discount all future income at a rate of 7 per cent per annum, this is equivalent to an annual capitalisation rate, or rate of return of 7 per cent. The calculation to be made is to deduct from net income (Table 8) a 7 per cent charge on the market value of land capital employed in the farming industry in each year. The residual income in each year is then available to reward the wages of management element in net income.



The principle being followed is illustrated in Figure III. Market value or price paid for land is related to net income by the fairly steep line A B showing that for every \$ increase in net income market values increase by \$14.34. This is equivalent to an annual rate of return of 7 per cent. At the horizontal line O D the value of land is zero but some net income remains. The distance O D represents average income available and the distance A D, the proportion of net income "paid" to the land factor. Thus \$14 of capital value is deducted from average capital value for every \$ of income deducted from average income. The distance left over, that is O A, is the mean return to the management factor.

For the data in the period 1954-69,

$$\bar{Y} = \$ 278.3 \text{ m.} \quad (\text{O D})$$

$$\bar{M} = \$ 1871.9 \text{ m.} \quad (\text{D B})$$

$$\frac{7}{100} \bar{M} = \$ 131.0 \text{ m.} \quad (\text{A D})$$

$$\therefore \text{management return} = \$147.3 \text{ m.} \quad (\text{O A})$$

Table 11 shows the same calculation for every year from 1954 to 1969. Income in a given year is related to market value of land as determined in that year in the ex-post sense. The marginal return to land is calculated at 7 per cent of market value. As shown in the table, the means of the columns are the same as the example data given above.

Since market value has increased rapidly over the period an increasing proportion of net income is required to pay land its full opportunity cost. The estimated return remaining as a reward to management has stayed at a fairly constant level through the period though fluctuating somewhat with export prices. All external fluctuations of this sort are of course picked up in a residual calculation like that in Table 11.

A possible refinement of the return to management is to express it as the return per holding or per farmer. Table 12 shows the calculations for this. The number of holdings in Farm Production Statistics is taken as the best measure of number of farmers in New Zealand even though it is realised that this figure relates to the number of agricultural and statistical returns made each year. In the year before 1959-60 the published figures of numbers of holdings have been corrected for the numbers of holdings less than 10 acres not given in recent Farm Production Statistics.

TABLE 11

Estimated Ex Post Return to Management
\$m

	<u>Income to Land & Management</u>	<u>Market Value of Land</u>	<u>M.V. P. to Land</u>	<u>Estimated Return to Management</u>
1953-54	238.4	1121.3	75.5	159.9
1954-55	241.9	1283.3	89.8	152.1
1955-56	237.3	1359.2	95.1	132.2
1956-57	269.5	1397.2	97.8	171.7
1957-58	269.0	1525.9	107.8	162.2
1958-59	235.6	1613.4	112.9	122.7
1959-60	266.3	1629.1	114.0	152.3
1960-61	282.4	1908.4	133.6	148.8
1961-62	245.7	1937.8	135.6	110.1
1962-63	268.6	1832.1	128.2	140.4
1963-64	309.8	1937.3	135.6	174.2
1964-65	317.4	2215.8	155.1	162.3
1965-66	331.2	2483.9	173.8	157.4
1966-67	310.6	2549.7	178.5	132.1
1967-68	295.6	2560.2	179.2	116.4
1968-69	334.0	2596.7	181.7	152.3
Means	278.3	1871.9	131.0	147.3

The 1956-57 ratio of 13 per cent of all holdings has been used for this purpose.

Even with the slight decline in the number of holdings, the money income available per holder does not show much upward trend over these years. Whereas \$2000 might be a satisfactory target money income in the early 1950s, it would certainly not be so accepted during the 1960s.

It must be concluded that the land factor is taking an undue proportion of net income in this calculation as it would generally be accepted that money wages of management would need to have doubled over this period just to keep up with the cost of living. In technical terms it is therefore likely that the assumed constancy of the rate of return on land over the period cannot be accepted and alternative procedures explored to make the situation clearer.

Thus the second method of calculating the management element in net income can be utilised to overcome this problem. It is assumed that every farm owner would expect a reward for his own work at least equal to the money wages earned by paid employees. These money wages can be calculated from Tables X and XI of Research Report No. 59 and multiplied by the number of farm-holders in Table 12 of this report. Table 13 shows the estimated aggregate return to management that would be needed on this basis, and the residual return to the land factor. The last column shows this residual return as a percentage of market value.

Given the assumption that expected wages of management can be equalised with employee's wages, this result shows a considerable decline in the return received each year by the land factor in New Zealand agriculture. Put another way, land prices have been increasing at a much faster rate than residual income (as calculated)

TABLE 12

Estimated Management Return per Holding

	Aggregate Management Return \$m	No. of Holdings ≥ 10 acres th.	Return per Holding \$
1953-54	159.9	79.8	2003
1954-55	152.1	80.4	1891
1955-56	142.2	73.7	1929
1956-57	171.7	73.6	2332
1957-58	162.2	72.2	2246
1958-59	122.7	72.5	1692
1959-60	152.3	76.9	1980
1960-61	148.8	73.1	2035
1961-62	110.1	72.7	1514
1962-63	140.4	72.3	1941
1963-64	174.2	71.7	2429
1964-65	162.3	70.5	2302
1965-66	157.4	69.9	2251
1966-67	132.1	68.2	1936
1967-68	116.4	66.9	1739
1968-69	152.3	66.0*	2307
* Provisional			
Means	\$147.3 m.	72.5	\$2033

and suggest a considerable shift in buyers' attitudes to land purchase.

One explanation would be that buyers have lowered their time discount rate, as the fluctuations of the past have been forgotten and the post-war expansion has continued for 25 years virtually uninterrupted. In effect they are showing a willingness to accept a lower return on capital investment. In some quarters this trend might be interpreted as an excessive increase in land prices but it is a brave man who can tell the difference between increased confidence and over-confidence.

A possible check on the change in expectations hypothesis is to calculate the marginal return to land for different periods since 1954. Because of the restrictions imposed by regression analysis it is only possible to re-calculate the marginal return to land for two sub-periods, namely 1954-61 and 1962-69, periods of eight years each. The results of this analysis are not presented in detail as the significance tests on the regression coefficients barely reached the 5 per cent level in most cases. The broad conclusion that did emerge, however, was that there was very little difference in the capitalisation rates calculated for the two sub-periods. As might be expected the capitalisation rate was higher in the second period and the implied rate of return lower, but not by a very great margin.

Unfortunately the regression and residual imputation methods employed do not allow any greater refinement of analysis with the data available. General supposition supports a hypothesis of declining discount rates of future income in rural land buying in New Zealand but the techniques of analysis available do not produce results which would give strong support to such a hypothesis.

Various reasons can be advanced for expecting greater or lower management rewards than those calculated in Tables 12 and 13.

TABLE 13

Return to Land as a Residual
(\$m)

	<u>Income to Land & Management</u>	<u>Wages of Management</u>	<u>Residual Return to Land</u>	<u>Residual as a % of Market Value</u>
1953-54	238.4	62.1	176.3	15.7
1954-55	241.9	66.4	175.5	13.6
1955-56	237.3	64.0	173.3	12.7
1956-57	269.5	67.9	201.6	14.4
1957-58	269.0	71.1	197.9	13.0
1958-59	235.6	75.7	160.0	9.9
1959-60	266.3	86.0	180.3	11.1
1960-61	282.4	88.9	193.5	10.1
1961-62	245.7	95.2	150.5	7.8
1962-63	268.6	97.1	171.5	9.4
1963-64	309.8	104.6	205.3	10.6
1964-65	317.4	113.8	203.6	9.2
1965-66	331.2	122.9	208.4	8.4
1966-67	310.6	129.1	181.5	7.1
1967-68	295.6	136.6	159.0	6.2
1968-69	334.0	145.0	189.0	7.3

For example, a shift to higher equity in the period of analysis could lead to farmers accepting a lower level of wages of management than would otherwise be the case. In some circumstances the reverse might hold true as well. The well-known shift to a greater number of single man farms, and the absolute decline in hired employees, suggests that a greater proportion of the normal work is now done by the owner-operator. In this case, the absolute amount of wages of management should be increasing more quickly than assumed in this paper.

On balance, the equality of management rewards with paid wages assumed in Table 13, is probably a fair guide to the participation of farmers in the practical side of farming, hence the decline in the real return to land also shown in Table 13 must be accepted as a real change in land buyers' expectations with regard to the land factor and future changes should be watched closely.

Discussion

This paper represents an attempt to understand the workings of the rural land market in New Zealand through a study of the national aggregates. Clearly not every detail of personal or day-to-day observation of the market working can be incorporated in such a study, and only the main changes in the aggregates will yield to analysis.

The aggregate data on market value has been constructed specially for this study and some imperfections in the methodology still remain. In particular the assumptions concerning the sale value of leasehold land are very approximate. It appears likely that leasehold land will be used more extensively than freehold

properties of the same size, and therefore they will probably be lower valued on a unit area basis. If this is so, then the share of total market value represented by the over 500 acre group of farms is probably too high. Further detailed investigations are required to resolve this matter further.

The inclusion of family transactions in the sales data, unavoidable when using the published statistics, leads to a slight under valuation of assets of all size groups on a market value basis. Again very detailed analysis of sales, such as carried out by the Valuation Department, could be carried out to eliminate family transactions, and the resulting commercial sales used to build a national aggregate using the same procedures as set out earlier in this report.

The aggregate data on income earned by the land factor is satisfactory as far as the author can see. The measure suffers slightly from the usual errors of residual imputation though it should be noted that the adjustments to the national income data on personal income are relatively small.

As far as possible, both the land value aggregate and the net income aggregate have been defined so as to cover the entire farming industry. It was suggested at the beginning that some urbanised property sales situated in counties might be classified as a rural freehold property sale, but recent advice from the Valuation Department suggests that the inclusion of such transfers are small in number. On the income side, personal income and company income from farming are unlikely to be seriously affected by non-farm income elements.

The general result of the study suggests a steady appreciation of capital values of land similar to the earlier

period in New Zealand history noted by Condliffe. Clearly land buyers are subject to changing expectations as to future income and one element in such expectations is the general feeling of confidence in the future. A reasonably long period of stability in export markets and the national economy leads to greater confidence on the part of buyers that conditions will continue and hence that a lower return can safely be accepted on capital investment.

The regression technique used in the analysis does not lend itself to a full exploration of this phenomenon of changing expectations and a verbal interpretation must be made in addition.

The interpretation of the residual income available as wages of management is also subject to some reservations on the data side. In particular, the number of holdings in Farm Production Statistics is probably not an adequate index of farmers earning a full-time living from agriculture. It is also difficult to specify, as a result, the opportunity cost of the work performed by owners of farms. Taking a wage equal to employees' average money earnings and multiplying it by the number of farm occupiers in Production Statistics may lead to considerable errors of measurement in the aggregates.

The downward trend in net earnings to land over the period 1954 to 1969 is so clear-cut, however, that these difficulties with the data can largely be discounted. It is fairly clear that the rewards to the land factor are getting lower, and the preceding analysis suggests a changing expectations hypothesis as the most likely explanatory factor.

AGRICULTURAL ECONOMICS RESEARCH UNIT

TECHNICAL PAPERS

1. An Application of Demand Theory in Projecting New Zealand Retail Consumption, R.H. Court, 1966.
2. An Analysis of Factors which cause Job Satisfaction and Dissatisfaction among Farm Workers in New Zealand, R. G. Cant and M. J. Woods, 1968.
3. Cross-Section Analysis for Meat Demand Studies, C. A. Yandle.
4. Trends in Rural Land Prices in New Zealand, 1954-69, R. W. M. Johnson.
5. Technical Change in the New Zealand Wheat Industry, J. W. B. Guise.
6. Fixed Capital Formation in New Zealand Manufacturing Industries, T. W. Francis, 1968.
7. An Econometric Model of the New Zealand Meat Industry, C. A. Yandle.
8. An Investigation of Productivity and Technological Advance in New Zealand Agriculture, D. D. Hussey.
9. Estimation of Farm Production Functions Combining Time-Series & Cross-Section Data, A. C. Lewis.
10. An Econometric Study of the North American Lamb Market, D. R. Edwards.
11. Consumer Demand for Beef in the E. E. C. A. C. Hannah.
12. The Economics of Retailing Fresh Fruit and Vegetables, with Special Reference to Supermarkets, G. W. Kitson.
13. The Effect of Taxation Method on Post-Tax Income Variability. A. T. G. McArthur, 1970
14. Land Development by Government, 1945-69, H. J. Plunkett, 1970