Copyright Statement

The digital copy of this thesis is protected by the Copyright Act 1994 (New Zealand).

This thesis may be consulted by you, provided you comply with the provisions of the Act and the following conditions of use:

- you will use the copy only for the purposes of research or private study
- you will recognise the author's right to be identified as the author of the thesis and due acknowledgement will be made to the author where appropriate
- you will obtain the author's permission before publishing any material from the thesis.
AN EXAMINATION OF SOME INVESTMENT DECISIONS UNDER CROWN RENEWABLE LEASE TENURE

A thesis submitted in partial fulfilment of the requirements for the Degree of Master of Agricultural Science in the University of Canterbury

by
L.T. Evans

Lincoln College 1971

LINCOLN UNIVERSITY LIBRARY
This item has been added to the collection through the generosity of

The family of the late Ralph Frizzell, (Dip VFM 1946-1947 and Lecturer in Valuation, Lincoln 1968-1980)
## CONTENTS

| LIST OF FIGURES |  
| INTRODUCTION | 1  
| PART I  DESCRIPTION OF CROWN RENEWABLE LEASE TENURE | 3  
| I  CROWN LAND TENURE IN NEW ZEALAND | 4  
| The History of Land Tenure in New Zealand | 5  
| Crown Renewable Lease Tenure | 10  
| PART II  ON-FARM INVESTMENT ALTERNATIVES CONSIDERED | 14  
| II  THE EVALUATION OF ALTERNATIVE INVESTMENT OPPORTUNITIES | 15  
| Investment Decision Theory | 15  
| The Net Present Value Criterion | 17  
| The Benefit Cost Ratio | 18  
| The Internal Rate of Return | 19  
| The Discount Rate | 20  
| The Financing Decision | 22  
| Uncertainty | 25  
| Farm Investment | 26  
| Derivation of Cash Flows | 27  
| The Effect of Taxation | 31  
| Consumption, Investment and Taxation | 35  
| III  CROWN RENEWABLE LEASE TENURE AND FARM INVESTMENT | 42  
| Rent Payments and Time | 43  
| Profitability from the Landlord's Point of View | 47  
| Profitability to the Crown of Renewable Lease Tenure | 52  

The Profitability of Freeholding
The Perfect Market Situation
The Imperfect Market Situation

IV A CASE STUDY
Physical Description
The Tenant
Tenure
Investment Opportunities
Development
The Net Cash Flows

V CASE STUDY RESULTS
The Lessee's Point of View
The Profitability of Development
Freeholding in 1963
Freeholding in 1969
Freeholding in 1969 and Selling in 1980

The Crown's Point of View
Conclusions

PART III CROWN RENEWABLE LEASE TENURE AND RESOURCE ALLOCATION

VI THE THEORY OF RENT
Economic Rent
Scarcity and Rent
The Point of View
Differential Rent
Quasi-rent
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rent: A Summary</td>
<td>112</td>
</tr>
<tr>
<td>VII RENT AND THE THEORY OF THE FIRM</td>
<td>114</td>
</tr>
<tr>
<td>Rent and the Productivity of Land</td>
<td>115</td>
</tr>
<tr>
<td>Rent and the Marginal Value Product of Land</td>
<td>118</td>
</tr>
<tr>
<td>Compensation of Unexploited Resources</td>
<td>120</td>
</tr>
<tr>
<td>Economic Rent and the Firm</td>
<td>124</td>
</tr>
<tr>
<td>Composition of Total Costs</td>
<td>126</td>
</tr>
<tr>
<td>Level of Rent and Resource Allocation</td>
<td>127</td>
</tr>
<tr>
<td>Economic Rent and the Payment for Land</td>
<td>133</td>
</tr>
<tr>
<td>VIII CROWN RENEWABLE LEASE TENURE AND RESOURCE ALLOCATION</td>
<td>135</td>
</tr>
<tr>
<td>Rent Determined by the Crown Renewable Lease System</td>
<td>136</td>
</tr>
<tr>
<td>Rent and the Price Paid for Undeveloped Land</td>
<td>138</td>
</tr>
<tr>
<td>Rent under Today's Conditions</td>
<td>140</td>
</tr>
<tr>
<td>Rent Determination: An Example</td>
<td>144</td>
</tr>
<tr>
<td>Economic Rent and Crown Renewable Lease Tenure</td>
<td>147</td>
</tr>
<tr>
<td>The Value of Improvements</td>
<td>150</td>
</tr>
<tr>
<td>The Renewal Period</td>
<td>153</td>
</tr>
<tr>
<td>The Capital Market and Crown Renewable Lease Tenure</td>
<td>154</td>
</tr>
<tr>
<td>The Market Price of Farms</td>
<td>156</td>
</tr>
<tr>
<td>The Allocation of Resources</td>
<td>156</td>
</tr>
<tr>
<td>IX GOODWILL</td>
<td>159</td>
</tr>
<tr>
<td>Lessee's Interest</td>
<td>160</td>
</tr>
<tr>
<td>Goodwill and Compensation</td>
<td>170</td>
</tr>
<tr>
<td>SUMMARY AND CONCLUSIONS</td>
<td>173</td>
</tr>
</tbody>
</table>
LIST OF FIGURES

FIGURE                  PAGE
1. Schematic Representation of a Development Programme.  30
2. Hypothetical Pre- and Post-Tax Net Present Values.  33
3. Schematic Representation of Investment Alternatives.  66
5. Composition of Total Stock Numbers.  77
6. The Net Present Value of Development (Reduced Prices).  78
8. Comparison in 1963 of Freeholding, Leasing and Developing (Reduced Prices).  84
10. Comparison in 1969 of Freeholding and Leasing (Reduced Prices).  90
12. Rent Determination under Competition.  101
13. Intra-Marginal Firm.  107
14. Marginal Firm.  107
15. Quasi-Rent.  110
16. Rent Less than Economic Rent.  128
17. Rent Less than Economic Rent, and Output.  128
18. Rent in Excess of Economic Rent.  130
19. Rent Payments over Time.  162
20. Goodwill.  166
INTRODUCTION

New Zealand has a total area of 66.4 million acres, of which 44 million are classified as occupied farm land. More than 40 per cent of this latter area is held under leasehold tenure. The Crown is the landlord of 14.9 million acres which are let under several forms of leasing arrangement.

In recent years there have been marked increases in land prices throughout New Zealand. A result of this has been a substantial increase in rents, which has caused many farmers to become disaffected with leasehold tenure. The Committee of Investigation into Rentals and Freeholding of Crown Leases (1968), convened by the Minister of Lands, studied this problem and has forwarded to Parliament recommendations for an amendment to the 1948 Land Act.

The subject of this study is Crown Renewable lease tenure and its effect on farm investment. It falls naturally into three parts: firstly, a descriptive section providing a resume of the history of land tenure in New Zealand, and defining the terms of Crown Renewable lease tenure. The second part investigates the micro-economic aspects of this form of tenancy. This section takes as given the
terms of the lease and investigates various courses of action at the farm level. A case study approach is used to explore the economics of alternative investment opportunities open to an individual lessee. In the third part, macro-economic aspects of Crown Renewable lease tenure are investigated. This section examines whether or not this form of tenure promotes efficient resource allocation, and is concerned with the community's point of view rather than that of the individual.
PART I

DESCRIPTION OF

CROWN RENEWABLE LEASE TENURE
CHAPTER I

CROWN LAND TENURE IN NEW ZEALAND

The Land Settlement Board acting through the Lands and Survey Department administers all Crown leasehold land. The characteristics of different Crown leases are contained within various acts of Parliament. Of the 14.9 million acres let by the Crown 12 million fall under the jurisdiction of the 1948 Land Act. Forty-four per cent of the remaining 2.9 million acres is held under Lease in Perpetuity, for which the term is 999 years at a fixed rental. Table 1 provides a summary of the main forms of tenure by which farmers leased land from the Crown in 1970.

TABLE 1

Farm Land Let by the Crown

<table>
<thead>
<tr>
<th>Leases</th>
<th>Under the 1948 Land Act</th>
<th>Under Acts other than the 1948 Land Act</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Area in acres (000s)</td>
</tr>
<tr>
<td>Renewable</td>
<td>4722</td>
<td>2581</td>
</tr>
<tr>
<td>Pastoral</td>
<td>499</td>
<td>7458</td>
</tr>
<tr>
<td>Perpetuity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deferred Payment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Licences</td>
<td>2134</td>
<td>923</td>
</tr>
</tbody>
</table>
The two main types of leasehold tenure for which the 1948 Land Act is the relevant authority are Pastoral and Renewable leases. Pastoral leases are confined to high country areas and have an annual rental which is set every thirty-three years. The lessee has the right of renewal but cannot purchase the land.

Seventeen per cent of the land let by the Crown is let to farmers under renewable leases, the terms of which are contained in the 1948 Land Act. These leases are scattered throughout New Zealand, and embrace all types of farming. As this form of tenancy permits freeholding, the lessee is confronted with a further investment alternative.

The History of Land Tenure in New Zealand

Throughout New Zealand's short history, problems concerning the ownership of land have caused many political controversies. The first permanent residents bartered with the Maoris directly when purchasing land. The complicated form of Maori ownership and the speculative nature of some of the purchases led to many conflicting claims on land by both factions. To prevent further confusion, Governor Grey, soon after his arrival in 1845, decreed that future land purchases from the Maoris would be carried out by the Government only. The land bought in this way was then resold or let to settlers.
When this Government monopoly of land purchases was revoked in 1862, most of the South Island and large areas of the North Island were in European hands. Grey was antagonistic towards 'landlordism' as it was known in England at that time. He considered that every immigrant should be able to purchase his own block of land, and to achieve this end he lowered the price of land to 5 and 10 shillings per acre. Although this may have helped some settlers with limited capital to obtain land, it facilitated the creation of large estates by the more wealthy immigrants.

At this time settlers in the Wakefield colonies faced the iniquitous situation of paying a high fixed price for land owned by the New Zealand Company, whereas other settlers were accumulating land from the Crown at a much lower price under the auspices of Grey's edict.

Between 1840 and 1858 Crown lands were sold, reserved for public uses, granted under special authority, leased under grazing licences, or occupied for timber cutting. Although new provincial legislation required the assent of the Governor, the provinces introduced various forms of land tenure. After 1876, when the provincial governments were abolished, all land legislation was initiated by the central Government. The enactment of the Land Act 1877 replaced provincial land statutes with one uniform system of land administration. In place of the provinces, ten
land districts were set up with a land board for each
district and a Commissioner of Crown Lands in charge.
This was the forerunner of the Lands and Survey Department's
current organisation.

Sutch (1969,p.121) has pointed out that if the
quarter of a century prior to 1890 produced effects, the
following twenty-five years produced results. Immediately
before 1890 the Conservatives had dominated the government,
and wage earners had in general received scant recognition.
Although attempts had been made to form unions, the con-
dition of the economy and the attitude of the employers
precluded success. The poverty experienced in New Zealand
during the 1880s precipitated the fall of Atkinson's Con-
servatives in 1890 and the election of the Liberal Party
led by Ballance. Though the Conservatives knew by 6
December 1890 that they had been defeated they remained
in office until 23 January 1891. During the intervening
six weeks they recommended to the Governor that six
additional Conservatives be appointed to the Legislative
Council. This was done, and for the next two years the
Council was able to frustrate the Liberals' attempts at
legislation, as all bills, except those related to finance,
could be rejected by them. Nevertheless the Liberals
managed to pass some bills, often after many changes had
been made to the original clauses.
By 1890, there existed many large estates of both freehold and leasehold land. Considerable areas had already been freeholded in response to the low price of Crown land, and a form of lease tenure which permitted prospective settlers, as well as the lessee, to freehold leasehold land. This led to the system known as gridironing, as in self-defence lessees had to freehold strategic areas of land to protect their tenure. The Liberal Party which drew much of its support from the owners of small properties, and aspiring farmers came into power pledged to break down the monopoly of land ownership. Hence a large part of its legislative program was directed towards encouraging closer settlement. By this time the theories of Ricardo and Mill were well-known and the concept of taxing the 'uneearned increment' associated with land ownership enjoyed wide support. The Liberal Party introduced land tax on a graduated scale envisaging that it would fall more heavily on the owners of large acreages. The Crown was also given the power to repurchase land for settlement. Although it is difficult to ascertain the extent to which these measures were effective, the size of holdings decreased markedly over the next twenty years. Sinclair (1959, p. 162) records that by 1911 the total area of privately-owned land in holdings over 10,000 acres had fallen from 7 to 3 million acres. Although some estates were purchased by the Crown and resettled,
others were broken into smaller units and sold by the owners themselves.

Rolleston, who had been Superintendent of Canterbury, considered that the Crown should retain ownership of the remaining Crown land. To this end he introduced a bill creating a perpetual lease to be revised after thirty years. However, by the time it became the Land Act 1882, there had been added to it a clause conferring on the lessee the right of purchase. The tenure form Lease in Perpetuity, was initiated by the Liberal Party. They intended it to be a lease with periodic rent renewals and no right of freehold, but were forced to accept the curious compromise of Lease in Perpetuity. These leases could be taken up until 1907 when the law allowing this type of tenancy was rescinded. However, some settlers were reluctant to farm under Lease in Perpetuity tenancy, instead preferring a renewable lease system whereby they had the right of freehold.

The role of the Crown as landlord had been established by the early 1900s. The depression of the late 1800s eased with the rise in world prices of agricultural produce which began in 1895 and continued for the next twenty years. The greater prosperity enjoyed by farmers increased the demands made by state tenants for the right of freehold, and this concept has remained of paramount importance. The forms of
land tenure offered by the Crown have frequently been modified during this century, legislation often being concerned with the rehabilitation of ex-servicemen. The Land Act of 1948 consolidated previous Land legislation by which the Crown let land under a wide variety of tenures. Although it retained in existence the forty or more different types of Crown leases, this Act did provide for most of these to be replaced, at renewal, by leases under the 1948 Land Act. The thirty-three year renewable lease was established as the standard tenure for both new leases and renewals of former leases.

Throughout its history of land ownership the Crown has seldom relied solely on market forces to determine rentals. An exception to this was pastoral runs which, until this law was revoked, were auctioned at the time of renewal.

Crown Renewable Lease Tenure

The conditions pertaining to Crown Renewable leases are contained in the 1948 Land Act, and its subsequent amendments. These leases extend for a term of thirty-three years with a perpetual right of renewal for the same term, and with the exception of the rent, under the same conditions. Several restraints imposed on the lessee by the 1948 Land Act are seldom invoked. Some examples of these are that
the lessee reside on the land, maintain all improvements belonging to the Crown, insure buildings against fire and obtain prior approval to sell trees which are included in the lease. Although the lessee must inform the Land Settlement Board if the property is to be sold, the rent is not changed at the time of sale, unless it is a transfer between a discharged serviceman and a civilian.

When the lease is to be renewed, the new rental value is determined by the Land Settlement Board between two or three years prior to the termination of the lease period. Four values are ascertained:

(a) The value of the improvements as defined in the 1948 Land Act, which are in existence and not exhausted on the land included in the lease. These must have been purchased by the lessee or his predecessors at the beginning of the lease or carried out by them during the lease.

(b) The value of the Crown's improvements.

(c) The value of the land included in the lease, exclusive of the above improvements.

(d) The capital value, defined as the property's estimated market value at the time of valuation.

The sum of (a), (b), and (c) must not exceed the capital value of the property. The rental value is given by (b) and (c).

1 This valuation is carried out by the Valuation Department, for the Land Settlement Board.
The rental value is synonymous with the unimproved value of the land on most of those properties where the Crown does not own any improvements. There are two reasons why these values may differ. Firstly, because the lessee is awarded the value of improvements he has put on the land. The Valuation of Land Act 1951 permits any improvements, if they are paid for by the lessee, to be excluded from the unimproved value, although they may not actually be on the property. Secondly, because leases which commence at a time when the properties have deteriorated from their original state may have rental values which differ from their respective unimproved values.

At present the annual rent is determined as five per cent of the rental value. The proportion of the rental value which determines the rent is termed the rental rate. The rent is paid in half-yearly instalments due on 1 January and 1 July. Half a per cent of the rental value is added to the annual rent if payment is not made by the due date.

At any time the lessee may purchase the improvements belonging to the Crown. When a property is valued for rent renewal or freeholding, the value of the Crown's improvements must be in total at least what they were at the

1. The unimproved value is defined in the Valuation of Land Act 1951.
commencement of the lease. This condition is included because the lessee is expected to maintain the improvements belonging to the Crown. In practice, if the total value of the Crown's improvements as assessed by the valuer, is less than that amount at the beginning of the lease the difference is made up.

The lessee has the right to purchase the rental value at any time. The sum of (b) and (c) as outlined above is determined at the time of freeholding and is the purchase price. Freeholding can be carried out either by paying cash or by a deferred payment licence. In the latter case the lessee must pay a deposit and the balance in the form of a table mortgage. In practice this deposit must be greater than fifteen per cent of the purchase price. The initial rate of interest is five and one half per cent for the deferred payment licence but is reviewed at five-yearly intervals.

Discharged servicemen if graded A, are entitled to lower rents. The rental rate in this instance is three per cent as is the rate of interest payable on a deferred payment licence. These concessions are restricted to certain rental values for sheep and dairy farms, above which the normal rental rate applies.

This is the framework of the Crown Renewable lease system which has evolved through this century, and under which the Crown lets land to tenants.
PART II

ON-FARM INVESTMENT

ALTERNATIVES CONSIDERED
CHAPTER II

THE EVALUATION OF ALTERNATIVE INVESTMENT OPPORTUNITIES

The evaluation of investment alternatives can be carried out from various points of view. Clearly the nation, the Crown, and the lessee may have different objectives and hence place different emphases on factors involved with an investment. The investigation of investment options under Crown Renewable lease tenure is carried out with respect to the lessee, and the landlord as individuals.

Investment Decision Theory

Fisher (1930) recognised that investment is not an end in itself, but is a vehicle by which consumption is balanced over time. Investment options open to an individual cannot be evaluated separately from consumption alternatives. These two related factors have been considered by Hirshleifer (1958, p.332) who described them as production and financing decisions. The production decision involves a choice of the investments which will permit the individual to attain his optimal intertemporal consumption pattern. Criteria such as net present value and internal
rate of return have been devised to assist in making this decision.

The actual consumption pattern is determined by the financing decision. In this case the individual decides whether to borrow or lend money in order to balance his consumption over time. This decision depends on the individual's intertemporal indifference curves and the investment opportunities open to him. The production decision cannot be made in isolation from the financing decision.

The three criteria commonly used to make a choice between investments are outlined below. As the costs and returns generated by investments are usually scheduled over some time period, these criteria embody the principles of compounding and discounting as described by Fisher (1930).

(a) Net Present Value (NPV)
(b) Benefit Cost Ratio (B/C)
(c) Internal Rate of Return (IRR)

Lutz (1951) has pointed out that there is a problem in choosing the most appropriate criterion because, in the real world, disequilibrium conditions exist which can cause the criteria to give conflicting results. A considerable volume of literature has been written concerning the relative merits and demerits of these criteria.

1. Hirshleifer's conclusions were based on the two-period case. Bailey (1959) demonstrated that these were also valid in the multi-period situation.
Although a full review is not contemplated it is necessary to emphasise those aspects of the criteria which are important from the point of view of this study.

The Net Present Value Criterion

The net present value of an investment is computed as the sum of the discounted revenues and costs associated with that investment as given by Equation (3.1) where the benefits and costs extend over k years.¹

\[
\text{NPV} = \sum_{j=1}^{k} (R_j - C_j) d^j
\]  

(3.1)

Where \( R_j \) is the revenue in the jth year resulting from the investment and i is the discount rate.

From Equation (3.1) it follows that the net present value of an investment can be obtained by subtracting the present value of costs from the present value of returns:

\[
\text{NPV} = \sum_{j=1}^{k} R_j d^j - \sum_{j=1}^{k} C_j d^j
\]  

(3.2)

¹ To clarify exposition the discount factor \( \frac{1}{1+i} \) is defined as \( d \) throughout this study.
A positive net present value at the appropriate discount rate indicates that the investment being evaluated is profitable. Hirshleifer (1958) has demonstrated that this rule may fail in the case of non-independent investments in an imperfect market. However, in this instance only the individual's utility map will enable the correct conclusion to be drawn.

The net present value criterion is recognised by many writers as the most universally-correct rule to use in making production decisions. It is used extensively in this study.

The Benefit Cost Ratio

Eckstein (1958) has described the way in which the benefit-cost ratio can be used to rank alternative investments. The benefits and costs can be defined for the purpose of a general benefit-cost ratio as the discounted revenues and discounted costs respectively. These can be calculated in various ways. A project is acceptable if, at a given discount rate, its benefit-cost ratio is greater than one. This criterion is not used in this study.

1. Johnson (1968) discusses further this aspect of the benefit-cost ratio in 'Proceedings of a New Zealand Seminar in Project Evaluation in Agriculture and Related Fields'; Lincoln College Agricultural Economics Research Unit bulletin, Number 48: p, 132-137.
The Internal Rate of Return

This criterion has evolved from the concept that an investment has a rate of return which is a characteristic of that investment. It is described by Boulding (1935) as being an internal rate, not one which is determined outside the project. As it is obtained by equating the function which describes the net present value to zero and solving for the interest rate, it is that rate which will equate the present value of costs and returns. An investment project will be acceptable if its internal rate of return is greater than the relevant external rate of interest. There are a number of conceptual and theoretical problems with this criterion which are worthy of mention.

The internal rate of return is obtained by calculating the roots of a polynomial function. For this reason the criterion expresses all the characteristics of the roots of a polynomial. There are two theorems which are useful for determining the presence and number of roots in an equation.¹ The upper limit to the number of positive roots is given by Descartes' Theorem of Signs. This theorem proves that the number of positive roots cannot exceed the number of changes in sign of the equation coefficients. It is therefore

¹. These theorems are described by Turnbull (1952).
possible to have as many internal rates of return as there are changes in sign of the cash flow associated with the investment. Sturm's Theorem enables the determination of the number of real roots within a specified range. For an internal rate of return to exist there must be at least one sign change in the cash flow, and where there is only one such change a unique internal rate of return can be found.

As the internal rate of return is a characteristic of the investment it is independent of external interest rates. The discount rate, as expressed by the solving rate of interest, is constant between periods and therefore cannot take into account fluctuating interest rates. Hence this rule cannot consider the concept of time preference even if it is known via some future pattern of interest rates.

The Discount Rate

The discount rate used by an individual in the net present value formula, or with which he compares the internal rate of return, provides the link between production and financing decisions. The criteria outlined previously all require some meaningful discount rate in order to determine the profitability of investments. This discount
rate is determined by financing decisions which are made by the individual.

There are two prime determinants of market interest rates. The first is the time productivity of capital as a factor of production. The demand for investment capital will be higher the greater the economy's anticipated marginal rate of capital growth, and this will be reflected in the interest rates. Interest rates are also affected by the time preference for capital as related to consumption, and therefore reflect the relationship between consumption in different periods. In a perfect market these two factors are equated and determine a single interest rate. Individuals will have to pay this rate for borrowed funds and be paid this rate in return for lending money. Hence this interest rate would be used by individuals to evaluate investments.

There is no unique interest rate in an imperfect market. From the individual's point of view the interest rates which do exist can be broadly divided into lending and borrowing rates. Where an individual alters his consumption pattern by borrowing, the interest rate which he pays for borrowed funds is the correct discount rate for him to use in investment evaluation. It will be profitable for such an individual to carry out investments with a positive net present value at the borrowing rate of interest
or any project whose internal rate of return is greater than this rate. Similarly, an individual who lends money in order to redistribute consumption over time will use the rate of interest earned by the funds which he has lent as the discount rate for the evaluation of productive investments. Hirshleifer (1958, p.334) has pointed out that in certain circumstances a rate between the borrowing and lending rate would be the correct one to use. This situation arises when investment is carried out to the point where no borrowing or lending is required to achieve an optimal distribution of consumption over time. However this rate can be defined only by reference to the individual's utility map.

To use one rate of interest to evaluate investments implies that an individual can lend or borrow at that rate an amount which will enable him to attain his desired intertemporal consumption pattern.

**The Financing Decision**

Stewart (1968) has pointed out that an individual is ultimately concerned with the actual cash flow from an investment. If consumption is to be redistributed over time by borrowing then the actual consumption stream can be obtained by including in the revenues and expenses,
borrowing as a cash inflow and the debt-servicing expenses as outgoing charges.\(^1\) Consumption \((Y_j)\) in year \(j\) would then be written:\(^2\)

\[
Y_j = R_j - C_j + B_j - P_j - I_j
\]  

\((3.3)\)

where

\(R_j\) represents revenues generated by the investment in year \(j\).
\(C_j\) represents costs generated by the investment in year \(j\).
\(B_j\) represents borrowing in year \(j\).
\(P_j\) represents principal repayments in year \(j\).
\(I_j\) represents interest payments in year \(j\).

Consumption in each year as described by Equation (3.3) can be incorporated in the net present value formula in the following way:

\[
\text{NPV} = \sum_{j=1}^{k} Y_j d^j
\]  

\((3.4)\)

---

1. Hirshleifer (1958, p.332) has pointed out that borrowing by an individual to finance productive investment is modifying his intertemporal consumption pattern.
2. This model assumes that the investment is the only source of revenue for this individual.
To ensure that the total principal repaid equals the amount borrowed over the planning horizon \(k\), the constraint

\[
\sum_{j=1}^{k} B_j = \sum_{j=1}^{k} P_j
\]

can be added.

Equation (3.4) describes the net present value of an individual's consumption stream. Stewart (1968) noted that if the interest rate paid for the borrowed funds equals the discount rate, then the present value of the investment is unaffected by the method of borrowing or timing of loan funds.\(^1\) It has already been mentioned that if borrowing is carried out then the discount rate should be the interest rate paid for the borrowed money. Hence the inclusion of borrowing and repayment in the net present value formula will not affect the choice of investments.

Fisher's (1930) analysis of the choice between income streams, which has been further elaborated by Hirshleifer (1958) emphasises the point that the net present value rule is useful only for production decisions. The net present

---

1. Jensen (1969, p. 263) has demonstrated that if the discount rate equals the interest rate paid for borrowed funds, Equation (3.4) reduces to Equation (3.2). This analysis can be extended to include the situation where funds are lent and their lending rate equals the discount rate. Neither the method nor the timing of the lending will affect the net present value of the investment.
value criterion chooses the investments which generate income streams with the highest net present value. The consumption stream is determined by the individual’s utility map and his opportunities for lending or borrowing. The main failing of the net present value and internal rate of return rules is that they make only the productive decision, and give no indication of the amount which should be borrowed or lent to enable the individual to attain his optimal consumption pattern. For this reason the net cash flows in the net present value formula should include only the costs and revenues generated by the investment.

Uncertainty

Expected values of prices and technical coefficients form a substantial portion of the base on which investment decisions are made. The criteria are therefore subject to the effect of uncertainty.

Turvey (1963) has suggested three methods by which an allowance for uncertainty can be made:

(a) in the calculation of annual costs and returns
(b) in assumptions concerning the life of the investment
(c) in the discount rate.
Each of these methods has characteristics peculiar to it, and none is universally valid. A useful way of exploring the effect of uncertainty is by parametising the most important unknown variables. The range of results so determined permits more confidence to be placed in any conclusions which are drawn.

Farm Investment

Most on-farm investment is characterised by costs and returns extending over a number of years and is therefore usually termed continuous-input continuous-output investment. The following discussion refers mainly to development, but the principles which are established apply to all on-farm investment decisions.

Derivation of Cash Flows

Gow (1968) has pointed out that owing to the continuous nature of farm development and the complex relationship between technical co-efficients on the farm, it has proved impossible to differentiate clearly between capital and maintenance expenditure. Hence the cash flow technique of isolating extra costs and extra revenues generated by farm development, is usually employed.
This technique requires the establishment of a base, with which the net cash flows derived from the farm plus investment can be compared. A property which is a functioning entity at the time alternative investments are contemplated, has a net cash flow related to its level of output, and ruling prices and costs. The net present value of such a net cash flow can be written:

\[ \text{NPV} = \sum_{j=1}^{k} (R_{oj} - C_{oj})d^j \]

where \( R_{oj} \) and \( C_{oj} \) represent farm revenues and costs respectively in the \( j \)th year when no investment occurs.\(^1\)

The present value of the net cash flows resulting from the farm plus investment can be written

\[ \text{NPV} = \sum_{j=1}^{k} (R_{oj} + R_j)d^j - \sum_{j=1}^{k} (C_{oj} + C_j)d^j \]

where \( R_j \) and \( C_j \) are the extra costs and returns generated by the investment in the year \( j \) and incorporated in the farm's net income. Then the net present value from the investment is given by

\[ \text{NPV} = \sum_{j=1}^{k} (R_{oj} + R_j)d^j - \sum_{j=1}^{k} (C_{oj} + C_j)d^j \]

\(^1\) The method of discounting and compounding used in this study assumes that revenues and costs occur at the end of each year.
\[ - \sum_{j=1}^{k} R_{oj} d^j - \sum_{j=1}^{k} C_{oj} d^j = \sum_{j=1}^{k} R_{oj} d^j - \sum_{j=1}^{k} C_{oj} d^j \] (3.5)

From Equation (3.5) it is clear that in determining the net present value of an investment by this method the base should be calculated in such a way that the extra costs and returns reflect only the effect of the investment. The method by which a base with this characteristic can be established is described as the 'with and without' principle by Eckstein (1958). To compare before and after situations may not be correct, as the after situation may include effects due to the changes in factors other than those caused by the investment. What should be compared is the progress of the farm with and without the investment. Lawson (1967) exemplified this approach by the establishment of a moving base which took into consideration the lagged effect of previous investment.

Alchian (1955) has pointed out that with the adoption of the cash flow method of evaluation, the present values of two net income streams are being compared at some discount rate. To set the net present value to zero and solve for the discount rate is to determine the interest rate at which the two income streams have the same present value. Fisher (1930) called this the 'rate of return over
cost'. In the particular case when the base is zero, then only the investment is being discounted and the solving rate of interest for this will be the internal rate of return.

A hypothetical development programme is illustrated in figure 1. The development programme extends from the base year to the year in which the increased production which has been stimulated by the developmental inputs has stabilised. The pre-tax net income which describes the base is computed by deducting from the gross farm income all cash expenditure and depreciation. In this instance cash expenditure does not include any reward to the owner's labour and management. The base will be derived from physical input-output coefficients measured in the base year. Depreciation is included as an expense, for the base is assumed to be able to maintain its level of production to perpetuity. The net cash flow over the development period for the farm plus development is calculated by subtracting the total cash expenditure from the gross farm income. Depreciation is not included as an

1. The main elements in Figure 1 are described by R.W. Oartwright (1967, p.142) in his unpublished M.Agr.Sc. thesis entitled 'The Potential for Increased Production on Sheep Farms in Wairoa County'.
2. The post-tax net cash flows are examined following a discussion of the implications of taxation.
3. Although the base is usually established on a 'status quo' basis with fixed technical coefficients, it can be calculated as a moving base, as previously described.
Schematic Representation of a Development Programme

Magnitude of Production Profits and Borrowing

Development Period | Post-Development

Pre-Tax Net Income

Post-Tax Net Income

Pre-Tax Cash Profit

Post-Tax Cash Profit

Payback

Base Year

Figure 1
expense because it is assumed to be incorporated in the expenditure on capital items regarded as development expenses. Interest payments in excess of those incurred in the base year are excluded from the expenses.\textsuperscript{1} The post-development net cash flow is assumed to be able to be maintained at this level to perpetuity and hence depreciation is included as an expense. The pre-tax net income, described in Figure 1 is given by the farm plus development net cash flow less the base net cash flow. In this way the extra revenues and extra costs of a development programme are isolated.

The Effect of Taxation

Before an entrepreneur can dispose of the profits from the farm firm, they are modified by taxation. The taxation structure to which the firm's net profit is subjected may therefore have a significant effect on the plans which will optimise intertemporal consumption. For this reason the profitability of farm investment from the national viewpoint may differ from that of the individual. It is therefore pertinent to review the effect taxation may have on investment analysis from the individual's

\textsuperscript{1}. Mention has been made that the net present value criterion is useful only in making production decisions.
point of view.

In any year tax payments are calculated from the level of net income. Using the terminology described earlier the after-tax net present value can be expressed in the following way, when no development is carried out,

$$NPV = \sum_{j=1}^{k} (R_{oj} - C_{oj} - T_{oj})d^j$$  \hspace{1cm} (3.6)

and where $T_{oj}$ is the tax paid in year $j$.

The after-tax net present value of an investment option can be written using the terminology described earlier,

$$NPV = \sum_{j=1}^{k} (R_j - C_j - T_j)d^j$$

where $T_j$ represents the tax payable in excess of $T_{oj}$ and caused by the investment. $T_j$ may be positive or negative. As the individual faces a progressive tax structure, the extra tax paid is a function not only of the receipts and payments caused by the investment, but also of the absolute level of net income. Post-tax and pre-tax net present values are demonstrated in Figure 2.

The curves OC' and DD' in Figure 2 express the net present value pre-tax and post-tax respectively, of an investment as a function of the interest rate. As the
Hypothetical Pre- and Post-Tax Net Present Values
respective internal rates of return are given by the intersection of these curves with the horizontal axis, taxation has reduced by A the internal rate of return, in this hypothetical example. The vertical distance B describes the difference in present values between the pre-tax and post-tax income streams at a particular rate of interest.¹

If it is assumed that the individual who carries out this investment borrows to redistribute his consumption, then the borrowing rate of interest should be used as the discount rate. From Hirshleifer (1958), the individual can transfer money from the future to the present by borrowing, the cost being given by the interest paid. In the pre-tax situation the interest paid is a linear function of the amount borrowed.²

The individual faces the same borrowing situation for the post-tax evaluation with one exception. As interest is tax-deductible the real interest payment, or reduction in consumption is a curvilinear function of the amount borrowed. The discount rate used in post-tax investment evaluation is therefore related to the marginal

¹ Documentation of practical examples may be seen in 'The Impact of Taxation on the Profitability of Farm Development in New Zealand' by R.W. Cartwright (1967).
² It has been assumed that the marginal cost of borrowing remains constant.
tax rate, and in practice may be much lower than the interest rate actually paid to the moneylender. In this study the discount rate used in post-tax investment evaluation is given by the reduction in the base net income caused by the interest paid when $1 is borrowed.¹

It is meaningful to evaluate alternatives after tax, only if they are all compared on the same basis. Investment options on the farm evaluated after tax can only be compared with off-the-farm alternatives if these also are considered in an after-tax framework.

Lessees' consumption decisions are made on an after-tax basis and to ignore this is unreal. This is especially true when the freeholding option is being considered as there is no capital gains tax. In this instance income streams must be compared, after tax, with any movement in land values which may benefit the lessee if he freeholds.

Consumption, Investment and Taxation

The classical theory of investment evaluation relates the choice of income streams to consumption decisions via the discount rate. In practice a further link is pro-

¹. The rationale for adopting this discount rate is discussed in detail in Appendix IV.
vided by taxation. Both consumption and investment decisions influence taxation payments and hence the amount available for subsequent investment or personal drawings. Investments affect the amount of tax paid by generating extra costs and extra revenues. The consumption pattern decided on by an individual affects taxation payments, because interest paid is tax-deductible whereas interest received is taxable. In contrast to the pre-tax situation wherein if the discount rate equals the borrowing rate the timing and amount of loan funds will not affect the net present value of the investment, the post-tax situation is affected by the financing decision. In the past various methods have been employed in order to evaluate farm investment in an after-tax framework.

The techniques reviewed below all use a base net cash flow with which the net cash flow derived from the farm plus investment is compared. Consumption \((Y_{oj})\) in year \(j\) which would have occurred had there been no investment can be defined as:

\[
Y_{oj} = R_{oj} - C_{oj} + B_{oj} - P_{oj} - I_{oj} - T_{oj} \tag{3.7}
\]

1. Borrowed funds and principal repayments do not influence tax payments except through interest.
using the previously-established terminology. If the assumption that no borrowing will take place without investment is made, then Equation (3.7) can be rewritten as:

\[ Y_{oj} = R_{oj} - C_{oj} - T_{oj} \]  

(3.8)

A method of post-tax investment evaluation described by Wright (1963) involves comparing a base net cash flow as determined in Equation (3.8) with a consumption stream generated by the farm plus investment. If the desired consumption pattern is attained by borrowing, then consumption in the jth year of a farm plus investment situation can be written:

\[ Y_j = R_j - C_j + B_j - P_j - I_j - T_j \]  

(3.9)

The net present value of the investment option is then calculated by:

\[ NPV = \sum_{j=1}^{k} (Y_j - Y_{oj})d^j \]  

(3.10)

1. The individual is assumed to redistribute his consumption by borrowing.
2. Interest payments are assumed to be zero in the pre-development situation.
where \((Y_{0j})\) is calculated from Equation (3.8).\(^1\) A point which emerges is that if the series \(Y_j - Y_{0j}\) is positive for all \(j\) then the investment is obviously profitable. This method of investment evaluation assumes a consumption pattern in order to determine the amount borrowed. The net present value described by Equation (3.10) therefore embodies both consumption and production decisions. If the investment has been carried out, and the analysis is instigated completely on an ex-post basis, then the consumption pattern is known. The series of \(Y_j\) for \(j = 1\) through \(k\) then represents the individual's actual drawings in these years. However, even in ex-post analysis a consumption pattern has to be assumed for the base net cash flow. The series of \(Y_{0j}\) for \(j = 1\) through \(k\) used in Equation (3.10) assumes that this represents the actual consumption pattern, or if it is regarded as consumable income, implies that the pattern of drawings is not altered by borrowing or lending.\(^2\) Carrying out post-

\(^1\) The net cash flow \(Y_j\) for \(j = 1, k\) is constrained to ensure that the amount borrowed equals the amount repaid.
\(^2\) Both these assumptions are unrealistic. Friedman (1957) has shown that consumption in any one year is not uniquely determined by the net income in that year. Hence it is not realistic to presume that the base net income will be consumed exactly in each year. Neither is it valid to assume that if the individual had chosen the base net income stream he would not have borrowed, or lent to alter its distribution over time.
tax investment analysis by this method on an ex-ante basis, involves making the assumptions concerning the consumption pattern, about both the base and the 'with investment' net cash flows.

Clearly a net cash flow incorporating borrowing and principal repayments will stabilise only after the loan funds have been repaid. This stabilisation year is described in Figure 1 as payback. In the instance where a farmer repays a development loan by a table mortgage the net cash flow would not stabilise until the end of the mortgage. To approximate this method of repayment in order to facilitate the analysis, by the adoption of a shorter repayment period or a flat mortgage, would alter the net present value of the investment. The net present value will be affected not only by the amount which is borrowed but by the method of repayment.

Cartwright (1967) has described a similar method by which post-tax investment evaluation has been carried out. This technique computes the net present value as described in Equation (3.10), but excludes borrowing as an inflow and principal repayment as an outgoing charge. The net cash flow is then a series of $Y_j$ defined in the following way:

$$Y_j = R_j - C_j - I_j - T_j \quad j=1,k \quad (3.11)$$
Although such a net cash flow does not represent personal drawings it does assume a pattern of consumption in order to determine the interest payments. Hence this method and the previous one make essentially the same assumptions. A net cash flow derived by the method described in Equation (3.11) is illustrated in Figure 1 as the post-tax cash profit.

A third method entails the exclusion of the financing decision from the analysis. The base net cash flow is again determined by Equation (3.8). The farm plus investment net cash flow is given by:

\[ Y_j = R_j - C_j - T_j \quad j=1,k \quad (3.12) \]

The net present value as calculated by including Equations (3.12) and (3.8) for all k in Equation (3.10), is derived from the extra costs and returns generated by the investment itself and does not assume any arbitrary consumption pattern. This method includes the base and 'with investment' net cash flows as consumable income and not actual consumption streams. Although it is recognised that borrowing or lending will affect the net present value of the investment it is hypothesised that this method enables as realistic a comparison of after-tax income streams as
the net present value rule will permit. It is obvious that the two former methods of after-tax investment evaluation reduce to the third if no borrowing is carried out.

This study has used the latter technique. The after-tax net cash flow is defined as gross income less gross expenditure including depreciation, less taxation. Depreciation is not deducted from the 'with investment' net cash flow during the development period.

---

1. Any deviation from the consumption pattern assumed in the other methods will also affect their net present values.
2. Consumption decisions will again affect the net present values of after-tax investment evaluation, and hence cause the three methods to give differing results, if the individual lends to redistribute his consumption over time.
CHAPTER III

CROWN RENEWABLE LEASE TENURE
AND FARM INVESTMENT

An entrepreneur leasing land under Crown Renewable lease tenure pays an annual amount for the use of this resource. The landlord receives payment for forgoing the employment of that resource in other uses. A basic premise to equitable leasing arrangements is that a profit-maximising firm exists from the point of view of both the landlord and the tenant.

Most leasing agreements have evolved through time in response to forces such as competition and tradition, and can be divided broadly into two classes. Firstly, there are those for which the landlord and the tenant each contributes resources and receives a share of output. These are called share leases being exemplified by sharemilking agreements. As the landlord receives a share of output, rent is a marginal cost to the tenant. Heady (1952) has described the sources of conflict which may develop between landlord and tenant in this type of contract.

Crown Renewable leases fall into the second class of
tenure agreements which involve a fixed annual payment for the use of the resource by the tenant. In the short run, a Crown Renewable lease is an example of a cash lease, wherein the rent is independent of product mix and level of output. Hence, the rent does not enter the firm's marginal costs, but is incorporated in its fixed costs. The tenant is free to adopt any plan which will achieve his objectives and as this plan will not affect rent payments, the landlord will be indifferent to it. However, in the long run the annual rent instalment may not be independent of the level of output. If the rent is related to the productivity of the land and the lease is renewed within the tenant's time horizon the annual rent instalment may be some function of output, and therefore in the long run the system may be a share lease. As the rent set for Crown Renewable leases is based on the price paid for unimproved land it is largely independent of the efforts of an individual lessee, and can be regarded as a cash lease.¹

Rent Payments and Time

Heady (1952) has pointed out that a tenant leasing land hires both flow and stock resource services and that

¹. This aspect is reviewed in more detail in Part III.
time is involved in leasing arrangements concerned with land. The time periods over which lease contracts run vary widely. Although the majority of lease agreements are drawn up for some longer period, a few are of one year's duration only. The term of the lease has a significant effect on tenant plans. If the objective of the tenant's firm is profit maximisation and the lease extends for one year only, then his objective will be to maximise profits in that year. In contrast, the tenant with a Lease in Perpetuity has an unrestricted planning horizon as far as the lease is concerned. Whether or not the terms of the lease include the right of renewal is also important to the lessee, for if this is not the case his on-farm planning will be restricted to the lease period. The greater security of tenure afforded by the right to renew the lease enables planning to be extended to the period the lessee expects to remain on the property.

These factors emphasise the importance of time in the analysis of any lease system. From the tenant's viewpoint, the rent paid each year represents a cost in that year, and under Crown Renewable lease tenure the lessee is confronted with a stream of these costs over the period he expects to lease the property. The present value of rent payments is given by the sum of the discounted rental instalments.
A renewable lease system in which the rent is calculated as a proportion of the rental value is outlined below.

- $t$: the period between lease renewals
- $r_t$: the rental rate
- $i$: the discount rate
- $R_o$: the initial rental value
- $\rho$: the percentage annual change in rental value per year. Assumed to be constant over the period.

Rent calculated on the basis of this general lease system is given by $R_0 r_t$ in the first year. At the end of each lease period the rent will change according to the change in rental value. Then, if it is assumed that the rent payments occur at the end of each year and that at present the rent is being revised, the present value of rent payments ($PV_t$) over an unrestricted time horizon can be written:

$$PV_t = R_0 r_t \sum_{k=1}^{t} d^k + R_0 r_t \frac{(1+\rho)^t}{(1+i)^t} \sum_{k=1}^{t} d^k + \ldots$$

$$= R_0 r_t \sum_{k=1}^{t} d^k \left(1 + \frac{(1+\rho)^t}{(1+i)^t} + \left(\frac{(1+\rho)}{(1+i)}\right)^2 + \ldots\right) \quad (4.1)$$

This can be extended to obtain the present value of rent payments when this general lease system persists for
n periods.¹

This is given by:²

\[ PV_t = R_0 r t \sum_{k=1}^{t} d^k \left[ \frac{1-A_t^n}{1-A_t} \right] \]

Tenants leasing land under Crown Renewable lease tenure have their rent reviewed every thirty-three years. Half the annual rent is paid at the commencement of the lease and thereafter payments occur at six-monthly intervals. The inclusion of these parameters in Equation (4.1) enables the present value of rent payments to be calculated under the conditions pertaining to Crown Renewable lease tenure. In this instance

\[ t = 33 \] represents the number of years between rent renewals

\[ r_{33} \] is the rental rate

\[ R = \frac{R_0 r_{33}}{2} \] is the half-yearly rental payment

\[ I = (1+i)^{\frac{1}{2}} - 1 \] is the discount rate over a six month period equivalent to \( i \), the discount rate for a year.

¹ For the remainder of this study \( r_{33} &= \) is represented by \( A \).
² Equation (4.1) can be modified to give this form because

\[ 1 + A^t + A^{2t} + \ldots + A^{(n-1)t} \] is a geometric series and can therefore be rewritten as

\[ \frac{1-A_t^n}{1-A_t} \]
Then the present value of rent payments for a Crown Renewable lease is given by:

\[ PV_{33} = \sum_{j=0}^{n-1} RA_{33} \left[ 1 + \sum_{k=1}^{65} \frac{1}{(1+1)^k} \right] \]

where \( n \) periods of the lease are being considered.

Profitability from the Landlord's Point of View

Time is involved in determining the return to the landlord. When he lets the resource he invests the rental value at that time in return for a stream of rent receipts into the future. As he owns the resource he also gains any asset increment or decrement which may occur owing to changes through time of the community's valuation of that resource. The landlord can consume any asset increment by using it as security for borrowing or by selling the resource.

The net present value of the costs and returns associated with ownership of the resource is described below.\(^1\)

\[ NPV = -R_0 + R_0A^n + \frac{R_0r_1}{(1+1)} (1+A+A^2+\cdots+A^{n-1}) \tag{4.2} \]

\(^1\) The derivation of Equation (4.2) is contained in Appendix I.
Equation (4.2) employs the terminology used previously, and assumes that the asset is sold at the end of year n. The rent payments in Equation (4.2) are based on a rental system in which the rent is renewed annually. Hence, $r_1$ in this equation is the rental rate of the system in which the rent is revised every year. If this net present value is positive at the discount rate on which the landlord's investment decisions are based, it will be worthwhile for him to own and let this resource.

The equation describing the net present value from the landlord's standpoint is readily re-arranged to obtain an expression for the internal rate of return. It can be presented in the following way. \(^1\)

$$ r = r_1 + \phi $$

(4.3)

In Equation (4.3) the internal rate of return from the landlord's point of view is described as a function of the annual rate of change in rental value, and of the rental rate of a renewable lease system in which the rent is revised annually. As Equation (4.3) is a root of Equation (4.2) this model holds regardless of the year in which the landlord sells the property. When this internal

\(^1\) The derivation of Equation (4.3) is contained in Appendix II.
rate of return is greater than the landlord's relevant discount rate, then owning and letting the resource will be profitable to him.

Although Equation (4.3) expresses the rate of return to the landlord, it is limited in that it assumes the rent is reviewed annually. As $r_1$ can be expressed as a function of lease systems with longer renewal periods the model can be generalised. If the present values of rent payments associated with two leasing systems are equal then they will reduce the net present value of the lessee's income stream equally. He will therefore be indifferent between the two systems, as the substitution of one for the other will not affect his intertemporal consumption. Similarly, two receipt streams which have the same present values will be equally acceptable to the landlord. Obviously this presumes that all conditions pertaining to the leases other than the rental rate and the period between rent renewals are the same for both systems.

If there is to be no source of conflict between lessee and landlord each must regard the rental systems in question with impartiality. Although a lessee may be indifferent between two lease systems, on the basis of their present values, the landlord will be in the same

---

1 For a lessee to be indifferent between various lease systems they must all be equally acceptable to him in an after-tax framework. Where the Crown is landlord tax considerations are irrelevant from the landlord's point of view.
position only if the discount rate on which he bases his investment decisions is the same as that of the lessee.\textsuperscript{1} It has been mentioned previously that there is only one interest rate in a perfect capital market, and that this rate would be used by landlords and tenants to evaluate investments. In this situation the landlord will be indifferent between lease systems which are equally acceptable to the lessee. In the imperfect market which exists in reality, there are a wide range of interest rates and only by coincidence would the lessee and the landlord base their investment decisions on the same discount rate. If the discount rates used by the landlord and the lessee differ, then some compromise has to be reached in order to determine a rate acceptable to both. In the instance where the landlord and tenant cannot agree they would have to resort to arbitration in order to determine some compromise discount rate.

The rental rate of an annually-revised lease system which will give the same present value of payments as a system renewed every \(t\) years, can be expressed in the following way.\textsuperscript{2}

\textsuperscript{1} It has been assumed that the landlord and lessee have the same expectation as to the future rate of change in rental value. On an ex-post basis this rate of change will be known, and be the same for both lessee and landlord.

\textsuperscript{2} For the justification of this conclusion see Appendix III.
Given the lessee's and landlord's compromise discount rate, and expectation of the rate of change in rental value, they will be indifferent to a choice between a lease system renewed every $t$ years and one which is renewed annually if $r_1$ as calculated in Equation (4.4) is used in the annual renewal system. As the rate of change in rental value is included in Equation (4.4), $r_1$ is a long run concept. The time period over which it is calculated must be sufficient to permit lease renewals and in this way express the effect of any changes in rental value.

The internal rate of return from the landlord's point of view can now be completely described. The substitution of Equation (4.4) into Equation (4.3) gives the following expression for the internal rate of return.

$$r = \frac{r_t \sum_{k=1}^{t} d^k}{\sum_{k=1}^{t} d^k (1+\rho)^{k-1}} + \rho$$

(4.5)

The internal rate of return from the landlord's standpoint is therefore described as a function of the annual rate of change in rental value, the parameters of a system
in which the lease is renewed every $t$ years, and the discount rate which is acceptable to both landlord and tenant.

**Profitability to the Crown of Renewable Lease Tenure**

The Crown is treated only as a profit-taking firm with regard to its role as landlord. It therefore can employ the model contained in Equation (4.5) to determine the profitability to it of letting land under renewable lease tenure. The substitution of the parameters associated with Crown Renewable Lease tenure into Equation (4.5) will describe the internal rate of return to the Crown from this form of tenure. This is given by the following expression.

\[
 r = \frac{\sum_{k=1}^{33} d^k}{\sum_{k=1}^{32} d^k (1+r)^{k-1}} + \rho
\]

\[ (4.6) \]

1. For convenience Equation (4.6) assumes that the rent is paid at the end of each year. Equation (4.6) can be written as

\[
 r = \frac{r_{33} \left[ 1 + \sum_{k=1}^{65} \frac{1}{(1+r)^k} \right]}{\sum_{k=1}^{32} d^k (1+r)^{k-1}} + \rho
\]

where $\rho = (1+r)^{\frac{1}{2}} - 1$. This formula conforms precisely to the conditions of Crown Renewable leases.
As discussed previously, the rental rate of a system revised every year and determined by Equation (4.4) reflects the effect of alterations in rent owing to changes in rental value. For this reason, only long run situations can be explored with this model in relation to Crown Renewable lease tenure.

The change in rental value is known when the return to the landlord is calculated on an ex-post basis. Ex-ante analysis includes the change in rental value as an expectation. This does not invalidate the model but introduces uncertainty.

The Profitability of Freeholding

A tenant leasing land under Crown Renewable lease tenure can purchase the land and Crown improvements on it at any time. When the tenant applies to freehold the rental value is set by the Land Settlement Board.¹ The lessee has to pay this rental value in order to freehold. If he does not concur with this value he can attempt to have it reduced by resorting to arbitration.

Under the 1948 Land Act a lessee who does not freehold

¹ The valuation to determine the rental value is carried out by the Valuation Department for the Land Settlement Board.
the property within a specified time of being notified of the above valuation, cannot re-apply for a period of five years.

The purchase of the rental value by the lessee is an investment which has costs and returns associated with it. These occur over varying periods and therefore time is again involved in the analysis. The profitability of freeholding is relevant from the tenant's point of view, and therefore his planning horizon is relevant to the analysis.

**The Perfect Market Situation**

In the long-run competitive equilibrium situation, each factor will be paid its marginal value product. The landlord will pay the costs associated with land and will receive its marginal value product as rent.

The cost associated with freeholding is the rental value which, under the assumed conditions, will be the discounted marginal value product of land. The gain from freeholding which is pertinent if the lessee does not include the sale of the property in his plans, can be represented by the rent payments between the time of freeholding and infinity.
The net present value of the costs and returns attributable to freeholding is given by

$$\text{NPV} = \text{PV}_{t, \infty} R_0$$

using the established terminology and where the rent is reviewed every $t$ years.

Owing to the assumed conditions there will be one market rate of interest. Clearly, as the rent equals the marginal value product of the rented resource, the present value of the freeholding option under these assumptions will be zero. The lessee will be indifferent between owning or renting the resource.

**The Imperfect Market Situation**

In the real world a perfect market situation never exists and this creates problems which are important from the lessee's viewpoint.

Decisions made by the lessee in the present time period are based largely on what he expects to happen in the future. The uncertainty surrounding future occurrences will influence both his plans and his planning horizon.

Individuals are confronted with various interest
rates which can be used to evaluate courses of action. A lessee may select one of a range of lending or borrowing rates depending on which is appropriate.

The rent paid is unlikely to equal the marginal value product of land. The parameters of lease systems which have evolved largely through custom may not determine rent on the basis of land's productivity. Even if a competitive market situation existed, it is not at all clear that the rent should equal the marginal value product of land.¹

The benefits and costs which are attributable to the lessee from adopting the freeholding option vary according to his future plans. If the lessee plans to sell the property at some future date, for example n years into the future, then the relevant benefits are given by the market value \( MV_n \) of the property at that date and the rent payments between the time of freeholding and the time of sale. Hence, if the property is sold at the end of the nth year, the present value of the benefits using the previous terminology, is given by

\[
PV = PV_{t,n} + MV_n d^n
\]

¹ This aspect is further discussed in Part III.
where the lease is renewed every $t$ years.

The costs associated with freeholding are given by the rental value and the proportion of the market value which would have been paid to the lessee at the time the property was sold if it had remained leasehold. The present value of these costs is given by:

$$PV = R_0 + \alpha MV_n d^n$$

where $\alpha$ is the proportion of the market value which the lessee would have received had the property not been freeheld.\(^1\) The net present value of the freeholding option where the property is to be sold at the end of the $n$th year is given by the following.

$$NPV = PV_{t,n} - R_0 + (1 - \alpha) MV_n d^n \quad (4.7)$$

The relevant discount rate is that which is appropriate for the lessee to use in the evaluation of his investment options.

The lessee may not include selling the property in his future plans. This is often the case where the farmer

\(^1\) If $P_n$ is the price which would be paid for a leasehold property in the year $n$, and $MV_n$ is the market value of that property if it was freehold in year $n$, then

$$\alpha = \frac{P_n}{MV_n}$$
hopes to retain the farm within the family. The benefits are then described by the present value of rent payments between the time of freeholding and infinity. The net present value of freeholding but not selling is given by the following;

\[ NPV = -R_0 + PV_{t,\infty} \]

There are some indirect factors associated with freeholding which may modify a tenant's outlook. The most important of these is the ability of the lessee to borrow money. He does not own the land, and therefore cannot use it as security for a loan. Although in the short run freeholding will not alter the lessee's equity position, it may alleviate the problem in the long run, especially if the value of the land increases markedly.
CHAPTER IV

A CASE STUDY

Investment options open to a tenant farming a property under Crown Renewable lease tenure were investigated by means of a case study. The farm, situated at Leamington, nine miles west of Cheviot, dates back to the break-up of the 'Cheviot Hills' estate in 1893. 'Cheviot Hills' was a 100,000 acre property which had been amassed by a William Robinson during the second half of the nineteenth century. Gardner (1966) records that in 1885 the property ran the largest flock in New Zealand. However, after the death of Robinson in 1889, when the estate was managed for the trustees, it deteriorated rapidly. By 1893 it could not meet its annual commitments and was offered to the Government.¹ The Liberal Government of the time recognised in this offer an opportunity for land reform and bought the estate. 'Cheviot Hills' was subsequently divided into smaller holdings which were made available to settlers. The land was let under two forms of tenancy. One was Lease in Perpetuity, and the other was the forerunner of

¹ For a further discussion of the factors which motivated this sale, see Gardner (1966).
Crown Renewable lease tenure. The case study farm belongs to the latter category.

Physical Description

The property is a 952 acre hill country farm, divided into areas of 300 acres and 650 acres by a small permanent stream. Approximately 150 acres are ploughable, and a further 250 acres are able to be disc-ed. The remainder consists of gullies. The altitude varies between 600 and 1350 feet above sea level.

Although the rainfall is evenly spread with an average of 35-40 inches per year, the farm is subject to severe dry periods between November and March caused by strong north-west winds which are prevalent at that time of the year. The south-east faces and the deep gullies balance to some extent the north-west faces as they are less prone to drying out. The no-growth period persists for approximately two months during the winter.

Frengley (1965) records that the natural cover consisted of silver tussock (Poa caespitosa), some matagouri (Discaria toumatou), tutu (Corieria sarmentosa), and fern (Pteridium esculentum) which was particularly prevalent on the shady faces. At present there are few problem weeds on the property. The present cover consists
of

38 acres lucerne
573 acres native and oversown areas
58 acres greenfeed
283 acres improved pasture

The Gower hill soils, which comprise most of the property are moderately fertile. The Amberley soils, found on the flatter hill tops, are also fertile. In general the nutrient deficiencies are phosphate and sulphur.

The stock carried in the winter of 1970 were:

sheep
1630 Corriedale ewes
760 ewe hoggets
160 wether hoggets
190 wethers
33 rams

cattle
76 cows
20 two-year heifers
42 yearling heifers
11 yearling steers
3 bulls

The farm produces mainly fat lambs, wool and calves. Some wether lambs are retained over the winter and sold in early spring. The wool is of good quality, and in the past has earned a large proportion of the property's total
income.

The cattle have been able to utilise the gullies, grazing the swamps in the bottom in the drier periods. Until recently cattle and sheep have been complementary, but with the increased stock numbers they now compete for the available grazing. The policy has been to purchase young in-calf cows and to retain them for six or seven years.

There have been no major pest problems although increasing problems are being experienced with grass grub.

The Tenant

The lessee is fifty years of age and is married with five children. He purchased a half interest in the property in 1947 and the remainder in 1949 from his father who had leased the property since 1919. Most of the lessee's farming experience has been gained on the property, as prior to 1947 he was employed in the Navy. He is a member of a Farm Improvement Club, and is recognised as a skilful manager. This is demonstrated by the progress made on the property in recent years. The lessee is keen to retain the property within the family.
Tenure

The land is held under Crown Renewable lease tenure. When the lease was renewed in 1959 it was converted from a twenty-one year lease to a thirty-three year renewable lease. On this property the rental value would be synonymous with the unimproved value if they were both estimated at the same date.¹

The present rental value of $16,150 was determined two years prior to 1959. As the lessee is an ex-service-man, his present rent was calculated in the following way:

Rent based on the rental value set in 1938

$9,310 at 3% - $279.30

Rent based on the increase in rental value between 1938 and 1959

$6,840 at 5½% - $376.20

Less rebate ½% on $6,840 for prompt payment - $34.20

Annual rent payable - $621.30

The future situation is complicated by the farmer's having purchased a half interest in the property in 1947 and the remainder in 1949. As the concessions extend for 33 years the rent will increase to $761 in 1980 and to $807 in 1982, when the lessee will be charged the full

¹ The relationship between these two values is discussed in Chapter I.
rental rate on the present rental value. The lease is renewable in 1992.

Investment Opportunities

The on-farm investment options which concerned the lessee have been investigated in relation to two decision-making years. In 1963 he was confronted with a range of alternatives not all of which could be carried out owing to his financial restrictions. The three alternative courses of action open to the lessee in 1963 and examined in this study are:

(a) to continue leasing and not to develop
(b) to continue leasing and to develop
(c) to freehold and not to develop

The lessee chose to continue leasing and to develop.

By 1969 the lessee had largely completed the development programme begun in 1964, but still faced an array of investment opportunities. He was more concerned with the profitability of freeholding, as the unimproved value or rental value had increased rapidly in the more recent past. Between 1953 and 1968 the unimproved value grew at a compound rate of 4.8 per cent per annum. This rate increased to 8.6 per cent over the period 1963 to 1968.

The net present value criterion is used to evaluate
investment alternatives in 1963 and 1969. Figure 3 outlines the timing of the alternative courses of action investigated in this study.

**Development**

The lessee began a development programme in 1964/65. Although he contemplated some further intensification, the programme was essentially finished by 1969/70.

The techniques of developing this class of hill country are well-known. Cultivation to provide winter feed and to permit the renewal of pastures has been carried out. A feature of the programme has been the increased subdivision, directed at fencing off the gullies from the tops and separating shady faces from sunny faces. At the time of writing further fencing is contemplated.

Gully blocks have been oversown with 4lbs subterranean clover per acre on the sunny faces, and 4lbs white clover, 2lbs Broad Red clover, and 1lb Montgomery Red clover on the shady faces. Cocksfoot was plentiful in the gullies prior to the development programme.

The initial fertiliser dressings consisted of 4cwt. 200 sulphur superphosphate per acre. Maintenance has been provided by dressings of 3cwt. sulphurised superphosphate every second year.
Schematic Representation of Investment Alternatives

<table>
<thead>
<tr>
<th>Year</th>
<th>Freehold</th>
<th>Lease</th>
<th>Development</th>
<th>Freehold</th>
<th>Lease</th>
<th>Development</th>
<th>Sell</th>
</tr>
</thead>
<tbody>
<tr>
<td>1963</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1969</td>
<td>No Development</td>
<td>No Development</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 3
As lucerne can be established readily on the Amberley soil type, increasing areas are being planted on the farm. This has meant that there is now a more certain source of hay, and that the property is less prone to the effects of drought, enabling the owner to approach higher carrying capacities with more confidence.

Extension of access and improvements to the water supply have also been carried out. There are now vehicle tracks to most areas of the farm and this has already had a considerable effect on management, as the house, woolshed, and yards are situated at one end of the property. In the Cheviot area a community water supply scheme is being constructed. This is timely, as the area has been affected by drought over the last two years and the water supply to paddocks has tended to dictate stock management over this period. The lessee is contributing to the cost of this scheme.

The increase in carrying capacity over the development period is reflected in the growth in ewe equivalents per acre from 2.1 to 3.5. The original development programme called for an increase in wether numbers. However, the fall in wool prices over the period, plus the unforeseen incidence of pizzle rot forced this plan to be modified. Instead, the increase in stock numbers was largely composed of ewes and cattle.
Permanent labour on the property is supplied by the lessee. Although it was envisaged that a second house would be built and a married couple employed, this has not proved necessary. The labour supply is augmented by contract work and by employing casual labour for jobs such as shearing and crutching.

The original plan involved financing development out of income. Largely owing to the fall in wool prices in 1964/65, the development programme could not be sustained without borrowing, and a loan to the extent of $13,800 was raised from the State Advances Corporation.

The Net Cash Flows

The rationale behind the establishment of net cash flows used in the net present value formula, has been described. It remains to outline the precise formulation of the net cash flows derived from the alternatives which have concerned the lessee.¹

A base was established from 1963 to perpetuity to enable the evaluation of alternative courses of action on the case study farm. The physical input-output coefficients for this base were derived from the production figures in the years 1962-1964. Any changes in these

¹. These alternatives are summarised in Figure 3.
coefficients which have occurred between 1963 and 1970 are assumed to result from the development programme. Although technical innovations may effect changes in these coefficients, this would be extremely difficult to measure and is more likely to be a benefit associated with development, as investment often provides the opportunity for incorporating new technology. The base revenue for each year was calculated on the prices received in that year. The prices paid in each year of the development programme were adjusted from the base year of 1963/64 in response to changes in a cost index.

The post-development budget has been established for the 1969/70 year. This is an arbitrary cut-off point, as although the lessee does not intend to implement major investment expenditure in the near future, he does propose to carry out some further intensification. However, deriving a status quo budget in this year permits the evaluation of the development actually carried out. For the post-development budget to represent faithfully the impact of the development it must fully reflect the increased productivity generated by that investment.

1. Constant prices were not used to evaluate development, ex-post, as this is in conflict with the concept of a base as described previously. Constant price analysis in ex-post investment evaluation abstracts from the decision-making environment which occurs over the development period.

2. The cost index used was that compiled by the Meat and Wool Boards' Economic Service.
Revenue and expenditure for 1969/70 were calculated on a status quo basis and this was used as the post-development budget.

Where the freeholding option is being investigated, there are no adjustments to the net cash flow after the status quo budget in 1970. The cash surplus of this budget can then be capitalised in 1970. However, where the property continues to be leased, adjustments are made to the cash surpluses in 1980, 1982 and 1992 in response to changes in rent. The budgeted surplus is finally capitalised in 1992. This assumes that changes in rent payments beyond this date will have a minimal effect on the net present value.
CHAPTER V

CASE STUDY RESULTS

The case study approach was employed to permit the exploration of certain intra-farm courses of action within the framework of the Crown Renewable lease system. This method of study enables the evaluation of alternatives on one property and for one set of objectives in more depth than could otherwise be contemplated. The disadvantages associated with this approach become evident whenever an attempt is made to extrapolate the results from a case study to other farms. The subsequent analysis emphasises that the conclusions are dependent on such factors as the date of lease renewal and the lessee's time horizon. As these will vary between farms, the conclusions obtained from a case study cannot be used directly to make decisions on an inter-farm basis.

The Lessee's Point of View

The models and criteria discussed previously were used to evaluate the alternatives confronting the lessee of the case study farm. These have been considered firstly on an ex-post basis as this permits an investigation of the
recent development programme and a comparison of that course of action with freeholding. Secondly, the past has been taken as given and the alternatives facing the lessee in 1969/70 examined.

Although the events up to 1970 are known, those which will occur in the future are not. Some of the more important variables have been parametised to enable the results to be interpreted over a range of future events. The construction of the net cash flows has been described.  

The Profitability of Development

The development programme which was initiated in 1964 and concluded in 1969 was investigated to ascertain its profitability to the lessee. This is measured by the net present value at June 1963 of the extra costs and extra revenues attributable to investment on the farm. The net cash flows which describe these costs and revenues are contained in Table 2.

The net present values described in Figure 4 assume that the prices ruling in 1969/70 will continue into perpetuity and that the rent will not be changed in 1992. If the rental value increases at the same rate with and

---

1. The methodology involved in determining the relevant net cash flows is outlined in Chapter II. The construction of the base is described in Chapter IV.
### TABLE 2

**Additional costs and returns from development**  
*(Actual Prices)*

<table>
<thead>
<tr>
<th></th>
<th>63/64</th>
<th>64/65</th>
<th>65/66</th>
<th>66/67</th>
<th>67/68</th>
<th>68/69</th>
<th>69/70</th>
<th>80/81</th>
<th>82/83</th>
<th>1992</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-tax</td>
<td>0</td>
<td>-4420</td>
<td>-10345</td>
<td>-119</td>
<td>112</td>
<td>1466</td>
<td>6741</td>
<td>6741</td>
<td>6741</td>
<td>6741</td>
</tr>
<tr>
<td>Post-tax</td>
<td>0</td>
<td>-3473</td>
<td>-8476</td>
<td>1483</td>
<td>398</td>
<td>870</td>
<td>2630</td>
<td>2651</td>
<td>2672</td>
<td>2672</td>
</tr>
</tbody>
</table>

### TABLE 3

**Additional costs and returns from development**  
*(Reduced Prices)*

<table>
<thead>
<tr>
<th></th>
<th>63/64</th>
<th>64/65</th>
<th>65/66</th>
<th>66/67</th>
<th>67/68</th>
<th>68/69</th>
<th>69/70</th>
<th>80/81</th>
<th>82/83</th>
<th>1992</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-tax</td>
<td>0</td>
<td>-4420</td>
<td>-10345</td>
<td>-119</td>
<td>112</td>
<td>1466</td>
<td>5669</td>
<td>5669</td>
<td>5669</td>
<td>5669</td>
</tr>
<tr>
<td>Post-tax</td>
<td>0</td>
<td>-3473</td>
<td>-8476</td>
<td>1483</td>
<td>398</td>
<td>870</td>
<td>2808</td>
<td>2839</td>
<td>2868</td>
<td>2868</td>
</tr>
</tbody>
</table>
The Net Present Value of Development (1969/70 Prices)

N.P.V. at June 1963

($000's)

Post Pre-Tax Tax

Interest Rate

Figure 4
without development, then this will not affect the pre-tax net present values. However, owing to the progressive tax structure, the after-tax net present values will be affected even if the respective rent payments change by the same amount.

The development programme has been extremely profitable, as the net present values are positive over a wide range of interest rates, both before and after tax. There are several factors which have contributed to the success of this development. As the lessee's standard of management has been high, per head stock performance has not suffered under the stress of increased stock numbers. During 1969 the Cheviot area was subjected to a severe drought and stock performances were lower than normal on most farms. Although this occurred on the case study property, the lessee considers that the consequences would have been more severe had he not developed.1 As there were no lumpy inputs such as buildings included in the programme, the profitability of the programme as a whole would be overstated by the forgoing result if investment of this type had to be carried out in the near future. However, this is not the case. Another factor which may have affected

1. The post-development budget was based on average per head stock performances, and not those which occurred in the drought year.
the profitability of the programme, was a change in product mix. If the lessee responded to relative price changes between forms of output, say, sheep and cattle, then the base as calculated would not represent a true 'without' situation. This was found to be unimportant as the property's classes of livestock have remained relatively constant over the development period. Figure 5 demonstrates this point.

The profitability of the programme implemented by the lessee was also investigated under a lower price regime. The prices received up to 1969/70 were not changed as these have actually occurred, but the prices of all output except wool were lowered by 20 per cent, from the post-development year to perpetuity. The wool price was not changed as the 1969/70 price was the lowest the lessee had received over the last decade. The net cash flows associated with this change in prices are contained in Table 3, while the pre- and post-tax net present values are illustrated in Figure 6.

Figure 6 demonstrates that the development has been extremely worthwhile both pre- and post-tax, even under a lower price structure. The net present values are positive in both instances over the appropriate ranges of discount rates.

The levelling effect that a progressive taxation
Composition of Total Stock Numbers.

Proportion of Total Ewe Equivalents

Sheep

Ewes

Cattle

Cows

Wethers

1963/64 64/65 65/66 66/67 67/68 68/69 69/70

Years

Figure 5
The Net Present Value of Development

(Reduced Prices).

Figure 6
system has on the fluctuation in post-tax cash surpluses is indicated by a comparison of these surpluses in Tables 2 and 3. Although the pre-tax net cash flows fall when the price falls, the post-tax cash flows increase slightly. This occurs because the with-development income stream is taxed at a much higher rate than is the base income stream. Hence, in this instance, the fall in revenue has reduced the after-tax cash surpluses of the with-development situation at a slower rate than those of the base.

Freeholding in 1963

The two aspects of this alternative which concerned the lessee were firstly, whether or not freeholding was worthwhile at all, and secondly, whether or not it compared favourably with farm development. The net cash flows relevant to the evaluation of freeholding in 1963 are contained in Table 4. Freeholding at this date assumes that the lessee pays $18,000 as a lump sum in 1963.¹ The farmer is not contemplating selling and hence the benefits are expressed by the rental payments to perpetuity. Where leasing is continued, adjustments are made to the net cash flows for changes in rent payments which occur in

1. The unimproved value of the property in 1963 was $18,000.
<table>
<thead>
<tr>
<th>Annual rate of increase in rental value (percent)</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>63/64  64/65  65/66  66/67  67/68  68/69  69/70  80/81  82/83  1992</td>
</tr>
<tr>
<td>Freeholded 1963. Not developed</td>
<td>-11,541  5428  6237  5701  5075  5023  5610  5610  5610  5610</td>
</tr>
<tr>
<td>Leasehold. Not developed</td>
<td>10 6249  5095  6007  5404  4732  4674  5274  5222  5170  -6939</td>
</tr>
<tr>
<td></td>
<td>8  6249  5095  6007  5404  4732  4674  5274  5222  5170  -1050</td>
</tr>
<tr>
<td></td>
<td>6.5  6249  5095  6007  5404  4732  4674  5274  5222  5170  1740</td>
</tr>
<tr>
<td></td>
<td>5  6249  5095  6007  5404  4732  4674  5274  5222  5170  3295</td>
</tr>
<tr>
<td></td>
<td>3  6249  5095  6007  5404  4732  4674  5274  5222  5170  4383</td>
</tr>
<tr>
<td></td>
<td>0  6249  5095  6007  5404  4732  4674  5274  5222  5170  5170</td>
</tr>
<tr>
<td>Leasehold. Developed</td>
<td>10  6249  1622  -2469  6887  5130  5544  7904  7873  7842  -198</td>
</tr>
<tr>
<td></td>
<td>8  6249  1622  -2469  6887  5130  5544  7904  7873  7842  4679</td>
</tr>
<tr>
<td></td>
<td>6.5  6249  1622  -2469  6887  5130  5544  7904  7873  7842  6177</td>
</tr>
<tr>
<td></td>
<td>5  6249  1622  -2469  6887  5130  5544  7904  7873  7842  6878</td>
</tr>
<tr>
<td></td>
<td>3  6249  1622  -2469  6887  5130  5544  7904  7873  7842  7411</td>
</tr>
<tr>
<td></td>
<td>0  6249  1622  -2469  6887  5130  5544  7904  7873  7842  7842</td>
</tr>
</tbody>
</table>
the years 1980, 1982, and 1992. The net cash flows in Table 4 assume that the price regime described by 1969/70 prices continues on to perpetuity.

The comparison between freeholding, developing, and maintaining the status quo from 1963 is illustrated in Figure 7. The net present values in this diagram have been computed from the net cash flows contained in Table 4 at a discount rate of 5 per cent. The expected annual rate of change in rental value over the period 1963/1992 has a strong influence on the relative merits of the alternative courses of action. As a consequence the net present values have been expressed as a function of this variable.

In Figure 7 the difference between the various options at an expected rate of change in rental value expresses their relative profitability. These comparisons suggest that development has been the most profitable course of action. Only if the rate of change in rental value is greater than 9 per cent would it have paid the lessee to freehold rather than develop. The third option of retaining the status quo is inferior to development and is less

1. The derivation of the post-tax discount rate is described in Appendix IV. The interest rate on borrowed funds has been included at 7 per cent and the marginal tax rate used to calculate the 5 per cent discount rate is that appropriate to the base net income in 1963/64.

2. This section assumes that the rate of increase in rental value is independent of whether or not the lessee develops.

($000's)

N.P.V. 5%

130

110

90

70

50

2 4 6 8 10

Annual Rate of Gain in Rental Value

Lease-Development

Freehold No Development

Lease No Development

Figure 7
profitable than freeholding where the annual gain in rental value is greater than 4 per cent.

As uncertainty is reflected in unknown future prices and costs, it is pertinent to investigate the relative profitability of these alternatives under a different price structure. The net cash flows in Table 5 are calculated in the same way as those in Table 4 except that output prices, excluding that of wool, have been reduced by 20 per cent from 1969/70 to perpetuity. The net present values of these net cash flows are expressed in Figure 8. Again the net present values are strongly influenced by expected changes in the rental value, under the leasing system. Figure 8 confirms the conclusions drawn earlier. The net present value of the development programme is greater than that of freeholding or maintaining the status quo over a wide range of rates of change in rental value.

**Freeholding in 1969**

The development programme had been completed by 1969 and the lessee was concerned with the freeholding alternative. This section assumes that the lessee does not include selling the property in his future plans. Table 6 describes the net cash flows associated with freeholding,
Comparison in 1963 of Freeholding, Leasing and Developing (Reduced Prices).

![Figure 8](image-url)
TABLE 5

After Tax Net Revenues
(Reduced Prices)

<table>
<thead>
<tr>
<th>Annual Rate of Increase in Rental Value (Percent)</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freeheld 1963. Not developed.</td>
<td></td>
</tr>
<tr>
<td>4493 4493 4493 4493</td>
<td></td>
</tr>
<tr>
<td>Leasehold. Not developed.</td>
<td></td>
</tr>
<tr>
<td>8 4090 4027 3967 -2990</td>
<td></td>
</tr>
<tr>
<td>6.5 4090 4027 3967 -194</td>
<td></td>
</tr>
<tr>
<td>5 4090 4027 3967 1689</td>
<td></td>
</tr>
<tr>
<td>3 4090 4027 3967 3023</td>
<td></td>
</tr>
<tr>
<td>0 4090 4027 3967 3967</td>
<td></td>
</tr>
<tr>
<td>Leasehold. Developed.</td>
<td></td>
</tr>
<tr>
<td>8 6898 6866 6835 2552</td>
<td></td>
</tr>
<tr>
<td>6.5 6898 6866 6835 4544</td>
<td></td>
</tr>
<tr>
<td>5 6898 6866 6835 5623</td>
<td></td>
</tr>
<tr>
<td>3 6898 6866 6835 6371</td>
<td></td>
</tr>
<tr>
<td>0 6898 6866 6835 6835</td>
<td></td>
</tr>
</tbody>
</table>

The net cash flows in the years 1963/64 to 1968/69 inclusive are the same as those in Table 4.
TABLE 6

After Tax Net Revenues  
(1969/70 Prices)

<table>
<thead>
<tr>
<th>Annual rate of Gain in Rental Value (Percent)</th>
<th>Year</th>
<th>1969/70</th>
<th>1980/81</th>
<th>1982/83</th>
<th>1992</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freeholded 1969</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-20519</td>
<td></td>
<td>7941</td>
<td>7941</td>
<td>7941</td>
<td></td>
</tr>
<tr>
<td>Leasehold. With development</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>7735</td>
<td>7704</td>
<td>7674</td>
<td>831</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>7735</td>
<td>7704</td>
<td>7674</td>
<td>4378</td>
</tr>
<tr>
<td>6.5</td>
<td></td>
<td>7735</td>
<td>7704</td>
<td>7674</td>
<td>5703</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>7735</td>
<td>7704</td>
<td>7674</td>
<td>6470</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>7735</td>
<td>7704</td>
<td>7674</td>
<td>7007</td>
</tr>
<tr>
<td>0</td>
<td></td>
<td>7735</td>
<td>7704</td>
<td>7674</td>
<td>7674</td>
</tr>
<tr>
<td>Leasehold. Without development</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>5274</td>
<td>5222</td>
<td>5170</td>
<td>-5400</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>5274</td>
<td>5222</td>
<td>5170</td>
<td>-1019</td>
</tr>
<tr>
<td>6.5</td>
<td></td>
<td>5274</td>
<td>5222</td>
<td>5170</td>
<td>1288</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>5274</td>
<td>5222</td>
<td>5170</td>
<td>2780</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>5274</td>
<td>5222</td>
<td>5170</td>
<td>3929</td>
</tr>
<tr>
<td>0</td>
<td></td>
<td>5274</td>
<td>5222</td>
<td>5170</td>
<td>5170</td>
</tr>
</tbody>
</table>
leasing plus the past development programme, and the
maintenance of the status quo from 1963. These net cash
flows are constructed in the way previously described.¹
The freeholdings price is assumed to be $28,460 or the un-
improved value as determined in 1968. Figure 9 expresses
the net present values, at a discount rate of three per
cent, of the above net cash flows as a function of the
expected annual rate of change in rental value between
1969 and 1992.²

The net present value of the freeholding option in
1969 was greater than that of maintaining the status quo
if the expected rate of increase in rental value is
greater than 5 per cent. If no investment had been
carried out from 1963 onwards, then the net present value
of the income stream is shown to be much lower than that
of the other two alternatives.

Table 7 includes net cash flows based on the same
parameters as those in Table 6 but with the price of all
output except that of wool, reduced by 20 per cent from
1969 to perpetuity. The effect of this is reflected in
Figure 10.

¹. The after-development net cash flows have included
the interest paid in 1969/70, as this year is the base for
this section. The without-development net cash flow
assumes that the same interest is paid in 1969/70 as that
which was paid in 1963.
². In the calculation of this discount rate the marginal
tax rate used was that appropriate to the after-
development net revenue in 1969/70.
Comparison in 1969 of Freeholding and Leasing

(1969/70 Prices).

($000's)

N.P.V.

Freeholding-Development

Leasehold-Development

Leasehold-No Development

Annual Rate of Gain in Rental Value

Figure 9
TABLE 7

After Tax Net Revenues
(Reduced Prices)

<table>
<thead>
<tr>
<th>Annual Rate of Gain in Rental Value (Percent)</th>
<th>Years</th>
<th>1969/70</th>
<th>1980/81</th>
<th>1982/83</th>
<th>1992</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freeholded 1969</td>
<td></td>
<td>-21692</td>
<td>6768</td>
<td>6768</td>
<td>6768</td>
</tr>
<tr>
<td>Leasehold, with development</td>
<td></td>
<td>6742</td>
<td>6692</td>
<td>6662</td>
<td>2577</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>6742</td>
<td>6692</td>
<td>6662</td>
<td>3856</td>
</tr>
<tr>
<td>6.5</td>
<td></td>
<td>6742</td>
<td>6692</td>
<td>6662</td>
<td>4975</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>6742</td>
<td>6692</td>
<td>6662</td>
<td>5821</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>6742</td>
<td>6692</td>
<td>6662</td>
<td>6662</td>
</tr>
<tr>
<td>0</td>
<td></td>
<td>6742</td>
<td>6692</td>
<td>6662</td>
<td>6662</td>
</tr>
<tr>
<td>Leasehold, without development</td>
<td></td>
<td>4090</td>
<td>4027</td>
<td>3967</td>
<td>-2959</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>4090</td>
<td>4027</td>
<td>3967</td>
<td>-661</td>
</tr>
<tr>
<td>6.5</td>
<td></td>
<td>4090</td>
<td>4027</td>
<td>3967</td>
<td>1027</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>4090</td>
<td>4027</td>
<td>3967</td>
<td>2480</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>4090</td>
<td>4027</td>
<td>3967</td>
<td>3967</td>
</tr>
</tbody>
</table>
Comparison in 1969 of Freeholding and Leasing (Reduced Prices).

Figure 10
This confirms the same general conclusions arrived at previously. If the rate of change in rental value is expected to be greater than 5 per cent, then the lessee should freehold. The low net present value which results from maintaining the 1963 status quo situation describes the plight the lessee would have been in had he not developed.

**Freeholding in 1969 and Selling in 1980**

The assumption that the lessee did not intend to sell the property is relaxed in this section and an arbitrary date of sale, 1980, has been assumed. The model expressed in Equation (4.7) is used to determine whether or not a substantial gain would accrue to the lessee if he freeholded in 1969 with the objective of selling in 1980. The gain from freeholding would be the rent payments to 1980. He would also gain the market value of the property in 1980. The cost in 1969 is given by the rental value, which for this analysis is assumed to be $28,460, or the unimproved value set in 1968.

The net present value at June 1969 associated with freeholding at 1969/70 prices is given by:

\[ NPV = -R_0 + PV_{33,11} + (1 - \alpha) \cdot \frac{MV_{11}}{(1+i)^{11}} \]

Figure 11
\[ NPV = -28,460 + 6,590 + \frac{MV_{11}}{1.384} \left(1 - \alpha\right) \]

where \( MV_{11} \) is the price received for the property in 1980 and \( \alpha \) is the proportion of \( MV_{11} \) the lessee would be paid if the property was leasehold. Then at a discount rate of 3 per cent:

\[ NPV = -28,460 + 6,590 + \frac{MV_{11}}{1.384} \left(1 - \alpha\right) \]

Although \( MV_{11} \) and \( \alpha \) are unknowns in this equation, it is possible to express the relationship between them. This is shown in Figure 11 where the market price of the property in 1980 is expressed as a function of the proportion of the market price which the lessee would receive if the property was still leased at that date. This relationship describes the break-even point for freeholding from the lessee's standpoint. If for any given \( \alpha \) the expected market price falls on or above the line in Figure 11, then it would pay the lessee to freehold even if he planned to sell in 1980.

From Figure 11, if the property could be sold in 1980 for $68,390 then freeholding would be profitable if
...was less than .58.\(^1\) Many consider that the prices paid for leasehold properties have often approximated the prices they would have realised if they were freehold.\(^2\) In this instance \(\alpha\) approaches 1. If this occurred in 1980 freeholding in 1969 and selling in 1980 is unlikely to be profitable.

The Crown's Point of View

The Crown is considered only in its role as a profit-taking firm and policy implications are not reviewed.

Although the Crown has owned the land associated with the case study farm since 1893, the area included in this lease has been changed periodically. These changes have been small but have affected the rental value at the date they occurred. The last modification of the area was in 1937, and it is from this date that the profitability of owning the present case study farm can be investigated from the landlord's point of view.

The rental value in 1937 was $9,310. In 1968 it can be assumed to be $28,460, or the unimproved value in that year. This change in rental value represents a growth rate of 3.6 per cent per annum. The model as described by

---

1. The capital value of the property estimated by the Valuation Department in 1968.
2. An example of this is provided by Eville (1967, p.135).
Equation (4.6) is used to determine the return to the Crown. This is given by

\[ r = 0.033 + 0.036 \]
\[ = 0.069 \]

at a discount rate of 7 per cent. This has been the internal rate of return to the Crown from owning and letting the property between 1937 and 1968. As the lessee has been farming the property since 1949, it is possible to gain some indication of the profitability to the Crown over his tenancy by investigating the change in unimproved value between 1953 and 1968. The annual rate of growth in unimproved value or rental value has been 4.8 per cent over this period. The return to the Crown over this time has therefore been 7.6 per cent.

It is necessary to consider the external interest rates to which the Crown is subject before the profitability of owning land can be assessed. These rates of return which have been calculated from the Crown's point of view are greater than the interest rates on mortgages

1. It has been established that 7 per cent is the discount rate on which the lessee should base his investment decisions. This discount rate is also assumed to be acceptable to the Crown. At a discount rate of 3 per cent the return to the Crown would fall to 6.5 per cent.
2. The 1948 unimproved value could not be obtained.
over the last decade; as the opportunity cost of funds to the Crown is unlikely to exceed these, its ownership of this area of land has been profitable.¹

Conclusions

The development programme carried out by the lessee between 1963 and 1969 has been extremely profitable. Although freeholding in 1963 is likely to be more profitable than maintaining the status quo, it would be almost certainly less profitable than the development programme which has been carried out. Freeholding in 1969 is likely to be beneficial financially to the lessee if he does not sell the property in the near future, and if the rental rate increases at a rate of five per cent or more per annum between 1969 and 1992. As previously mentioned, the comparison of the freeholding and development options assumes that any change in rental value, and hence rent, is independent of development. Part III of this study examines whether or not Crown Renewable leases are cash leases and discusses their effect on tenant plans.

The Crown's investment in this property from 1937 to

¹ Dr. R.W.M. Johnson (1970) Principal Research Economist at the Lincoln College Agricultural Economics Research Unit, pers. comm.
1968 has been profitable.

These results have been obtained from within the framework of the present Crown Renewable lease system. Although the models derived to evaluate alternatives in this case study can be used in a study of any leasehold farm, the conclusions obtained are dependent on factors peculiar to the case study farm, and therefore cannot be applied directly to other properties.
PART III

CROWN RENEWABLE LEASE TENURE

AND RESOURCE ALLOCATION
CHAPTER VI

THE THEORY OF RENT

Throughout history rent has been influenced by tradition and political considerations. Although the wealth of a nation is directly affected by the efficiency of resource allocation, the processes which stimulate this allotment are often modified in response to other sociological goals. It is pertinent to examine the effect of Crown Renewable lease tenure on resource allocation, as its implications are important to the community. The theory of rent is a convenient starting point.

Economic Rent

The term 'rent' is commonly used to define a payment made periodically for the hire of goods. It need not be restricted to the instalments paid for the hire of land, but applies to all goods which are leased. In economic theory the term rent is applied only to payments made for any factor of production whose supply is not perfectly elastic. Robinson (1969) describes the concept of economic rent as the notion of a surplus earned by a particular
factor of production over and above the minimum earnings necessary to induce it to do its work. Rent in common parlance therefore, may include economic rent plus payment for other items related to the maintenance of that productive factor in its employment.¹

Rent is not peculiar to land as it may also be earned by the other broad factor categories; labour, capital and entrepreneurship. This has been pointed out by Robinson (1969) who outlines the example of capital often earning a surplus, or rent, over the reward needed to induce many individuals to save. Rent however, can only exist for those factors not in perfectly elastic supply.

Scarcity and Rent

Ricardo (1817) recognised that rent accrued to land because it is essentially fixed in area. In Figure 12, which has been described by Samuelson (1961, p. 594), the completely inelastic supply curve for land is shown as SS'. To simplify the discussion, land in this instance is taken to be of homogeneous quality in the production of one form of output. As DD' is the total demand curve for

¹ Economic rent is referred to as rent for the remainder of this chapter.
Rent Determination Under Competition.

Figure 12
land, it represents the addition of the demand curves of all the individual firms. The demand and supply curves intersect at the equilibrium point \( E \). The rent of land will tend towards the factor-price defined by this equilibrium point.\(^1\) If the rent was above this level some land owners would be unable to rent all or a proportion of their land, and hence they would offer their land for less, bidding down the rents. If the rents fell below the equilibrium factor-price the bidding of unsatisfied firms would ensure that rent rose. As land does not require any payment to be in existence, the whole of the payment made for land is rent.

From Figure 12 it is clear that as the supply of land is unresponsive to price, changes in the level of rent offered for land will be brought about by shifts in the demand curve for land. If in Figure 12 the price of output was to fall, then the demand curve for land would shift downwards to the left. Rents would then fall to a new equilibrium level. All factors which influence the demand for land will affect the rent paid for land.

Rent exists only for factors not in perfectly elastic supply. Returning to Figure 12, it is evident that if the

\(^1\) A competitive market in which there are no monopoly or monopsony elements has been assumed.
supply of land was perfectly elastic no rent would be paid for land.¹

Samuelson (1961) has noted that in the above example land earns rent; firstly, because its total supply is perfectly inelastic, and secondly, because the land has no other use to which it can be put. In order to consider further the ramifications of rent it is necessary to examine this latter point in detail.

The Point of View

From a community's point of view the total supply of land is fixed and it requires no payment to remain in existence. For this reason the whole of the reward to land is regarded as rent by the community.

The necessary minimum payment for a factor, from an industry's point of view, is not that which is required to keep the factor in existence. It is that payment which will retain it within that particular industry rather than in another. The price necessary to retain a unit of a factor within a certain industry is called its transfer earnings, as a payment below this would cause it to shift elsewhere to obtain a higher reward. A unit of a factor

¹. No payment is required to ensure land's existence.
receiving its transfer payment exactly is termed a marginal unit, for a slightly lower reward would encourage it to shift to another industry. An intra-marginal unit is the term given to unit of a factor receiving earnings which are greater than its transfer earnings. Robinson (1969) has emphasised that when the supply of a factor is being considered from a particular industry's viewpoint, the total supply of that factor is not important. The relevant consideration is the level of earnings which will induce units of the factor to transfer themselves from other uses to the industry in question. If institutional constraints are ignored, and the demand for a commodity increases, then the industry making the commodity will want to expand. The industry can obtain as much of a factor as required in a perfectly competitive market by paying it slightly more than its transfer earnings. Hence, a factor may be in perfectly inelastic supply in total, but may be in perfectly elastic supply to each use considered separately. From the point of view of each industry the factor can receive its transfer earnings and not earn rent.

There may be some productive factors which earn more in the industry in which they are employed than their transfer earnings. The difference between their transfer earnings and actual earnings in that industry can be regarded as rent from the point of view of that
industry.¹

The reason for the different ways the community and individual industries regard rent have been outlined by Samuelson (1961, p. 597). To an industry using relatively little of a factor, the factor-price is an important determinant of that industry's commodity price.² To the economy as a whole, however, the rent of a factor in inelastic supply results from the prices of commodities which need quantities of that factor for their manufacture. Although the payments made for land are rent from the community's point of view, they are merely payments for a factor of production from an industry's point of view.

Differential Rent

Although rent can be earned only by a factor of production whose supply is not perfectly elastic, the level of rent is influenced by the technical consideration that units of a productive factor may have greater or lesser production advantages. This section is again confined to the rent of land, although principles involved apply to other factors in imperfectly elastic supply.

¹ An example of this is given by Robinson (1969, p. 105).
² The factor-price is an element of the supply curve of that industry's output.
The firm whose cost curves are described in Figure 13 is assumed to use one scarce factor only, that of fertile land. Figure 14 describes the costs and returns of a firm employing land of low fertility. In each case AC is the average cost of the output of the firm excluding any payment made for land, but including normal profits to management and capital employed with the land. MC represents the marginal cost curve. Both firms produce to the point where marginal cost equals price AO. The intra-marginal firm earns the surplus profit ADCB in Figure 13, and as land is the only scarce factor, this represents the rent of land. This firm can afford to pay up to this amount for the use of land and still make normal profits. The firm employing the less productive land has a total revenue of AFEO in Figure 14, and total costs of AFEO and therefore is earning no surplus profits. This firm is said to be on the margin of cultivation where it can only just afford to operate provided no rent need be paid for the use of land. This demonstrates that land of differing fertility will earn different levels of rent. This differential rent arises essentially be-

---

1. The concept of normal profits has been described by Samuelson (1961) as profits being determined competitively everywhere in industries of similar riskiness.
2. The surplus profits ADCB, in this instance represent Marshall's (1920, p. 811) producer's surplus.
Figure 13

Figure 14
cause the marginal value product of different types of land, given the employment of other productive factors, will differ. There is obviously a hierarchy of rents attributable to different types of land, decreasing as the land becomes less productive.

Differences in the location of areas of land will also cause differences in the rents they earn even if they have the same inherent fertility. It has been shown that ultimately the rent of land is determined by the price paid by consumers for the product of land, and the firm's costs. The proximity of land to a market will affect the production costs of a firm in that situation, and therefore influence the rent which can be paid. Those firms close to a market can obviously afford to pay more rent than those further away.

**Quasi-rent**

There are some factors of production which are not fixed in supply as land is, but whose supply is inelastic in the short run and elastic in the long run. Manmade factors such as machinery fall into this category. In the short run the supply of a machine may be fixed owing to knowledge of its production process, or the time it takes to be constructed. However, in the long run its supply
may be perfectly elastic. The quasi-rent earned by a machine whose supply is inelastic only in the short run is defined by Stonier and Hague (1964, p.293) to be 'its total short run receipts less the total cost of hiring the variable factors used with it and of keeping the machine in running order in the short run'.

Figure 15, also described by Stonier and Hague (1964), can be used to illustrate quasi-rent. An entrepreneur hires a machine for which he pays a fixed annual amount. By using this fixed factor with certain variable factors he earns a profit which varies with changes in demand and cost. If the assumption is made that the machine is the only fixed factor, and labour the only variable factor, then the total receipts less the total wage bill is the quasi-rent earned by the machine. In the Figure 15 the firm faces the average revenue curve PD. Total wages are TSMO. The rental of the machine is LQST. The quasi-rent is given by PRST. In this instance the machine is earning an abnormally high quasi-rent. In the long run the number of machines can be increased and the high quasi-rent competed away. If the demand curve fell to P'D' the quasi-rent P'R'S'T' being earned would be less than the rental of the machine as L'Q'S'T' equals LQST. The quasi-rent earned by the machine is now abnormally low and would not be sufficient to cover the
Quasi-Rent

Figure 15
rental. In the long run the number of machines would fall and the quasi-rent would return to the normal position.

Marshall (1920, p. 424) has pointed out that the expectation of quasi-rents from a machine is a necessary condition for the construction of that machine. For the builders of a machine will compare the cost of construction with the sum of the expected quasi-rents discounted to the date of construction, in order to ascertain whether or not it will be profitable for them to build the machine.

From the previous definition of quasi-rent it is clear that some short run earnings of machines will represent maintenance costs and not quasi-rents from the point of view of both individual industries and the economy. However, from an industry's point of view all factors of production may have transfer earnings. From a single industry's viewpoint, quasi-rent is the excess earned by a factor in inelastic supply in the short run over and above its transfer earnings. Hence, the quasi-rent earned by a factor may differ according to whether it is estimated from the community's or individual industry's point of view.

Quasi-rent is not confined to inanimate capital goods. Stonier and Hague (1964) have shown that some human beings may also earn quasi-rent where the ability
they possess is inelastic in supply in the short run.

Rent: A Summary

A productive factor whose supply is perfectly inelastic will earn rent from the community's viewpoint. However, a factor in perfectly elastic supply will not earn rent. Between these two extremes factors earn quasi-rent because they are in imperfectly elastic supply in the short run.

The effect of product demand on rent has been discussed. However, the rent earned by a factor will also vary in response to changes in the productivity of individual firms. From Figure 13 it is obvious that if the total cost per unit of output falls, rent will increase. In this way technical innovations will influence rent.

From one industry's point of view changes in the factors affecting rent may influence other industries, and hence alter the transfer earnings faced by the former industry. As the demand for a factor increases a particular industry will have to pay increasing amounts to lure it away from other uses. The increasing transfer payments will reduce the rent earned by this factor in any industry if the price of output of that industry remains constant.

An individual firm may have to hire one or more
scarce productive factors. Although the firm can retain its factors of production by paying them their transfer earnings, surplus profits may remain. The distribution of a firm's total value product among its productive factors is examined in Chapter VII.
CHAPTER VII

RENT AND THE THEORY OF THE FIRM

The objective of an enterprise in which resources are combined to produce output is assumed to be that of maximising profits. According to marginal analysis this can be achieved by organising resources on the basis of their contribution to total revenue and their respective market prices. Rent paid for land is a factor-price from the tenant's point of view, and hence it will influence decisions concerning resource allocation on leasehold properties.\footnote{Rent in this chapter refers to the payment made for the hire of a productive factor and does not describe economic rent.} Heady (1952, pp.402-406) has demonstrated that problems exist when attempts are made to allocate the total value product from a firm among its productive factors. This process is termed resource valuation and is important, for if a resource's contribution to total revenue is estimated incorrectly it may lead to a mis-allocation of resources through the mechanism of marginal analysis. The main problem is described by Heady (1952) as the conflict between valuing each resource according to its productivity, and valuing resources by the process of residual imputation. This chapter examines both
methods of resource valuation with particular emphasis on the valuation of land and its effect on tenant plans.

Rent and the Productivity of Land

Marginal analysis involves valuing resources according to their productivity, or more specifically, on the basis of their marginal value products. It is useful to examine whether or not economic theory permits the division of a firm's total product among its productive factors according to their respective marginal value products.

The principle behind this apportionment is contained in Euler's theorem which states that if each factor is imputed its marginal value product, then under certain conditions the total value product will be exactly exhausted. The condition under which this proposition is valid exists when output from the firm can be explained in terms of the inputs by a production function which is homogeneous of degree one. This is readily demonstrated. Durell and Robson (1963) have shown that if output Q is produced from three inputs $x_1, x_2, x_3$ in terms of a homogeneous function of the nth degree as

$$Q = f(x_1, x_2, x_3)$$
Then,

\[ Q_n = \frac{\partial Q}{\partial x_1} x_1 + \frac{\partial Q}{\partial x_2} x_2 + \frac{\partial Q}{\partial x_3} x_3 \]

As the partial derivatives with respect to each input represent their respective marginal products, total physical product will be exactly exhausted by imputing to each factor its marginal product when the function is homogeneous of degree one. This can be extended to total value product by multiplying through by the price of output.

\[ PQ_n = \frac{P \partial Q}{\partial x_1} x_1 + \frac{P \partial Q}{\partial x_2} x_2 + \frac{P \partial Q}{\partial x_3} x_3 \]  

(7.1)

If \( n \) equals one and each factor is imputed its marginal value product, total value product will be exhausted exactly. The owner of each resource will be paid the marginal value product of that resource and there will be no unexplained surplus or deficit.

If a production function is assumed to exhibit increasing then decreasing returns, the exhaustion of total product proposition will hold in the long run competitive equilibrium situation. The average cost curve is U-shaped, and at the minimum cost position marginal cost

---

1. The product of output price and the marginal product of a resource describes its marginal value product.
equals average cost. For small movements about this position the conditions for a production function which is homogeneous of degree one will hold. In this hypothetical situation the marginal value product of each factor will equal its price, and if each resource is paid its marginal value product, total value product will be exactly exhausted.

It is obvious from Equation (7.1) that if \( n \) is not equal to one, then there may remain a surplus or deficit of total value product after each factor has been paid its marginal value product. A production function which is homogeneous of a degree greater than one exhibits increasing returns. If in this instance each factor is rewarded with its marginal value product, the resultant figure will be greater than the total value of output. Conversely, if the production function's degree of homogeneity is less than one, and each resource is imputed its marginal value product, the total product will not be exhausted. When the degree of homogeneity of the production function is other than one, the 'exhaustion of product' proposition cannot apply, and there is no basis by which the remaining surplus or deficit can be allocated to any resource. When resources are valued on the basis of their productivity, total product will be exactly exhausted only if the output from the firm, produced by the resources, can be explained in terms of a production function which
Rent and the Marginal Value Product of Land

Rent is here regarded as the payment made by a tenant for land. The relationship between land's factor-price, rent, and the marginal value product of land is examined to ascertain whether such a relationship should exist. If it did, it would provide some guide to the desirable level of rent, given the marginal value product of land.

A firm whose objective is to maximise profits will base resource organisation on the cost of these factors and their respective marginal value products. In the long run under perfect knowledge and competition, the prices, or costs, of all resources will equal their marginal value products. This is the general equilibrium situation wherein each firm is making normal profits and each factor is paid its marginal value product. Rent will equal the marginal value product of land, if it is leased, and the landlord will pay the costs associated with maintaining it at this level of productivity. However, this is a purely hypothetical situation devised by economists to explore inter-relationships within an economic system. Conclusions derived from such a model have to be modified
in response to conditions which exist in the real world.

The market price of a resource whose supply is fixed in the short run is irrelevant for short run productive decisions. Also, if a factor is not perfectly divisible it may be difficult to attain a situation where its marginal value product equals its price in the short run.

The perfect competition assumption is extremely restrictive. Samuelson (1961) defines it as meaning that each seller has no control over prices. As this requires that the demand curve facing each seller is perfectly elastic, this is obviously an abstraction from the real world. Farms are one of the few types of firms which can raise or lower prices and gain or lose all the customers in the market. Monopoly elements exemplify the most obvious deviations from the conditions which are assumed to exist under perfect competition. A firm or group of firms capable of influencing prices will try to maximise profits not only by efficient resource allocation but also by control of the price of output. Those firms will generally aim to continue making surplus profits and will not usually attempt to employ each resource to the point where marginal value product equals price.

The assumption of perfect knowledge is also violated in the real world. As future events are not known with certainty, decisions are based on expected occurrences.
Prices and technology are both subject to uncertainty and it is thus highly improbable that a firm will produce to the point where the marginal value product of each resource equals its price.

The foregoing discussion assumes that all firms have the objective of profit maximisation and that they act in a rational manner towards this end. This too is an abstraction from reality. Those firms which have other objectives may not employ productive factors according to marginal analysis. Resource use in these firms is unlikely to proceed in the direction of equating the marginal value product of each resource with its price.

For these reasons the marginal value product of resources under the conditions which exist in the everyday world will equal their respective prices only by coincidence. In such an environment there is no rationale to insist that the rent paid for land should equal its marginal value product. Nevertheless, as rent represents land's factor-price from the tenant's point of view, its relationship with the marginal value product of land may have considerable practical importance in decisions concerned with the allocation of resources on the farm.

Compensation for Unexploited Resources

The owner-occupier's objective of maximising
consumption over time can be assumed to be analogous with that of the tenant. Hence, they will both respond to economic forces and allocate resources according to their cost and value productivity. Planning over the tenant's or owner-occupier's time horizon enables on-farm investment alternatives to be considered. The terms of leasing contracts will affect tenant plans and consequently the allocation of the tenant's resources over time. The stated objective of the owner-occupier is consistent with the community's goal of efficient resource allocation in a competitive market. Hence, any deviation in the tenant's plans from what he would have carried out as an owner-occupier will lead to a less efficient allocation of resources from the community's viewpoint. A lease system should ensure that tenants implement plans as if they own the properties which they in fact lease.

The tenant will carry out on-farm investment to the same extent as an owner-occupier if he expects to gain the full returns from it. The benefits from such investment implemented by the tenant may not be completely exhausted at the time the lease expires. The lessee will face the same intertemporal production opportunities as the owner-occupier if he receives full remuneration for the unex-
hausted portion of the returns on the investment he has initiated. Heady (1952) has noted that some lease systems permit the tenant to be paid a proportion of the cost of investments at the end of the lease and that this does not maintain the production opportunities in a manner which would exist if the property was farmed by an owner-occupier. The lease system should permit compensation to be determined by the value productivity of the unexhausted portion of the investment, discounted to the date at which the tenant relinquishes the lease. This will usually be greater than the cost of the investments if they have been profitable.

It will be profitable for the tenant to carry out investments whose net present value of costs and returns is positive at the discount rate appropriate for his investment decisions. He may therefore still carry out investment although, owing to the form of compensation, it may be less profitable to him than it would be to an owner-occupier. However, there are two main reasons why the form of compensation may affect the amount of on-farm investment carried out by the lessee. Firstly, at the margin, where investment is only just profitable to the owner-occupier, it may be unprofitable to the tenant if the method of compensation reduces the benefits of the investment to the tenant. In this instance the tenant will not
carry out the investment which he would have implemented had he owned the property. Secondly, as farmers are confronted with a range of investment alternatives they will choose those that are most profitable to them. Clearly, if the form of compensation is expected to reduce some of the financial benefits generated by on-farm investment, it may alter the tenant's priorities concerning the projects he is willing to undertake. It may lead him to invest in the projects in which inputs are fully transformed into output within the period he expects to remain on the property, rather than long-term projects. If compensation reduces the profitability of on-farm investment from the tenant's point of view, then off-farm investments may become relatively more rewarding financially. This also may alter the tenant's investment plans from those he would have implemented had he owned the property.

Compensation may affect tenant investment plans in the way described above even where he has the right of renewal. This will occur if, at the time of renewal, the rent is calculated in such a way that it reduces the profitability of the tenant's on-farm investments. A cash lease, where the rent is set independently of the individual tenant's productive decisions, may alleviate this problem.

1. Investment analysis from an individual's point of view has been discussed in Chapter II.
The basis for advocating the discounted value productivity of unexploited resources to be paid to the tenant as compensation, in order to encourage efficient resource allocation, rests on the assumption that each entrepreneur's objective is to maximise profits. Those with other objectives will not respond to the 'profit' incentive and may not attempt to employ productive factors efficiently. To examine this further it is necessary to return to the concept of economic rent.

Economic Rent and the Firm

The economic rent of land has already been described as originating from the forces of supply and demand for land. A firm's surplus profits which remain after total cost, excluding any payment for land, has been subtracted from the total revenue, represents economic rent. This has been described in Figure 13 as the area ABCD where the firm is producing at the maximum profit point and land is the only scarce factor.

Those entrepreneurs purchasing land can afford to offer up to the present value of the expected economic rents as the purchase price of land and still be rewarded with their transfer earnings as well as making normal profits. The tenant can afford to pay up to the economic
rent each year as the payment for land and still make normal profits. However, if the tenant does pay the area ABCD in Figure 13 each year for land, then the factor land will be earning economic rent from the community's viewpoint but not from the tenant's.

To impute all of a firm's surplus profits to land, as economic rent assumes that the other productive factors are in perfectly elastic supply. Nevertheless, a firm may employ more than one scarce factor. Management, for example, may earn quasi-rent over and above its transfer earnings. Robinson (1969) has shown that if land and management were a firm's only scarce factors and the tenant was charged rent on the basis of the economic rent of land then at the maximum profit point he would receive surplus profits composed of the quasi-rent earned by management in excess of the transfer earnings of management. By imputing the total surplus to land, its factor-price would be composed of the rent earned by land and any abnormally high quasi-rents earned by other productive factors.

Heady (1952) has demonstrated that the residual imputation method of resource valuation entails deducting a firm's total costs, excluding any payment to the factor being valued, from its total revenue and regarding any remaining surplus as the value of that factor. This is essentially the process whereby the economic rent of land
Composition of Total Costs

If economic rent is paid for land then the composition of total costs is important. In Figure 13 the average cost curve AC must contain the maintenance costs of retaining each level of output. It will reward factors just enough to maintain their level of productivity and will include all fixed and variable costs. By the definition of economic rent, management will be included at its transfer earnings. The transfer earnings of other fixed factors on a farm are usually very low once the factors are in place, and the relevant cost is that required for their maintenance. An estimate of depreciation must also be included in the annual total costs. Similarly the transfer earnings of variable factors are reflected directly in their prices and are incorporated in the total costs accordingly. This concept of transfer earnings is important as it assumes that the price paid for input items is a measure of their utility to other industries. It assumes that the prices paid are essential for these inputs to be employed on the farm rather than in other uses.

It is clear that a component of total costs should be quasi-rent. It was evidenced previously that in the
long run some quasi-rent was essential for the continued employment of a factor of production. The quasi-rent included in a firm's costs should be a normal rate of interest, or normal profits on the tenant's invested capital. The expectation and existence of some quasi-rent is necessary if the tenant is to be induced to pay maintenance costs and replace assets.

A cash lease is one in which the rent does not enter the marginal cost of a tenant's firm. Economic rent falls within this category as it is independent of the firm's level of output. If the landlord claims the producer's surplus as rent the tenant will be rewarded with his transfer earnings plus normal profit on his investment. If however, the landlord pays the costs associated with maintaining the land at a level of productivity then the landlord can claim economic rent plus these costs.

**Level of Rent and Resource Allocation**

Although rent which is set independently of the level of output will enter the tenant's firm's fixed costs, it will influence his investment plans. It is therefore worth examining the effect of the level of rent on the allocation of a tenant's resources.

In Figure 16 rent has been set at less than the full
Rent Less than Economic Rent

Price

Bi

Output

Figure 16

Rent Less than Economic Rent, and Output

Price

Output

Figure 17
economic rent described previously. The total receipts earned by the firm are OADQ. The tenant pays OBCQ in costs, BFGC in rent and enjoys the surplus of FADG. A tenant whose rent is set at this level does not have to increase output to the point Q in order to make normal profits. This is demonstrated by rearranging Figure 16. In Figure 17 the area BAKL represents the rent and is the same as BFGC in Figure 16. It is obvious that the firm can earn normal profits by taking production to the point M. In Figure 17, if the tenant maximises profit by producing to the point Q he will earn surplus profits as LKDC is equivalent to FADG in Figure 16. Hence, a tenant may make normal profits without achieving the most efficient allocation of resources if the rent has been set lower than the full economic rent.

Figure 18 describes the situation wherein the rent has been set in excess of the true economic rent. The total revenue is again OADQ and total costs, including rent, OFGQ. The firm's payments exceed receipts by AFGD, and as this occurs at the maximum profit point Q, this loss cannot be reduced by altering the level of output. In the short run the tenant will continue to produce at point Q provided that the total revenue earned exceeds the variable costs incurred in producing it. For if there was some surplus of revenue over variable expenses the firm
Rent in Excess of Economic Rent.

Figure 18
could contribute some payments to fixed factors whose expenses are always incurred in the short run, whether or not any output is produced. However, in the long run, where factors fixed in the short run became variable, the firm would cease to operate.

A monopolistic landlord would maximise profits by setting the rent as the true economic rent. At this level of rent the tenant will be paid his transfer earnings and will be earning normal profits on his investment. From Figure 13 it is clear that if the firm produces at any point other than Q it will make a loss. A firm producing less than Q would have to expand output in order to remain viable. In this way economic rent could be used by a monopolistic landlord to force an efficient allocation of resources within the farm firm. Mention has already been made of forms of compensation which are necessary for a tenant to move towards the maximum profit point. The necessary assumption for this was that his objective involved maximising profits. However, if rent is based on economic rent it can be used to force tenants to the least cost position regardless of compensation or tenant objectives.

To some extent this may also occur in a competitive market free from institutional constraints. As Marshall (1920) suggested, if rent was set competitively, as it
was in Britain in the 1800s, at such a level that a 'normal' tenant made zero profits, then those managers with superior ability would earn quasi-rents. Those whose management was inferior would make losses.

A monopolistic landlord who claims economic rent from his tenants will set it on the basis of land's most profitable use and level of use. He would therefore have to be circumspect in determining the use to which the land is to be put. Rent determined on the basis of a specialised use not available to all the firms for which the landlord sets the rent, may be vastly different from that which would force efficient resource organisation.

Using economic rent as the annual payment for the use of the land can be effective in stimulating efficient resource allocation only if it is independent of the level of output. If the rent imposed is determined by the output that firm attains, it will neither provide incentive nor force any increased output. Depending on how long the lag is, the tenant will always be making normal profits. This is exemplified by Figure 17. If in this diagram the rent is determined on the basis of the output M, then the lessee will be earning only normal profits. If however, he expands to Q and the rent is again recomputed he will still be earning only normal profits. In the real world
the tenant would be unlikely to expand output to Q if he expected to receive only normal profits on his extra investment. However, if economic rent was set independently of output he would have to expand to Q or make losses.

A tenant's firm which is not producing at the maximum profit point would have to expand towards it if the rent was set as full economic rent. As development cannot be carried out instantaneously the firm would make losses until it produced at the maximum profit point. The tenant could not avoid these losses by selling his interest in the property because the incoming tenant would reduce the purchase price by the sum of the losses he would expect to make, discounted to the date of purchase.

The forgoing discussion assumes that the production function characteristic of each firm exhibits increasing then decreasing returns. Although production functions with degrees of homogeneity equal to or greater than one cannot reach an equilibrium least cost position in the long run, they may have U-shaped average total cost curves in the short run.

Economic Rent and the Payment for Land

As land is not in perfectly elastic supply it earns economic rent, the level of which is determined by the
demand for land. The payment made for land by firms, although regarded as economic rent by the community, is payment for a productive factor from the firm's viewpoint.

Only in the hypothetical, long run equilibrium situation will the price of each productive factor equal its marginal value product. Under the conditions existing in the real world, there is no reason why the rent of land should be equated with the marginal value product of land. However, a comparison of prices of factors with their respective marginal value products may permit the efficiency of resource allocation to be examined, even if a strictly competitive framework does not exist.

It now remains to consider the principle followed by the Crown when setting rent under renewable lease tenure.
CHAPTER VIII

CROWN RENEWABLE LEASE TENURE AND RESOURCE ALLOCATION

The Crown owns approximately a third of the occupied farm land in New Zealand and could therefore be regarded as a monopolistic landlord. This role is further emphasised by the Crown's being largely responsible for devising the rules by which this land is administered. However, in contrast to private monopolists, the Crown wishes to encourage efficient resource allocation throughout the economy.

The effect of Crown Renewable lease tenure on resource allocation is important from the nation's point of view. Although this also concerns the tenant, he can modify his plans to achieve his objectives if he understands the ramifications of the lease system. As these plans may not coincide with society's goal of efficient resource allocation, it is necessary to investigate this aspect of Crown Renewable lease tenure. The theory which has been reviewed in Chapters VI and VII is used as the basis for this evaluation.
Rent Determined by the Crown Renewable Lease System

At the time the lease is renewed four values are set by the Land Settlement Board. These have been documented in Chapter I as; the value of the improvements owned by the Crown, the value of the improvements owned by the lessee, the value of the land exclusive of improvements, and the capital value of the property. The sum of the former three values cannot exceed the fourth. Land in this case is regarded as a resource providing services, to which the application of capital is termed improvements. Although this valuation is carried out under the auspices of the 1948 Land Act, the following discussion assumes that the rental value does not include the value of the Crown's improvements, and hence is analogous to the unimproved value of land as determined by the Valuation of Land Act 1951, at the date of rent renewal. Consequently the tenant is presumed to own the improvements and the Crown the land.

As the capital value is the estimated market value of the property at the time of valuation, it is based on

---

1. It has been pointed out in a research paper entitled 'A Critical Study of Unimproved Land' prepared by the Valuation Department (1968) that these two values are synonymous in most instances. They may differ by reason of the definitions of improvements in the two Acts. Although it is expedient to make this assumption, it is not necessary for the subsequent conclusions.
recent farm sales and therefore is the same, irrespective of which of the two Acts the valuation is being carried out under. As the sum of the unimproved value and the value of improvements must equal the capital value of the property under the Valuation of Land Act 1951, the relationship between these three values can be written

\[ CV = VI + UV \]

where CV, VI, and UV represent the capital value, value of improvements, and unimproved value respectively. This can be rewritten in terms of the 1948 Land Act under the assumed conditions as

\[ CV = VI + R_0 \]

where \( R_0 \) is the rental value at the time of valuation. The method of splitting the capital value into the value of improvements and rental value is crucial to the effect of Crown Renewable lease tenure on resource allocation.

1. Although this relationship is held to be valid by most valuers, and is generally implemented in practice, some confusion does exist. This is further discussed by M.B. Cooke (1967) in 'The New Zealand Valuer', Vol.20, Nos. 2 and 3, pp 69-75.
Rent and the Price Paid for Undeveloped Land

McVeagh (1952) defines the unimproved value of land as the price, which would be paid for land in its original state at the time of valuation. In this instance under the assumed conditions it is synonymous with the rental value and can be restated to be the price a block of land would command if offered for sale at the time of valuation and if no improvements had been carried out on it. If the rental value is determined on this basis, then rent under Crown Renewable lease tenure is set on the price paid for undeveloped land.

The prime determinant of the price paid for farms is the expected future net income. A purchaser will pay up to the present value of the expected net income stream associated with a property. Any modification of the expected net income stream will affect the price. Once the purchase has been completed, the farmer is free to implement his own plans which may include on-farm investment with the objective of augmenting farm income. Consequently, the price paid for a farm will reflect the level of output the purchaser expects to attain. To use the terminology previously established, prospective buyers can afford to bid up to the present value of the expected
producer's surpluses generated by the property, and still make normal profits. In a competitive market the buyer who purchases the property will be that person who expects to attain the highest producer's surpluses, given that factors such as discount rates are the same between individuals. Although expected net income is not the only factor influencing the price paid for farm land, it is not intended to review others, as Johnson (1970) has shown that expected net income, as approximated by the previous year's income, explains virtually all of the variation in prices paid for farm land in New Zealand in recent years.\(^1\)

Rent under Crown Renewable lease tenure is set as 5 per cent of the rental value. If the rental value is determined by the price paid for undeveloped land, then the rent set for Crown Renewable leases is consonant with the notion of economic rent. In a competitive market the price paid for land will be sufficient to negate the expected future producer's surplus, otherwise the anticipated surplus profits would attract a higher price from other purchasers. As there are no improvements on unimproved land the price paid for it will be based on its discounted expected economic rent only. Hence, by

\(^1\) Dr. R.W.M. Johnson, Principle Research Economist with the Agricultural Economics Research Unit at Lincoln College, unpublished research work (1970).
calculating the rent as a percentage of this price, the annual rent payment will approximate economic rent. In practice, this annual rent instalment will be only a crude approximation of economic rent as it is affected by factors such as individual's varying expectations, discount rates, and whether or not a competitive market does exist for farm land.

Rent under Today's Conditions

There are few areas in New Zealand remaining in their original undeveloped state. Certainly those which do exist are not sufficient to support a market for this type of land. Consequently there is no base which valuers can use to establish the price paid for undeveloped land and hence calculate unimproved value. McVeagh (1952) has stated that for the statutes to be followed correctly, the value of improvements, capital value and unimproved value should

1. The lack of sales of undeveloped blocks of land, and the consequent problems which confront valuers has been outlined in a research paper entitled 'A Critical Study of the Unimproved Value of Land' and prepared by the Valuation Department (1968).
2. This has been recognised by the Valuation Department and an amendment to the Valuation of Land Act 1951 has recently been enacted. This replaces unimproved value with land value for rating purposes. These are not comparable as the land value includes items previously regarded as improvements. However, unimproved value or, under the conditions adopted previously, rental value, remains the basis for setting rent under Crown Renewable lease tenure.
be ascertained independently. However, owing to the difficulty involved in estimating the unimproved value it has been accepted by the courts that the unimproved value can be determined as a residual.\footnote{The acceptance of this principle is recorded in the case 'Valuer-General vs Sullivan' in the 'Digest of the New Zealand Valuer'; second edition, pp 95-98.} Firstly, capital value is estimated, then the value of improvements, which is deducted from the former to give the unimproved value.\footnote{A recent exposition of this method is contained in the case 'Valuer-General vs W.J. Johnston and others' in the 'Digest of the New Zealand Valuer'; second edition, pp332-342.} This is described in the following way using terminology previously stated:

\[ R_0 = UV = CV - VI \]  

(8.1)

As the rent is set as a percentage, \( r_{33} \), of the rental value, it can be written:

\[
\text{Rent} = R_0 r_{33} \\
= (CV - VI) r_{33}
\]

The methodology adopted to determine the value of improvements and the capital value thus directly affects rent set under Crown Renewable lease tenure.
The value of improvements as calculated by the Valuation Department is closely related to their cost. Morris Jones (1967) made this clear when he stated, 'It is doubtful whether under normal circumstances the value of an improvement can exceed its cost, so replacement cost usually decides the ceiling to the value of any improvement, to informed persons in the land market'. In practice the full cost is often not credited to improvements if the valuer concerned does not consider that they are being used to the best advantage at the time of valuation.\footnote{This point is emphasised in 'Valuation Problems Illustrated' by M.B. Cooke, 1968.}

The price paid for an improvement represents its value to society, and the farmer has to pay this price in order to attract it away from other uses. The actual cost of an improvement is its transfer earnings, the payment of which represents an investment from the farmer's standpoint.

Once the improvement is fixed in place on the farm the costs relevant to the farm firm are those associated with maintaining it at a certain level of productivity.

Cooke (1965) has explained that the capital value of a farm is based on the prices paid for similar properties in the surrounding district. It is an estimate of what the property would fetch if offered for sale at the time of...
valuation. The total price paid for a farm will include payment for land, improvements, stock and plant. In bidding for the land plus improvements a purchaser can offer the present value of his expected future producer's surpluses, plus the normal profits earned by the improvements actually on the farm. Competition between purchasers will ensure that the successful buyer will, given certain assumptions, have offered the highest discounted economic rent for the land. Hence, the prices on which the capital values are based will result from the most profitable level of output envisaged by prospective purchasers.

At the beginning of each lease period, the rent is therefore calculated as a percentage of the present value of some relatively profitable future level of value output, less all or a portion of the transfer earnings of the improvements in place on the farm. As the capital value, and hence the rental value, is based on some district figure, the rent set on each farm is therefore largely independent of individual tenant resource use. Consequently the Crown Renewable lease is a cash lease, and it attempts to draw off economic rent because it is based

1. Not all sales are included, as the willing seller, willing buyer concept is taken into account.
2. The discount rates of individual buyers are assumed to be equal and it is also assumed that a competitive market exists for land, and, as noted in Chapter VII, a perfect market for the other factors of production.
on the most profitable anticipated level of output and estimated transfer earnings of improvements.

Rent Determination: An Example

The calculation of rent under Crown Renewable lease tenure can be related to the previous discussion of economic rent. The only difference between the five properties described in Table 8 is the amount of capital employed with land or the stage of development. The changing producer's surplus which occurs from left to right indicates diminishing returns to increased applications of capital.

The producer's surplus produced by farm one is $1500. The price which a purchaser could afford to offer for the property if he expected to maintain it at its present level of productivity and be rewarded with his transfer earnings and normal profits on his capital would

1. This example is described by B.P. Philpott in a paper entitled 'Economic Efficiency in Agriculture' presented at a meeting of the New Zealand Institute of Agricultural Science, August 1961.

2. The producer's surplus is here defined as the total revenue produced by the farm less the total costs incurred in producing it, where these costs exclude any payment made for land, and include normal profits, in this instance assumed to be 5 per cent, on the capital employed with land. Payment for productive factors other than land is therefore made on the basis of their transfer earnings.
TABLE 8
Producer’s Surplus and Unimproved Value

<table>
<thead>
<tr>
<th>Farm No.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area (Acres)</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>Capital ($)</td>
<td>10,000</td>
<td>20,000</td>
<td>30,000</td>
<td>40,000</td>
<td>50,000</td>
</tr>
<tr>
<td>Surplus ($)</td>
<td>2000</td>
<td>2829</td>
<td>3467</td>
<td>4000</td>
<td>4473</td>
</tr>
<tr>
<td>Normal Profit on capital at 5% ($)</td>
<td>500</td>
<td>1000</td>
<td>1500</td>
<td>2000</td>
<td>2500</td>
</tr>
<tr>
<td>Producer’s surplus ($)</td>
<td>1500</td>
<td>1829</td>
<td>1967</td>
<td>2000</td>
<td>1973</td>
</tr>
<tr>
<td>Rent at 5% on UV$40,000</td>
<td>2000</td>
<td>2000</td>
<td>2000</td>
<td>2000</td>
<td>2000</td>
</tr>
</tbody>
</table>

be the capitalised producer's surplus plus $10,000 for the capital in place on the farm. Assuming that the future is known with certainty the prospective purchaser could offer $30,000 for the land at a discount rate of 5 per cent. However, if a prospective purchaser expected to develop the property by injecting a further $30,000, the producer's surplus would rise to $2,000. If development could be carried out instantaneously then the purchaser could offer the capitalised value of $2,000, namely $40,000 at a discount rate of 5 per cent, for the land, and $10,000 for the capital in existence on the property. Indeed, if a
competitive market for land is assumed, the purchaser will have to pay $40,000 plus the $10,000 capital for property one.\(^1\) Clearly, as $2000 is the highest producer's surplus which can be obtained from any of the five properties, market forces would ensure that, regardless of which property is sold, $40,000 will be paid for the land. The unimproved or rental value of each property is therefore $40,000.

From the above example it is possible to illustrate the method used in practice to estimate the unimproved value. If it is assumed that of the capital employed with the land on farm one $5000 represents plant, stock and working capital, then the remaining $5000 can be regarded as the capital invested in improvements on the farm. In this instance the capital value is given by the sale price of the land plus improvements.\(^2\) The unimproved value or rental value is then calculated for farm one in the following way using the previously established terminology:

---

\(^1\) Not only does this assume a competitive market for land, but as previously noted, it assumes that the other productive factors are in perfectly elastic supply.

\(^2\) The capital value is an estimate of the sale price of the land plus improvements at the date of valuation. In practice it need not exactly equal the sale price of a property, as sales are modified or excluded from analysis according to any special circumstances surrounding a sale.
\begin{align*}
R_0 &= UV = CV - VI \\
&= $45,000 - $5000 \\
&= $40,000
\end{align*}

As the rental value or unimproved value is the same for each of the five properties so will be the rent determined under Crown Renewable lease tenure. The rent is calculated as 5 per cent of the rental value, and in this instance is $2000.\footnote{If the rent is not paid by the due date \( \frac{1}{2} \) a per cent of the rental value is added to it.}

In the real world such assumptions as perfect knowledge, competitive market, and instantaneous development will, of course, no longer hold. Nevertheless, this example illustrates that Crown Renewable leases are cash leases, and that they purport to set economic rent as the payment for land at the date of lease renewal.

Economic Rent and Crown Renewable Lease Tenure

The implications of insisting that tenants pay economic rent for land have been reviewed in Chapter VII. Its major effect is to force tenants to attain an efficient allocation of resources or make losses. This can be illustrated within the framework of Crown Renewable lease
tenure by means of the example described in Table 8. Clearly, if the rent was set at the same date for each farm at $2000, as it would be under Crown Renewable lease tenure, all farms other than farm four would make losses. Farm four is the only one which would reward the tenant with his transfer earnings and normal profits on his capital. The tenants on the other farms would have to employ more or less capital to move towards this position or accept earnings less than their transfer earnings.

The hypothetical example described by Table 8 also emphasises the importance of the Crown Renewable lease system's accurately determining the rental value. Clearly, if this is overvalued then the rent set may be greater than the true economic rent. All five farms illustrated in Table 8 would make losses if the rent was set as 5 per cent of a rental value greater than $40,000. Although this may have little effect on resource allocation in the short run because the resource structure described by farm four would minimise losses, in the long run these five farms would cease to operate. If the rental value is undervalued lessees may be rewarded with their transfer earnings and normal profits on their capital without achieving the most efficient

\[ \text{From Equation (8.1) the rental value will be overvalued if improvements are undervalued.} \]
allocation of resources.

As the rental value is determined in the manner described by Equation (8.1), it is only as accurate as the valuation of improvements. If the value of improvements is under-estimated then clearly the rental value will be over-estimated, and vice versa. When economic rent is paid to the landlord each year the tenant will make normal profits only on his investment in improvements. However, as discussed in Chapter VI, the existence of these normal profits is essential for the maintenance of the productivity of these improvements. The expectation of future quasi-rents, although restricted to the normal profit level, is essential to motivate tenants to implement improvements even if economic rent is paid each year for land. An incoming tenant would be prepared to pay the discounted normal profits of the improvements for them. In the competitive equilibrium situation this would clearly equal the market price of the improvements.

The Crown Renewable lease system purports to set economic rent as the payment for land at the date of lease renewal. The effects of this on resource allocation have been considered previously within the framework of economic theory under certain restrictive assumptions. In order to consider the actual effect of Crown Renewable lease tenure on resource allocation it is pertinent to
review some factors which may influence this in the real world.¹

The Value of Improvements

Mention has been made that the calculated value of improvements is related to their transfer earnings. However, valuers may not credit improvements with their full cost if they do not consider that the improvements are being used to the best advantage. The marginal value product of a resource may be much greater than its price even if it is not fully utilised, and hence it will be earning quasi-rent. The marginal value product of any resource depends on its level of use and the level of employment of all the other productive factors. If economic rent is set each year then those farmers not at the maximum profit point, but proceeding towards it, will make losses during the development period. Incoming tenants would discount these losses when determining the price to pay for the incumbent tenants improvements. Hence the price paid for improvements in place on a farm not at the maximum profit position, may be less than the price paid for them in the market. However, as the Crown Renewable

¹. The relaxation of assumptions inherent in the perfectly competitive equilibrium situation has been considered in Chapter VII.
lease system bases rent on the estimated value of land, it attempts to take into account the lower producer's surpluses expected in the development years. Purchasers can afford to pay up to the present value of these surpluses, and this will be reflected in the market price of land and hence the rent set under renewable leases. The procedure of allocating only a proportion of cost to improvements, which valuers consider are not being used to the best advantage, is therefore an attempt to ensure that full economic rent is set as the payment for land.

The prices paid for land reflect future economic rents. To calculate the value of an improvement to be less than its cost, owing to its present usage, may be no estimate of its future productivity. The tenant may not make normal profits on his investment if it is included at less than cost and if the rent is not renewed for some period. If the rent is not renewed every year then the value of improvements must be based on their future as well as present productivity.

Guise (1966) has outlined a view commonly held by valuers that the value of an improvement is its real cost to the farmer and not its actual transfer earnings. As many expenses of farm development are tax-deductible the real cost to a farmer of adding improvements is less than the price he pays for them in the market. It is considered
that the value of improvements should be related to the after-tax cost to the farmer rather than their transfer earnings. All investment and consumption decisions are made by individuals in an after-tax framework.\(^1\) As present and future taxation payments are influenced by present and future net revenues, the price paid for farm land will reflect the influence of taxation. Hence, taking cognisance of this influence when valuing improvements is in accord with attempting to set economic rent.

Valuers have considerable practicable difficulty in assessing the cost of invisible improvements such as original development work. Yet, as this is attempted by the valuation procedure, it can lead to wide variations in the calculation of the value of improvements.\(^2\)

Patently it is impossible to determine precisely the value of improvements. To ascertain whether or not they are earning quasi-rent requires that the value productivity of the improvements be calculated, a notoriously difficult problem.\(^3\) As a proportion of the cost is often attributed

---
1. This has been further discussed in Chapter II.
2. This problem is discussed in detail in a research paper compiled by the Valuation Department and entitled 'A Critical Study of the Unimproved Value of Land!', 1968.
3. Estimation of the marginal value product of a resource within a firm by a positive method requires production function analysis. Lewis (1969) discusses the problems with this approach in 'Discussion Paper No. 9', a publication of the Lincoln College Agricultural Economics Research Unit.
to improvements, on the basis of some arbitrary judgement, and their present or future productivity not investigated, it seems likely that the value of improvements under the present lease system may be under-estimated and hence with its consequential effect on resource allocation, the rental value over-estimated.

The Renewal Period

The rent is renewed every 33 years under the present Crown Renewable lease system. This means that although the rent may be an approximation of economic rent at the commencement of the lease, it is unlikely to be so during it. Factors such as technical change and varying prices ensure that economic rent will fluctuate markedly over time.

In the past, the 33 year time span has enabled tenants to reap any quasi-rents their improvements have earned. It has also meant that those farms earning normal profits, or more, in the past were not forced to develop. They could maintain the status quo and enjoy any surplus profits, just as those who owned freehold properties. As was pointed out in the previous chapter, a lag effect occurring when economic rent is imposed may result in a reduction in the profitability of tenant investment rather than acting as a spur to increased output.
The 33 year renewal period has not encouraged lessees to think about the form of tenure under which they are farming. It often comes as a surprise when they are confronted with increased rents at the end of a lease period. Shorter periods between lease renewals would encourage an awareness by the tenants of the effects of Crown Renewable lease tenure on their investment plans.

**The Capital Market and Crown Renewable Lease Tenure**

Setting economic rent as the rent of land assumes that the other productive factors are in perfectly elastic supply. It implies that a perfect, or near-perfect capital market confronts each tenant.

The concept of forcing tenants to be rewarded only the normal profits on their investment, while acceptable in theory, poses difficulties in the real world. In an imperfect capital market, where borrowing ability is a function of assets owned rather than the profitability of investment opportunities, all lending agencies require some margin of security. Lessees can offer their own capital as security, and hence may borrow some proportion.

---

1. This is noted in the 'Report of the Committee of Investigation into Rentals and Freeholding Crown Leases', 1968.
2. Labour is also unlikely to be in perfectly elastic supply.
of it. Clearly the supply of tenant owned capital will differ between tenants and consequently so will the available supply of loan funds. Tenants who have a low equity may not be able to borrow to expand output even if the lease system insists that they do.

For those farmers whose equity is low, increased borrowing can often take place only by the payment of higher interest rates. This may obviously not be profitable for the tenant who cannot afford to pay some normal profit rate for the use of capital.

The first requirement of lending agencies is that the enterprise is not making a loss prior to the injection of loan capital. Charging tenants economic rent may force some to make losses. Such tenants are unlikely to be able to borrow funds in order to finance development and thus attain a profitable level of output.

In an environment where there is some hierarchy of investments, determined by the profitability of each, it is unrealistic to expect capital to flow into an industry or enterprise where it will make only its transfer earnings. This factor also may influence the amount of investment carried out on land owned by the Crown and let under renewable lease tenure.
The Market Price of Farms

The procedure by which rent is determined assumes that there is a competitive market for farm land in each district. This condition may not always be valid, especially in isolated areas.

The effects of different farm sizes on rent are incorporated in the rent calculation. The market price of land is influenced by its acreage which in turn affects the rental value and consequently the rent.

The prices paid for farms are influenced by any factor which affects the expected net income stream associated with these properties. The part played by taxation has already been discussed. The prices paid for productive factors by farmers will also influence the price paid for land. Farm prices may therefore reflect, to some extent, imperfections in the market for productive factors.

The Allocation of Resources

The Crown Renewable lease system attempts to set economic rent as the rent tenants pay for land. The effect on resource allocation of demanding economic rent from tenants has been reviewed within the
framework of economic theory under restrictive assumptions. Its prime effect is to force tenants to attain an efficient allocation of resources. If the rent actually set is greater than the economic rent, tenant firms will make losses. Although in the short run they may continue to operate, they will not in the long run. Tenants can be rewarded with their transfer earnings and make normal profits on their capital without achieving the maximum profit level of output if the rent is set lower than the true economic rent. Tenants leasing land under renewable lease tenure have the option of purchasing the land. The profitability of this course of action to the tenant and its comparison with farm development is also affected by the level of rent.

The rental value, and hence the rent, under the Crown Renewable lease system is based on the market price of farms, less some independent assessment of the value of improvements. Owing to the existing valuation procedure, it seems likely that the value of improvements may be under-estimated, with its attendant effects on resource allocation.

1. In this instance the market price of farms has been assumed to be paid for the land improvements only.
There is now a need to investigate the real world situation where the effects of current valuation philosophy are confounded by such real world factors as those listed previously. This can be done by means of an empirical investigation with the objective of producing further hypotheses about the effect of Crown Renewable lease tenure on resource allocation in the real world. Such an investigation was beyond the scope of this study.
The prices paid for improvements on leasehold properties have in the past often approximated the capital value of these properties. Those associated with administering leasehold land in New Zealand have developed the concept of goodwill to explain the difference between the calculated value of improvements and the price paid for them in the market. The amount which incoming tenants pay for the improvements, in excess of the value of improvements is held to be goodwill. If MVI is the price paid for the improvements of a leasehold property, then

\[
\text{Goodwill} = \text{MVI} - \text{VI} \quad (9.1)
\]

where the value of improvements VI is calculated at the sale date of the property. Goodwill is commonly divided into two components. The first is termed 'lessee's interest' by the Valuation of Land Act 1951, and 'goodwill' by the proposed amendment to the 1948 Land

1. Examples of this are provided by Eville (1967, p. 135).
Act. 1 The second form of goodwill is given by the total goodwill less the lessee's interest calculated at that date. These two components of goodwill can be defined as

\[ \text{Goodwill} = G + \overline{G} \]

where \( G \) represents lessee's interest and \( \overline{G} \) the residual.

Lessee's Interest

Lessee's interest under Crown Renewable lease tenure is defined as the present value of rent payments, to the end of the lease, which would occur if the lease was renewed at this date, and at the same rental rate, less the present value of the actual rent payments to the end of the lease.\(^2\) If the rental value \( R_o \) at the beginning of the lease increases at the rate \( \rho \) each year, then at time \( t \),

\[ \text{Lessee's interest} = \sum_{j=1}^{33-t} (R_o (1+\rho)^t - R_o) d^j \]

1. The essential points contained in this amendment are summarised in Appendix VI.
2. The discussion assumes that the rental value increases over time. The concepts developed are readily modified to consider the instance where the rental value falls over time.
using the terminology established previously.\(^1\) The source of lessee's interest is illustrated in Figure 19.

Rent payments in each year, described in Figure 19, assume that the rental value, and hence the rent, increases at a constant annual rate. At time zero the lessee farming under Crown Renewable lease tenure has the rent renewed every 33 years, and faces future rent payments described by the stepped line A,B,C,D,E,F. However, if the rent was renewed every year at the same rental rate, he would have to pay rent according to the line AC'CE. It is advocated, that because the lease is not renewed every year, the lessee enjoys some goodwill which is expressed by the areas ABC and CDE in Figure 19.\(^2\) Lessee's Interest is the present value of a particular component of this goodwill. In Figure 19 lessee's interest, if calculated at time \(t\), is given by the value of the area A'C'B'B at \(t\).

Lessees interest oversimplifies this form of goodwill. In Figure 19 the incoming or incumbent tenant at time \(t\) will regard the discounted value of the areas

\(^{1}\) Lessee's Interest is discussed in detail by M.B.Cooke (1967). He has pointed out that there may be components other than the present value of a difference in rent payments included in the Lessee's Interest, depending on the terms of the lease. However, it is this aspect of Lessee's Interest which is included in the proposed 1970 amendment to the 1948 Land Act.

\(^{2}\) This aspect is reviewed in the 'Report of the Committee of Investigation into Rentals and Freeholding of Crown Leases' (1968, p.13).
Rent Payments over Time.

Figure 19
A'C'CB, CDE, and so on to his planning horizon as the asset he is purchasing or owns. As defined above, lessee's interest does not consider any goodwill beyond the current lease period. It also assumes that if the rent was renewed every year it would not increase between time $t$ and the end of the lease period.

Lessee's interest is held by many to be an asset peculiar to the tenant because he is paying a lower rent than that which he would have to pay if the rent was renewed during the lease period. Incoming tenants will be prepared to buy this asset from the outgoing tenants as they too would derive benefit from it. Hence, lessee's interest is regarded as part of the goodwill which is paid for improvements.

If this form of goodwill does exist it should belong to the Crown at the time the property is freeholded.¹ The presence of lessee's interest is based on the premise that the rent the lessee is actually paying is too low. Hence, it belongs to the Crown and not to the tenant at the time of freeholding. It is inconsistent to claim that the rent is too high and that goodwill should be paid to the lessee, as, if the rent is too high, this form of goodwill will not exist.

¹. Contrary to a clause contained in the proposed 1970 amendment to the 1948 Land Act.
The existence of lessee's interest rests on the proposition that, if the rent was renewed every year, the same rental rate associated with the Crown Renewable lease system would be used. Lease systems which are the same in all respects other than their time of renewal and rental rate are not distinct phenomena, but are inter-related.¹ This is demonstrated by Equation (4.4) which expresses the rental rate of a system involving yearly rent revisions as a function of a system with a different renewal period and rental rate. These systems are equivalent, as neither the lessee nor the landlord will prefer one to the other. The rent payments of a one year lease system, determined as a function of the Crown Renewable lease system, are shown as GE' in Figure 19. The present value of this latter rental stream is equal to the present value of the rent payments shown by the stepped line A, B, C, D, E. The 33 year renewal period can therefore be regarded as an approximation to a one year system, equivalent in every way except for the renewal period and rental rate. Hence the component of goodwill called lessee's interest does not exist.

Nevertheless, there is a valid form of goodwill created by the Crown Renewable lease system. The present value of rent payments over the 33 year lease period has

¹ This has been discussed in detail in Chapter IV.
to be the same for both one year and 33 year renewal systems if the lessee is to be indifferent between them.\footnote{1} If the lessee terminates rent payments during a lease period by freeholding, the two lease systems may not provide him with the same present value of rent payments, where the relationship between the two systems is derived from Equation (4.4). Goodwill at any time should maintain this equality of the present value of rent payments for both systems. Figure 20, which is drawn from a hypothetical example, illustrates the goodwill created by the Crown Renewable lease system. If the lessee's discount rate is assumed to be 7 per cent and the annual growth in rental value 5 per cent, then the rental rate which will give the same present value of rent payments as the Crown Renewable lease system and a yearly renewed system, is 2.56 per cent.\footnote{2} The initial rental value is assumed to be $100 and the rent payable each year under Crown Renewable lease tenure for the first lease period is

$$R_0 \times r_{33} = .05 \times 100 = 5$$

\footnote{1. It has been assumed that the relationship between the one year and 33 year systems has been established so that the landlord is also indifferent between these systems.
2. Calculated from Equation (4.4) with $r_{33} = .05$.}
Goodwill.

Figure 20
and for the second period

\[ R_0 \, (1.05)^{33} \times 33 \times 0.05 \times (500) = \$25 \]

The rent paid in the first year under the one year renewal system is

\[ R_0 \, r_1 \times 0.0256 \times (100) = \$2.56 \]

and this rent payment increases at the rate of 5 per cent per annum. The rent payments of these two lease systems are graphed in Figure 20.

The lessee who pays rent according to the 33 year Crown lease system will pay more each year than he would under the one year system, until \( C \) is reached in Figure 20. After year \( C \) the rent payments will be less than those that would be made under the annually-reviewed system. If the lessee freeholds the property at any time, say \( t \), during the lease period, the present value of rent payments actually made by him up to year \( t \) may be greater than the present value of rent payments he would have made under the annually-reviewed system. The present value of rent payments made under the Crown Renewable lease system up to year \( t \) is given by: ¹

¹ Using the terminology established previously.
The present value of rent instalments which would have been paid under the one year renewal system up to time $t$ is given by:

$$PV_{33} = R_0r_{33} \sum_{j=1}^{t} d^j$$  \hspace{1cm} (9.2)

Goodwill payable to the lessee at time $t$ will equate the present values expressed in Equation (9.2) and Equation (9.3), and therefore at year $t$ goodwill is given by:

$$PV_1 = R_0r_1 \sum_{j=1}^{t} A^j$$  \hspace{1cm} (9.3)

Goodwill payable to the lessee at time $t$ will ensure that he remains indifferent between the two lease systems.

The goodwill defined by Equation (9.4) is that amount of money which, if paid to the lessee at time $t$, will ensure that he remains indifferent between the two lease systems. If the lessee freeholds at time $t$ the landlord will have to pay the goodwill calculated by Equation (9.4) in order not to penalise the lessee for paying rent under the 33 year renewal system rather than the one year renewal system.

\[\text{Goodwill} = \left[ R_0r_{33} \sum_{j=1}^{t} d^j - R_0r_1 \sum_{j=1}^{t} A^j \right] (1+i)^t \hspace{1cm} (9.4)\]

The discount rate is again that rate which is acceptable to both the landlord and the lessee.
than the one year system. Clearly, if the improvements on the property are sold, the incoming tenant will be prepared to pay, and indeed in a competitive market, will have to pay, for the goodwill existing at the time of purchase.

Goodwill payable at $t$ can also be determined by subtracting the value at $t$ of rent payments to be made between year $t$ and the end of the lease under the 33 year renewal system, from the value at $t$ of payments to be made for the same period under the one year system. This is described in Equation (9.5).

$$\text{Goodwill} = R_0 r_1 \sum_{j=1}^{33-t} A^j (1+\rho)^t - R_0 r_{33} \sum_{j=1}^{33-t} d^j \quad (9.5)$$

Goodwill calculated by Equation (9.5) will be the same as that determined by Equation (9.4).¹

Goodwill and lessee's interest are compared in Figure 20. At year $t$ lessee's interest is given by the value at $t$ of the area $\text{CFED}$. The real goodwill created by the Crown Renewable lease system at $t$, is given by the value at $t$ of the area $\text{AA'C}$ or the area $\text{CJD}$.

¹. This conclusion is justified in Appendix V.
Goodwill and Compensation

The question of compensation arises whenever a lease is transferred, freeholded or renewed. At these times the value of the lessee's capital employed with the land has to be determined.

At the date of freeholding or lease renewal, the lessee is rewarded with the value of improvements set by the Land Settlement Board under the terms of Crown Renewable lease tenure. It has already been established that the value of improvements is closely related to their cost, or a proportion of their cost, to the lessee. Hence the Crown Renewable lease system does not compensate the tenant on the basis of the value productivity of his improvements, but attempts to reward him on the basis of their cost or transfer earnings. Compensating the lessee in this way is clearly consonant with the concept of economic rent. The effects of this form of compensation on resource allocation has been examined in Chapter VIII.

The incoming tenant has to enter a market and bid for the incumbent lessee's improvements. Mention has been made of the fact that in the past the prices paid for improvements have often been in the region of the capital values of the respective properties at the date
of sale. Goodwill is the concept used to explain the difference between this market price and the value of improvements at that date. If \( G_1 \) is the goodwill required to equate the present value of rent payments from the 33 year and one year lease systems, then the residual goodwill is given by

\[
\bar{G} = \text{MVI} - \text{VI} - G_1
\]

using the terminology previously established. If the tenants were charged economic rent each year, incoming tenants could afford to offer only up to the present value of the normal profits earned by the existing tenant capital. This would approximate the calculated value of improvements and \( G_1 \) would be the only form of goodwill purchased, or:

\[
\text{MVI} = \text{VI} + G_1
\]

In practice there is usually some residual goodwill paid by the incoming tenant. There are two main reasons for this.

Firstly, owing to the long renewal period, many tenants have not been aware that rent set under Crown Renewable lease tenure purports to approximate economic
They have realised that it is a cash lease, but not that it may draw off some of the value productivity of improvements. In this situation incoming tenants would offer up to the present value of the quasi-rent earned by existing improvements, plus expected quasi-rent earned by future development. The residual goodwill exists because the value of the improvements is restricted to an estimate of their transfer earnings by the method of valuation, yet purchasers pay the outgoing tenant on the basis of the value productivity of improvements.

Secondly, prospective lessees, early in a lease period may pay for improvements on the basis of their productivity even if they understand the implications of the lease system. When 20 or 30 years of a lease period remain, the incoming tenant may expect to reap most of the quasi-rents generated by his improvements.

An incoming tenant who pays the outgoing tenant some residual goodwill is, owing to the method used to calculate the rental value, is likely to have all, or a portion, of this goodwill incorporated in the rental value in subsequent rent revisions. Although this is consonant with drawing off economic rent, this reduction in tenant equity may have a marked influence on his ability to carry out on-farm investment plans.

1. The method by which the rental value is determined is outlined in Chapter VIII.
SUMMARY AND CONCLUSIONS

This study was implemented in three parts. Firstly, the history of Crown ownership of land in New Zealand was reviewed and the terms of Crown Renewable lease tenure outlined. Secondly, some on-farm investment alternatives were evaluated within the frame-work of the Crown Renewable lease system. The last section examined the method used by the Crown to set rent under the conditions pertaining to renewable leases, and its effect on tenant investment plans.

The terms of Crown Renewable lease tenure have evolved over the past hundred years, culminating in the 1948 Land Act and its subsequent amendments. The right of lessees to purchase the land was established at the beginning of this century and has remained of paramount importance. At present a further amendment to the 1948 Land Act is being considered.

Models were developed in order to facilitate an examination of investment alternatives within the frame work of the Crown Renewable lease system. These can be used in an analysis of investment options on any Crown Renewable lease property. Two of these models in particular may have more general applicability. The first describes the internal rate of return to the landlord...
from owning and letting land. The second enables two lease systems which are the same in every respect other than their rental rates and renewal periods to be related in a manner which ensures that both lessee and landlord are indifferent between them.

Some on-farm investment alternatives open to a tenant of a Crown Renewable lease property were investigated by means of a case study. The development programme carried out by the lessee between 1963 and 1969 was almost certainly more profitable than free-holding in 1963. This was influenced by the fact that the development programme was extremely profitable. However, it appeared that the lessee should have freeholded the property in 1969 on the completion of the development programme, if the expected increase in rental value had been greater than 5 per cent per annum and if the property was not to be sold in the near future. The ownership of the land by the Crown since 1937 has been profitable from its point of view. These results pertain only to the farm from which they were derived.

The Crown Renewable lease system bases rent on the price paid for land plus improvements, less some independent estimate of the value of these improvements. The Crown therefore sets rent according to the principles
of economic rent. The main effect of this on tenant plans has been reviewed within the framework of economic theory, and is to insist that tenants achieve an efficient allocation of resources. It seems likely that the rental value may be over-estimated owing to the current method of valuing improvements. The consequential effect of setting an excessive rent may have little influence in the short run, but is likely to force a misallocation of resources in the long run.

The form of goodwill, termed lessee’s interest in this study, was demonstrated not to exist. However, there does remain a form of goodwill created by the Crown Renewable lease system. This goodwill exists in order to maintain the equitability, to both landlord and tenant, of the present Crown Renewable lease tenure and a system in which the rent is renewed every year. This goodwill is an asset which belongs to the lessee at the time of freeholding.

The level of rent set by the Crown under renewable lease tenure, and the frequency with which it is reviewed affects both the efficiency of resource allocation, and the tenant decision of whether or not to freehold. Factors which may influence this in the real world were reviewed. There remains however, a necessity for an empirical study, designed to explore the actual effect of Crown Renewable lease tenure on resource allocation.
ACKNOWLEDGMENTS

I wish to express my sincere appreciation of the counsel, guidance and encouragement freely given to me during this study by Professor R.J. Townsley of the Farm Management and Agricultural Economics Department of Massey University, formerly Senior Lecturer in Farm Management at Lincoln College.

I am grateful for the helpful comments and suggestions contributed by Professor J.D. Stewart, particularly with regard to the case study.

Mr. R. Frizzell's assistance with the interpretation of the relevant Acts of Parliament was invaluable.

I am particularly indebted to the owner of the farm used in the case study. The ready access to financial and physical data connected with the farm greatly facilitated the analysis.

The field officers of the Christchurch office of the New Zealand Valuation Department were most co-operative. Discussions with them materially assisted my understanding of the valuation procedure, and they also provided some data necessary to the study.

Fruitful discussions were also held with officers of the New Zealand Lands and Survey Department.
Finally I wish to thank the New Zealand Department of Agriculture who granted me leave of absence, and financial assistance in order that this study could be carried out.

L.T. Evans
REFERENCES


APPENDIX I

THE NET PRESENT VALUE OF OWNING AND LETTING LAND

The landlord purchases the resource and lets it to obtain an income stream over time. The profitability of this course of action is given by the net present value of the annual net revenues generated by purchasing and letting the resource.

The landlord invests the rental value $R_0$ at the beginning of the first year to gain the rent for that year plus the asset value at the end of that year, or, using the terminology previously established

$$- R_0 + r_1 R_0 + R_0 (1 + \phi)$$

where the rent is paid at the end of the year and is renewed every year. The net present value of this cash flow is given by:

$$NPV = -R_0 + \frac{r_1 R_0}{(1 + 1)} + R_0 \left( \frac{1 + \phi}{1 + 1} \right)$$

The following year, $R_0 (1 + \phi)$ is invested to obtain a further rent payment and the asset value at the end of that year. The net present value over two years can be
If the resource is sold in year $n$ this can be extended to:

$$\text{NPV} = -R_0 + r_1 R_0 \frac{1}{(1+i)} + R_0 \frac{(1+i)}{(1+i)^2} - R_0 \frac{(1+i)}{(1+i)} + r_1 R_0 \frac{(1+i)^2}{(1+i)^2} + R_0 \frac{(1+i)^2}{(1+i)^2}$$

$$+ \ldots + R_0 r_1 \frac{(1+i)^{n-1}}{(1+i)^n} + R_0 \frac{(1+i)^n}{(1+i)^n}$$

Then $\text{NPV} = -R_0 + R_0 \frac{(1+i)^n}{(1+i)^n} + r_1 R_0 \frac{1}{(1+i)} \left[ 1 + \frac{(1+i)}{(1+i)} + \ldots + \frac{(1+i)^{n-1}}{(1+i)^{n-1}} \right]$)

This describes the net present value to a landlord of owning and letting a resource, from the present to the year $n$, where the rent is renewed annually at a constant rental rate.
APPENDIX II

THE INTERNAL RATE OF RETURN TO THE LANDLORD

The following expression explains the net present value from the landlord's point of view.¹

\[
\text{NPV} = -R_0 + \frac{r_1 R_0}{(1+r)} \left[ \frac{1+(1+\rho)}{(1+r)} + \frac{(1+\rho)^2}{(1+r)^2} + \cdots + \frac{(1+\rho)^{n-1}}{(1+r)^{n-1}} \right] + \frac{R_0 (1+\rho)^n}{(1+r)^n}
\]

The internal rate of return is obtained by equating this to zero and solving for \( r \) the discount rate. The following expression is therefore obtained:

\[
1 = \frac{(1+\rho)^n}{(1+r)^n} + \frac{r_1}{(1+r)} \left[ 1 + \frac{(1+\rho)}{(1+r)} + \cdots + \frac{(1+\rho)^n}{(1+r)^n} \right]
\]

If \( r = r_1 + \rho \) for all \( n \), then \( r + 1 = r_1 + \rho + 1 \) is a root of the above equation.

Substitute for \( r + 1 \)

\[
1 = \frac{r_1}{(r_1+\rho+1)} \left[ 1 + \frac{(1+\rho)}{(r_1+\rho+1)} + \frac{(1+\rho)^2}{(r_1+\rho+1)^2} + \cdots + \frac{(1+\rho)^n}{(r_1+\rho+1)^n} \right] + \frac{(1+\rho)^n}{(r_1+\rho+1)^n}
\]

¹ From Appendix I.
Let \( a = \frac{(1+\rho)}{(r_1+\rho+1)} \)

\[
1 = \frac{r_1}{(r_1+\rho+1)} \cdot (1+a+a^2 + \ldots + a^{n-1}) + a^n
\]

As \((1+a+a^2 + \ldots + a^{n-1})\) is a geometric series

\[
1 = \frac{r_1}{(r_1+\rho+1)} \cdot \left( \frac{1-a^n}{1-a} \right) + a^n
\]

but \((1-a) = \frac{r_1+\rho+1-1-\rho}{r_1+\rho+1} = \frac{r_1}{r_1+\rho+1}\)

then \[
1 = \left[ \frac{r_1}{r_1+\rho+1} \right] \cdot \left[ \frac{r_1+\rho+1}{r_1} \right] \cdot (1-a^n) + a^n
\]

\[
1 = 1-a^n + a^n
\]

Hence \((1+r) = r_1+\rho+1\) is a root of the equation describing the net present value and

\[
r = r_1 + \rho
\]

is the internal rate of return to the landlord irrespective of the year the resource is sold.
APPENDIX III

RELATIONSHIP BETWEEN DIFFERENT LEASE SYSTEMS

A form of lease system is assumed in which the rent is determined by the product of the rental value and the rental rate. It has been shown in Chapter III that the present value of payments of a system in which the rent is renewed every \( t \) years is given by:

\[
P_{\text{V}} = r_t R_0 \sum_{k=1}^{t} \frac{1}{(1+i)^k} + r_t R_0 \left( \frac{1+i}{1+i} \right)^t \sum_{k=1}^{t} \frac{1}{(1+i)^k} + \ldots.
\]

Let \( A = \frac{(1+i)}{(1+i)} \)

\[
d = \frac{1}{(1+i)}
\]

\[
D_t = \sum_{k=1}^{t} d^k
\]

Then \( P_{\text{V}} = r_t R_0 D_t \left( 1 + A^t + A^{2t} + \ldots \ldots \ldots \right) \)

This lease system can be related to any other where the rent is determined in the same way. A lease system with a renewal period of \( t \) years can be reduced to \( t \) periods of a lease system in which the rent is renewed every year.
Let the rent be renewed every year and PV\(_1\) be the present value of payments of this system, \(t\) being some year in the future. If rent is paid at the end of each year, then:

\[
PV_1 = r_1 R_0 d + r_1 R_0 (1+\rho) d^2 + \ldots + r_1 R_0 (1+\rho)^{t-1} d^t + r_1 R_0 \frac{(1+\rho)^t d^t}{(1+\rho)^t} + \ldots
\]

\[
= r_1 R_0 \sum_{k=1}^{t} d^k (1+\rho)^{k-1} (1+A^t+A^2 t^t + \ldots)
\]

If it is assumed that the only difference between two lease systems is their renewal period and rental rate, then if the present value of the payments associated with these systems is the same, the lessee and landlord will be indifferent between them.\(^1\) Equate \(PV_1\) and \(PV_t\) to obtain:

\[
r_t R_0 D_t (1+A^t + A^2 t^t + \ldots) = r_1 R_0 \sum_{k=1}^{t} d^k (1+\rho)^{k-1} (1+A^t+A^2 t^t + \ldots)
\]

or

\[
r_t D_t = r_1 \sum_{k=1}^{t} d^k (1+\rho)^{k-1}
\]

\[
r_1 = \frac{r_t D_t}{\sum_{k=1}^{t} d^k (1+\rho)^{k-1}}
\]

\(^1\) Assuming the landlord's and tenant's discount rates are equal.
r\textsubscript{1} as expressed by this equation is defined as the rental rate of an annually-reviewed system which will equate the present value of payments of that system with one which is renewed every t years.

This analysis can be extended to relate systems renewed every t years with those whose renewal period is T years. From the forgoing:

\[ PV\textsubscript{T} = r\textsubscript{T}R\textsubscript{0}D\textsubscript{T}(1+A\textsuperscript{T}+A\textsuperscript{2T}+\ldots) \]

\[ PV\textsubscript{1} = r\textsubscript{1}R\textsubscript{0} \sum_{k=1}^{T} d\textsuperscript{k}(1+\rho\textsuperscript{k-1}(1+A\textsuperscript{T}+A\textsuperscript{2T}+\ldots) \]

Equate present values and rearrange to obtain:

\[ r\textsubscript{T} = \frac{r\textsubscript{1}}{D\textsubscript{T}} \sum_{k=1}^{T} d\textsuperscript{k}(1+\rho\textsuperscript{k-1} \]

If r\textsubscript{1} is determined as a function of a system in which the rent is renewed every t years, then it can be substituted in the above equation and a rental rate r\textsubscript{T} solved for, which will give the same present value of payments for systems renewed every T and t years. In this way lease systems in which the only differences are the renewal periods and rental rates can be related.

Table 9 provides examples of rental rates which will
TABLE 9

Rental Rates Providing the Same Present Value of Payments as the Crown Renewable Lease System

<table>
<thead>
<tr>
<th>years between rent renewals</th>
<th>per cent rate of increase in rental value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>.0395</td>
</tr>
<tr>
<td>11</td>
<td>.0432</td>
</tr>
<tr>
<td>22</td>
<td>.0469</td>
</tr>
</tbody>
</table>

give a stream of rent payments with the same present values as that of the Crown Renewable lease system for leases with different renewal periods, and for a given rate of increase in rental value. The discount rate has been assumed to be 6 per cent.
APPENDIX IV

THE DISCOUNT RATE FOR AFTER-TAX INVESTMENT EVALUATION

Individuals make their consumption and investment decisions within an after-tax framework. The New Zealand taxation system to which individuals' incomes are subjected is a progressive one. This means that as an individual's income increases, the tax rate on the extra income earned increases. It is subject to an income level below which no tax is paid and a limit above which any further income is taxed at a constant rate. The evaluation of investment options from an individual farmer's viewpoint is complicated by the fact that interest paid in any year is a tax-deductible expense whereas interest received is a taxable revenue.  

Borrowing

The interest payments made by farmers who have borrowed for consumption or productive investment are tax-deductible. As the present tax structure is a progressive one, the cost of borrowing is a curvilinear function of

1. When borrowing or lending, tax payments are not affected by the principal.
the amount borrowed. Figure 21 describes the after-tax cash surplus as a function of the level of borrowing carried out in the previous year.\(^1\) As no principal is repaid out of the cash surplus it reflects only the interest payments made on previously borrowed money.\(^2\) AB is linear because it incorporates the assumption that interest payments are not tax-deductible. The line CB describes the reduction in the after-tax cash surplus which occurs under a progressive taxation system when money is borrowed and interest payments are tax-deductible. The curve CB approximates the stepped line which would result under a progressive taxation system.\(^3\) Above F interest is paid out of the after-tax cash surplus at the highest marginal tax rate. As the after-tax cash surplus is reduced, the taxation rate decreases and hence the effect of the borrowing rate on the cash surplus increases. At E the tax exemption is reached, and therefore below E the taxation system has no further influence on the effective borrowing rate. The slope of AB is given by the negative borrowing rate paid to the moneylender. The slope of CB

\(^1\) In Figure 21 tax is assumed to be paid in the year in which the income, on which the tax is based, occurs.
\(^2\) Figure 21 incorporates the assumption that the marginal cost of borrowing remains constant over the amount borrowed.
\(^3\) The marginal tax rate remains constant within certain ranges of income.
After Tax Cash Surplus

Borrowing and Taxation

Money Borrowed (in Previous Year)

After Tax Cash Surplus

Lending and Taxation

Money Lent (in Previous Year)

Figure 21

Figure 22
at each point is given by the reduction in cash surplus which occurs when one unit of money is borrowed at that cash surplus. Of the interest rate \( i \) paid to the moneylender a proportion is met from taxation. If \( r \) is the marginal tax rate at a particular cash surplus and \( i \) is paid to the moneylender when \$1 is borrowed, then the reduction in taxation (\( \triangle T \)) is given by:

\[
\triangle T = ir
\]

The reduction in the after-tax cash surplus (\( \triangle CS \)) resulting from borrowing \$1 is then:

\[
\triangle CS = -i + \triangle T = -i + ir = -i(1-r)
\]

The marginal tax rate is different for each level of cash surplus between E and F in Figure 21 and hence the slope of this line changes between these two limits.

Owing to the influence of taxation, the real cost to a farmer of paying interest on \$1 for a year at a particular cash surplus is not given by \( i \) but by \( i(1-r) \) where \( r \) is appropriate to the particular cash surplus.

\[1. \text{i and r in this discussion are expressed as decimals.}\]
As the marginal tax rate under the progressive taxation system is constant over income ranges, the real cost of borrowing will also be constant over these ranges.

**Lending**

The interest received by farmers in a particular year is taxable in that year. This has the effect of lowering the real interest rate earned by funds which farmers lend. This is demonstrated in Figure 22 where the after-tax cash surplus in a particular year is assumed to be composed entirely of interest received from money lent the previous year. It therefore includes no loan repayments. The line OE'G assumes that interest received is not tax-deductible, and hence the slope is given by the interest rate $i$. The line OE'F' represents the situation where interest received is subject to a progressive taxation system. Again E denotes the level of tax exemption and F the point at which the highest marginal tax rate is reached.

The slope of OE'F' at any point is given by extra interest received when $\$1$ is lent the previous year, less the extra taxation paid or,
\[
\text{Slope} = i - ir \\
= i(1-r)
\]

where \( r \) is the marginal tax rate at that particular level of cash surplus.

The effective interest rate which a farmer receives on money he has lent, is therefore less than the actual rate paid by the institution or person who borrows the money.

The Implications for Investment Analysis

Mention has been made that investment analysis from the individual farmer's viewpoint is based on the market rate of interest.\(^1\) The influence of taxation can be examined by reference to the two period case as described in Figure 23.\(^2\) The individual's consumable or after-tax income distribution is denoted by \( A \). He can borrow or lend from this position in order to alter the distribution of his income between the two years. The line \( XY \) describes the opportunities for borrowing or lending assuming that

---

1. To facilitate exposition it has been assumed that there is one rate of interest at which individuals can lend or borrow money.
2. The two period case has been discussed in detail by Hirshleifer (1958).
taxation is unaffected by interest. Money borrowed in year 1 must be repaid with interest in year 2. Hence, the slope of XY is given by \(-(1+i)\). By moving to the left of A along XY, the individual can redistribute his consumption by lending, to the right by borrowing. Investment decision theory normally assumes that the individual can move along XY in order to obtain his optimum intertemporal consumption pattern.

However, interest in fact affects taxation and hence the individual's consumable income. If he borrows in year 1 then he will have to repay principal, plus interest less the reduction in taxation caused by the interest payment, in year 2. If he lends in year 1 he will receive his interest and principal less any extra tax caused by the interest received, in year 2. The borrowing and lending opportunities which actually confront the individual at A in Figure 23, are described by the line CD. The slope of this line at any point will be given by:

\[
\text{Slope} = -(1+i(1-r))
\]

where \(r\) is the marginal tax rate appropriate to the second year cash surplus at that point. Clearly, CD will be parallel with XY only if sufficient money is borrowed in year 1 to lower the year 2 cash surplus, by the interest
Taxation and the Theory of Investment Evaluation.

The Choice Between Post-Tax Income Streams.

Figure 23

Figure 24
payments, to the level of the individual's exemptions.

The implications which can be drawn from this are important from the standpoint of investment evaluation. Previous theory held that the individual could move along XY in Figure 23, but the effect of taxation is to ensure that where the individual is on XY determines the initial tax structure, and hence the borrowing or lending opportunity curve he can move along. There will therefore be a different opportunity curve for each point on XY. This is exemplified by the curve FG at point B. There is also the possibility that some point inside XY gives a higher actual lending and borrowing opportunity curve over some region, than some points on XY. This is illustrated in Figure 24. The net present value rule or internal rate of return rule incorporating the market interest rate i would choose investments which place XY further from the origin. Clearly in this instance these rules would not choose income stream L in preference to A in Figure 24. Yet, the income stream denoted by L is obviously preferable to that of A, for it places the actual borrowing and lending opportunity curve further from the origin. To compare alternative income streams in an after-tax framework on the basis of the market rate of interest may precipitate an incorrect choice.

A method by which this problem may be overcome, is
to trace out the opportunity curves and define regions where one point is preferable to another. This would pose real difficulties if more than two time periods were considered.

This study has approached the problem by modifying the market interest rate and using this as the discount rate in the net present value formula. In Figure 24, A is assumed to be the base net cash flow. The appropriate discount rate for the comparison of alternatives with A is given by the cost of borrowing $1 at A. This discount rate is given by,

\[ \text{Discount Rate} = i(1-r) \]  \hspace{1cm} (A.4.1.)

using the terminology described previously and where \( r \) is the marginal tax rate appropriate to the after-tax cash surplus \( \text{OE}' \) in Figure 24. It is hypothesised that this rate approximates as closely as possible the individual's relevant decision-making discount rate. Where an alternative income stream has a higher marginal tax rate in year 2, than that appropriate to \( \text{OE}' \), the discount rate derived above will over-estimate the real interest rate. However, a discount rate lower than that determined by Equation (A.4.1) cannot be used where A is compared with another income stream as this may lead to an erroneous
1. The larger the net cash surplus the higher will be the marginal tax rate and lower the effective borrowing rate.  
2. This method can only approximate a unique discount rate as the base net income stream in this study persists for more than two years, fluctuating between years, and hence changing the tax rates accordingly.
GOODWILL CREATED BY THE CROWN RENEWABLE LEASE SYSTEM

Goodwill created by the Crown Renewable lease system exists in order to maintain the equality of present values of rent payments made under the 33 year renewable system and the annually-reviewed system.

The present value of rent payments to be made under the 33 year Crown Renewable lease system for one 33 year period is given by

\[ PV_{33} = R_0 r_{33} \sum_{j=1}^{33} d^j \]

using the established terminology. If \( 0 \leq t \leq 33 \) then the above equation can be rewritten:

\[ PV_{33} = R_0 r_{33} \left[ \sum_{j=1}^{t} d^j + \sum_{j=1}^{33-t} d^j d^t \right] \quad (A.5.1) \]

The present value of rent payments to be made under the annually-reviewed system, for a period of 33 years is described by
\[ PV_1 = R_0 r_1 \sum_{j=1}^{33} A^j \]

which can be rewritten:

\[ PV_1 = R_0 r_1 \left[ \sum_{j=1}^{t} A^j + \sum_{j=1}^{33-t} A^j A^t \right] \quad (A.5.2) \]

For the lessee and landlord to be indifferent between the two lease systems then \( PV_1 \) must equal \( PV_{33} \) or:

\[ PV_1 = PV_{33} \]

Incorporating Equation (A.5.1) and Equation (A.5.2)

\[ R_0 r_1 \left[ \sum_{j=1}^{t} A^j + \sum_{j=1}^{33-t} A^j A^t \right] = R_0 r_{33} \left[ \sum_{j=1}^{t} d^j + \sum_{j=1}^{33-t} d^j d^t \right] \]

By rearranging:

\[ R_0 r_{33} \sum_{j=1}^{t} d^j - R_0 r_1 \sum_{j=1}^{t} A^j = R_0 r_1 \sum_{j=1}^{33-t} A^j A^t - R_0 r_{33} \sum_{j=1}^{33-t} d^j d^t \]

Multiply through by \((1+i)^t\)

---

1. The annual rate of change in rental value over the 33 year period is assumed to be 0 for both tenant and landlord.
2. The lessee and the landlord are assumed to have the same decision-making interest rate.
Equation (A.5.3) demonstrates that the goodwill payable to the lessee at time $t$ is the same whether calculated as the value at $t$ of the expected difference in rent payments between the two systems to the end of the lease; or the value at $t$ of the difference in rent payments which had occurred between the beginning of the lease and $t$. 

\[
\left[ R_0 r_{33} \sum_{j=1}^{t} d^j - R_0 r_1 \sum_{j=1}^{t} A^j \right] (1+i)^t = \\
R_0 r_1 \sum_{j=1}^{33-t} A^j (1+i)^t - R_0 r_{33} \sum_{j=1}^{33-t} d^j 
\] (A.5.3)
APPENDIX VI

PROPOSED LAND AMENDMENT 1970

The following are the proposed amendments to the 1948 Land Act.

(a) The rental rate is altered to 4\(\frac{1}{2}\) per cent.

(b) The rent is to be renewed at eleven-year intervals.

(c) At the time of freeholding the Crown's improvements are restricted to what they were at the beginning of the lease. Lessee's Interest or Goodwill is to be deducted from the rental value to give the freeholding price. The discount rate used to calculated goodwill is to be the rental rate.

(d) For rent renewal purposes the value of improvements and the value of land exclusive of improvements shall be ascertained on an equitable basis between lessee and lessor. The value of Crown improvements is limited to the value at the commencement of the lease.