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Off-Farm Investment and Employment in the Australian Grazing Industry: A Preliminary Analysis

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The deployment of resources off the farm constitutes an important aspect of resource use in Australian agriculture. The aims in this paper are to document the nature and extent of off-farm employment and investment in the Australian grazing industry, to undertake an analysis to identify the factors important in determining both the type of off-farm employment undertaken by operators and the off-farm employment-investment strategy chosen by the farm family, and to present farmers' reasons given for undertaking off-farm employment and investment. Off-farm employment and off-farm investment were found to be widespread in the Australian grazing industry, with the majority of farm families receiving some income from off-farm sources. In addition to the relative incomes earned from farm and off-farm sources, human capital, family structure and the life cycle stage and some non-pecuniary influences were found to be important in determining the type of off-farm resources deployment undertaken, particularly with respect to off-farm employment. Many farmers were found to view off-farm employment and off-farm investment as efficient and profitable alternatives to the allocation of all resources to farm activities.

1. Introduction

The operators of family farms face the problem of allocating farm resources, which include land, non-land physical capital, liquid assets and labour, between farm activities and non-farm activities, subject to constraints on time and the budget of farm families. However, only the off-farm deployment of labour and liquid assets are examined here since very little scope exists for the deployment of land and non-land physical capital to off-farm uses.

The decision to deploy labour or liquid assets to off-farm uses may represent an adjustment to short-term fluctuations in farm income or a more permanent adjustment to long-term structural changes in agriculture. The ability of farm families to generate income from current off-farm resource use has implications for existing policies designed to achieve greater efficiency and also to improve welfare at the farm level. Yet policy makers know little about why farm families choose to allocate resources to non-farm activities or about their socio-economic characteristics.

In most theoretical treatments of off-farm resource deployment, emphasis has been placed on off-farm employment, particularly on explanations of the amount of time supplied by farm operators to off-farm work. The purpose of this study is slightly different. It is an attempt to isolate and investigate empirically several factors which are likely to be important in determining (i) the type of off-farm employment undertaken by farm operators; and (ii) the type of off-farm employment-investment strategies adopted by farm families.

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More specifically, the aims in this paper are, firstly, to document the extent and importance of off-farm investment and off-farm employment in the Australian grazing industry; secondly, to undertake a preliminary analysis to identify factors which are likely to be important determinants of a farm family's pattern of off-farm resource deployment and, in particular, the factors which may be important in determining the type of off-farm employment undertaken by farm operators and the type of off-farm employment-investment strategies adopted by farm families; and thirdly, to examine farmers' main reasons for off-farm employment and investment in order to provide a better explanation as to why some farm families deploy resources off farm whilst others do not.

The analysis in this study serves two purposes. Firstly, the failure in most other empirical studies of off-farm resource deployment to account for any resources other than labour is overcome by reporting the extent and importance of off-farm investment. Secondly, we attempt to identify factors which *may be* important determinants of a farm family's pattern of off-farm resource deployment. As such, this is a preliminary analysis and serves as an initial investigation of the data prior to a more sophisticated analysis which is currently being undertaken by the authors to explain the responses of the farm family to variations in these factors. We also attempt to demonstrate that certain operator attributes are important in explaining the type of off-farm employment that has been observed.

The nature, extent and importance of off-farm resource deployment in the Australian grazing industry is presented in the following section. A review of the literature is presented in section 3 in order to identify the factors which may affect off-farm resource deployment. Some of these factors are analysed in section 4. The motivation of farmers to deploy resources off farm is examined in section 5 and some concluding comments are made in section 6.

2. Background: Off-farm Resource Deployment in the Grazing Industry.

The extent of off-farm employment and off-farm investment in the Australian grazing industry is documented using BAE data collected in the 1976-7 and 1977-8 Australian Agricultural and Grazing Industries Surveys. The sample design and population of the grazing industry were described in BAE (1976). The farm family was adopted as the unit of primary analysis as the data collected on off-farm employment and off-farm income relates to the farm household. Company farms and properties where the operator was not able to provide complete information about off-farm activities were excluded from the analysis.¹ The resulting subsamples in each year represent 83 per cent and 85 per cent of all grazing industry properties, respectively. The data were approximately weighted to represent these components of the grazing industry survey population.²

1. In cases where there is more than one household per survey property, the information reported relates only to one operator or household on a property.
2. Sample estimates are usually different from those that would have been obtained if information had been collected from all farms. These differences are called sampling errors and their likely sizes in percentage terms are measured as relative standard errors of the estimates. The relative standard errors of the 1976-7 grazing industry estimates lie between 2 and 30 per cent and are reported in detail in Robinson and McMahon (1980, pp. 32-7). The relative standard errors of the 1977-8 estimates are expected to be of similar magnitudes.

2.1 Off-farm Employment

In both 1976-7 and 1977-8, approximately 25 per cent of farm operators in the grazing industry were employed off farm. Of these farm operators, a third worked on other farms, mainly on a casual basis, and the remainder were employed in occupations unrelated to farming, mainly on a full-time basis. The type of off-farm employment and the percentages of farm operators involved are reported in Table 1.

Table 1: Distribution of Farm Operators by the Type of Off-farm Employment : Grazing Industry

Type of off-farm work	Percentage of operators		Percentage of operators who were engaged in full-time off-farm employment in 1976-7 (a)
	1976-7	1977-8	
Work on other farms	8.6	8.6	29.3
Non-farm work			
Professional/managerial/ office or shop	4.0	9.9	81.0
Tradesman/manual	7.9	6.3	61.2
Other off-farm work	3.9	1.1	87.3
Total non-farm work	15.8	17.3	72.3
Total off-farm work	24.4	25.9	57.3
No off-farm work	75.6	74.1	—
Total	100.0	100.0	—

(a) Data not collected in 1977-8.

In 1976-7, 37 per cent of farm households had at least one member employed off the farm. Only 10 per cent of farmers' spouses worked off the farm and at least one other household member worked off the farm on 8 per cent of properties. This situation changed little in 1977-8 as at least one member of 35 per cent of households was employed off the farm, 14 per cent of farmers' spouses worked off farm and, for 9 per cent of households, at least one other household member worked off the farm. These results, in conjunction with those of Riethmuller and Spillman (1978), suggest that in recent years the incidence of off-farm employment has not varied a great deal from one year to the next.

2.2 Off-farm Investment

Off-farm investment is widespread in the grazing industry. Slightly more than 85 per cent of farm-firms reported off-farm asset holdings in both 1976-7 and 1977-8.³ Most farm-firms held highly liquid assets such as

3. Unfortunately, these assets cannot be related directly to the farm household, as data about the personal asset holdings of farm operators and other household members were incomplete. Therefore, only the off-farm asset holdings of the farm-firm were included in the analysis.

trading bank deposits, shares in co-operatives, interest bearing deposits and savings bank deposits. It is likely that most of the liquid assets were held as working capital for the efficient operation of the farm-firm rather than as substantial income-earning investments. Approximately half of all farms held less than \$5 000 worth of assets off farm in both years and presumably most of this was held as working capital.⁴ In contrast, 35 per cent of farm-firms held non-liquid assets, such as non-farm real estate, government bonds, shares in public companies and debentures and unsecured notes, in 1976-7. This figure was 40 per cent in 1977-8. These assets are more likely to represent a diversification of investment portfolios into the non-farm sector. The percentage of farm-firms by type of off-farm investment and the average investment per property are shown in Table 2.

Table 2: Type of Off-farm Investment : Grazing Industry

Type of investment	Percentage of farm-firms with type of investment shown		Average per farm with that type of investment	
	1976-7	1977-8	1976-7	1977-8
	%	%	\$	\$
<i>Liquid assets</i>				
Trading bank deposits	64.6	56.3	4 964	4 542
Savings bank deposits	24.6	21.3	3 899	3 933
Interest bearing deposits	30.0	24.5	14 106	16 611
Building Society, finance company and credit union deposits	10.2	9.6	10 499	11 026
Shares in co-operatives	34.4	36.8	1 690	1 757
Any liquid assets	82.1	78.9	12 214	11 621
<i>Non-liquid assets</i>				
Non-farm real estate	4.1	4.8	30 992	29 588
Shares in public companies	16.8	18.8	4 284	5 530
Debentures and unsecured notes	5.1	6.3	10 129	14 502
Government guaranteed bonds	4.3	3.4	7 063	9 545
Other off-farm investments	13.7	18.7	17 919	10 325
Any non-liquid assets	35.6	40.3	14 855	13 026
Any off-farm investments	87.2	85.1	17 546	16 943

2.3 Off-farm Income

Off-farm income is an important source of income for farm families in the grazing industry. In 1976-7, 87 per cent of households received an average of \$4 733 in off-farm income. In nominal terms, the average off-farm income for 85 per cent of grazing industry households rose to \$6 339 in 1977-8. The average incomes per farm and sources of off-farm income for the farm operator and household are shown in Table 3.

4. The distribution of properties by the level invested off farm is shown in Appendix A, Table A.1.

Table 3: Off-farm Income: Grazing Industry

Type of off-farm income	Percentage of farm-operators or farm households (a) with income from the source shown		Average income per farm operator or farm household with income from that source	
	1976-7	1977-8	1976-7	1977-8
	%	%	\$	\$
<i>Income from off-farm employment (b)</i>				
Farm operators	24.4	18.2	5 734	4 966
Farm households	36.8	35.3	5 666	6 078
<i>Income from off-farm investment (c)</i>				
Farm operators	47.6	51.1	2 885	4 221
Farm households	51.4	55.5	3 325	5 104
<i>Non-taxable income (d)</i>				
Farm operators	1.9	3.5	1 587	1 002
Farm households	43.1	48.9	755	771
<i>Total off-farm income (e)</i>				
Farm operators	66.7	62.9	4 604	5 047
Farm households	87.0	85.1	4 733	6 339

(a) The farm household includes the farm operator, the spouse and any other household member. (b) Includes income from self-employment off the farm in 1976-7 but not in 1977-8. (c) Includes income from self-employment off the farm in 1977-8 but not in 1976-7. (d) Non-taxable income represents payments from government. (e) Total off-farm income is the sum of income from off-farm employment, income from off-farm investment and non-taxable income.

The major source of off-farm income was from off-farm employment, and was roughly double that from off-farm investment in 1976-7. In 1977-8, the major sources of off-farm income were income from wage and salaried off-farm employment, from self-employment and from off-farm investment. Unfortunately, a direct comparison of these figures with those for 1976-7 is not possible due to a change in the method of data collection in 1977-8.⁵ The figures for non-taxable income and total off-farm income are comparable between the years.

Whilst, on average, off-farm income contributes significantly to the total income of farm families, there is considerable variation in the distribution of off-farm income in the grazing industry. For instance, in both 1976-7 and 1977-8, nearly 15 per cent of households received no income from off-farm sources and over one-third of households earned less than \$2 500 in off-farm income. In contrast, only 11 per cent of households earned more than \$10 000 in off-farm income in 1976-7. This figure was nearly 16 per cent in 1977-8. The distributions of off-farm income for both farm operators and farm households are shown in Appendix A, Table A.2.

5. Income from self-employment is included with income from off-farm employment in 1976-7. In contrast, this income was included with income from off-farm investment in 1977-8.

3. Literature Review

A review of the literature is presented in this section in an attempt to isolate the factors which are likely to be important in determining a farm family's pattern of off-farm resource deployment. Off-farm resource deployment falls within the neoclassical theory of resource allocation. Although most of the literature focuses on the supply of farm labour to off-farm employment, the principles developed for the analysis of off-farm employment may be expected to apply equally well to the study of other forms of off-farm resource deployment such as off-farm investment. The conventional approach to the allocation of labour between farm and non-farm activities can be stated as follows: the producer allocates his time between farm and off-farm work such that the marginal revenue product from farm work and the off-farm wage rate (net of the costs incurred in off-farm work) are equal (*e.g.*, Polzin and MacDonald 1971). Further, the producer allocates his time between work and leisure to maximize the utility of the resulting income and leisure (*e.g.*, Lee 1965; Sexton and Plunkett 1979).⁶

Those who adopt this approach usually assume the farm operator:—

- (a) is paid the value of his marginal product;
- (b) receives diminishing returns to the employment of his labour on the farm and that he receives constant returns to his labour in off-farm employment;
- (c) receives no non-pecuniary benefits or costs from the deployment of resources into particular income-accruing activities;
- (d) faces no market imperfections or institutional constraints;
- (e) faces a single off-farm labour market;
- (f) is not dependent on the labour market activities of other family members in his allocation decisions⁷; and
- (g) can freely obtain off-farm employment.

This approach is, however, subject to a number of criticisms. These criticisms relate to shortcomings of the approach which are discussed below. It is not intended to be a criticism of neoclassical economics in general, but merely a reflection of the failure of most of the existing studies of off-farm employment to incorporate factors which are normally included in other areas of economic analysis.

Firstly, the approach is static. No consideration is given to a farmer's desire to work longer hours in current production periods to raise his leisure-income

6. The framework has been extended to one of the allocation of family time to the production of final consumption goods using the approach adopted by Becker (1965). For example, see Sexton (1975).

7. The influence of the labour market activities of other family members on the operator's decision to work off farm was taken into account by Sexton (1975).

frontier in order to have more of both leisure and income in future time periods.⁸ There is considerable literature on resource allocation choices over the life cycle concerning education, on-the-job training, work and consumption (e.g., Ghez and Becker 1975; Blinder and Wise 1976; Heckman 1976; Sadik and Johnson 1976), yet little has been written specifically about the resource allocation of the farm family over time. Nalson (1964) is an exception. He proposed that the family development cycle is a significant determinant of on-farm resource allocation in Australian agriculture. Nalson (1964, p. 47) argued that “different combinations of farm and human resources can create different problems at each of the three developmental stages of the farm family”. The farm-firm and family compete for available resources. During early married life, family resource demands are high and the children are too young to contribute to farm labour; during middle married life, education expenses are high and expansion of the farm business may be necessary for children to work at home; and, during late married life, consolidation of the farm business may be possible leading to a different allocation of resources. The family development or life cycle may also be expected to influence off-farm resource deployment.⁹

Secondly, it is often assumed that utility derived from income is independent of the use to which the resource is assigned. However, there is considerable evidence to suggest that attachment to farming and the rural way of life is strong amongst many farmers. Non-pecuniary factors such as farmers’ goals and values have been the subject of several studies including Hobbs and Warrack (1968), Gasson (1973) and Kerridge (1978), and these factors have been linked to farm performance. It is logical, therefore, to expect that utility derived by some farmers from farm work may be different from that derived from off-farm work. If a preference is held for farm work then the relative marginal wage rates of farm and off-farm work will not fully explain the decision to work off farm.

Thirdly, a complete explanation of why some farmers participate in off-farm resource deployment and the type of deployment chosen whilst others do not is not provided under the conventional approach. The decision to seek employment off the farm is likely to be a function not only of the off-farm wage rates and the value of the marginal product of labour on farm, but also of the costs of search and prospects of obtaining employment. In other words, the expected wage rate rather than the actual wage rate is important. The prospect of obtaining employment off the farm is, of course, a function of the characteristics of the economy,

8. Campbell (1981) found that the reason given for off-farm employment is almost always to enhance income with, roughly, a half-half split into increased consumption income and increased farm investment income. Lee (1965) recognized the influence of the life cycle but argued that the indifference schedule between leisure and income for a given time period can be assumed to reflect indifference between current leisure and future income. Thus, the indifference contours for a farmer may differ over the life cycle, being steeper for the aggressive young farmer than for the older farmer nearing retirement.

9. Three stages of the life cycle have been identified by Nalson (1964):—

Stage 1: Early married life — when all the children are at school or have not yet started school, or the wife is of child-bearing age and has no children.

Stage 2: Middle married life — when some children live at home and work on or off the farm and at least one child is still at school.

Stage 3: Late married life — when all children are working and some or all have left home, or there are no children and the wife is past the age of child bearing.

as they affect the demand for labour. However, the level of human capital attributes (including education and job skills) that the individual possesses is also an important determinant of an expected wage and the type of job potentially obtainable. Human capital attributes may also have an influence on the decision to seek off-farm employment.¹⁰

Finally, the conventional approach does not adequately account for market imperfections and institutional constraints. For instance, the effects of unions on employment policies and the constraints on hours worked imposed by the eight-hour day affect a farmer's ability to secure off-farm employment.

A more recent trend in the literature has been the development of labour demand and supply models to explain the allocation of labour to off-farm activities. Theoretical demand or supply models have been developed in several studies (e.g., Sexton 1975; Larson and Hu 1977; Bollman 1979; and Huffman 1980) and empirical estimation of these models have been attempted. Two of these studies — Bollman and Huffman — represent significant theoretical refinements of the analysis of off-farm employment.

Bollman (1979) developed a kinked demand function for labour which, in conjunction with the labour supply function, determines the equilibrium quantity of work and value of time. Bollman (1979) argued that the demand for an operator's labour on farm is downward sloping and a function of the price of labour on farm, the prices of all other inputs and the price of farm output. The demand for an operator's labour in off-farm work is horizontal and is a function of the expected off-farm wage rate which itself is a function of operator skills and the cost of commuting. The result is that the effective total demand curve for labour is a kinked curve that is downward sloping when the price of the operator's labour in farm work exceeds the expected off-farm wage rate, and is a horizontal curve when the expected off-farm rate exceeds the marginal value of the operator's labour in farm work (Bollman 1979, pp. 38–40).

Huffman (1980) refined the theoretical analysis of off-farm labour supply by postulating that labour supply decisions are determined by the maximization of utility, subject to constraints on human time, income and farm production. Labour supply was postulated to be a function of the off-farm wage rate, the prices of farm output and inputs, the prices of consumption and leisure, other household income, household size, age, education, extension and time endowments (Huffman 1980, p.16).

These more recent approaches to the analysis of off-farm employment, to some extent, overcome many of the shortcomings of the studies described earlier. From the point of view of this study, some factors which are likely to be important determinants of a farm family's pattern of off-farm resource deployment are isolated, and these are discussed below.

10. Huffman (1974) argues that education is important for the "allocative effect" as well as the "worker effect". That is, in a dynamic environment with imperfect information, education contributes to production as an "allocative effect" arising from an enhanced ability to acquire and process information. Huffman (1974) found that a farmer's ability to adjust is positively related to education.

4. Factors Influencing Off-farm Resource Deployment

It is reasonable to assume that some of the factors which were found in previous studies to be important in determining the amount of time supplied to off-farm work, may also be important in determining the type of off-farm employment undertaken and the particular strategy of off-farm employment-investment which is implemented. On theoretical grounds, it could be expected that explanations of the different patterns of off-farm resource deployment should incorporate factors such as the life cycle and family structure, human capital, age and non-pecuniary influences as well as the relative incomes earned from farm and off-farm activities.

The hypotheses that are to be tested in this part of the paper are that each of these factors are important in explaining (i) the type of off-farm employment undertaken by farm operators, and (ii) the type of off-farm employment-investment strategies adopted by farm families. Accordingly, it is intended in this section to test for differences in the type of off-farm employment and off-farm employment-investment strategies adopted with respect to differences in:—

- the operator's age and the stage of the operator's family in the life cycle;
- the size of the family;
- the operator's level of human capital (*i.e.*, the level and type of education, the length of on-farm experience and the type of past occupations held by the operator);
- the level of farm and off-farm income; and
- non-pecuniary influences (objectives and value orientations of the operator).

Three mutually exclusive groups of farm operators are considered according to their involvement in off-farm employment. These are farmers who were employed on other farms, farmers who were employed in non-farm occupations and farmers who did not work off-farm. Four mutually exclusive groups of farm families are considered, as defined by the strategies which they adopted. These are the deployment of the operator's labour to off-farm work and some off-farm investment, the deployment of labour only, off-farm investment only and no resources off farm.

The factors which are likely to affect a farm family's pattern of off-farm resource deployment are examined using data collected in a 1977–8 survey of 72 farm families in the Jemalong Shire in the wheat-sheep zone of central New South Wales.¹¹ The pattern of off-farm resource deployment in the Jemalong Shire was found to be similar to that reported earlier for the Australian grazing industry.¹²

11. The Jemalong Shire survey collected data on farmers' attitudes and attributes, the farm family and the farm. A sample of 72 farmers were selected from the 650 who responded to an initial mail questionnaire and the data were appropriately weighted to represent this population. Further details about the survey and its sample design are reported in Robinson and McMahon (1980, pp.28-9).

12. A chi-square test of homogeneity comparing the data from the grazing industry and Jemalong Shire surveys revealed that the off-farm employment distributions were not significantly different at the 5 per cent level of significance. Some differences in the off-farm investment distributions were found in the zero and less than \$1 000 categories. These differences appear to be largely due to differences in the way in which this data were collected.

The methodology chosen for the analysis was the chi-square test of homogeneity. This choice was determined by the nature of the data available and the problem as defined for analysis. On the basis of the theory, polychotomous qualitative dependent variables are defined; namely, the type of off-farm employment of the operator on the one hand and the type of off-farm employment-investment strategy adopted by the farm family on the other. In this case the regression model is not well suited to test the relationship between the qualitative dependent variable and the independent variables. Accordingly, the results are presented in the form of contingency tables with the rows representing classifications of the dependent variable and the columns representing classifications of the explanatory variables.¹³ The relationship between these variables is tested using the chi-square test of homogeneity. The authors recognize that, in the absence of strong theoretical bases, the chi-square test statistic merely establishes a statistical relationship; this does not imply causation and the results have been interpreted accordingly.

4.1 The Importance of Age and the Family Life Cycle

The age of farm operators was not found to differ significantly with the type of off-farm employment of the operator or resource strategy adopted by the farm family.¹⁴ The inference drawn from the results was that a farmer's age is not a barrier to off-farm employment. This result is consistent with the findings in other areas of economic literature. Birren (1955), Clemente and Hendricks (1973) and Clarke, Kreps and Spengler (1978), all found the effect of age on productivity to be insignificant prior to the age of 60.¹⁵

However, whilst the analysis shows that age is not a barrier to off-farm employment, it does not explain how the off-farm labour of the farm operator varies with increasing age. To do this, the family life cycle is entered into the analysis. It is more usual in a neoclassical approach to enter the age of the farm operator in a quadratic form. However, we believe that it is the family life-cycle, and not necessarily the operator's age, which has an important influence on the decision of whether or not to work off the farm.

Most of the farmers who worked off the farm had young families, with all children yet to start working. Therefore, the indifference contours between leisure and income would be steepest for young families in early married life. Superficially, the influence of the life cycle on resource allocation between farm and non-farm uses would appear to be the most pronounced for those working in non-farm occupations. However, this result may mask the influence of the higher human capital of the younger farmers (which is discussed in section 4.2) as the

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13. The relative standard errors of the estimates presented below lie between 5 and 95 per cent and are reported in Robinson and McMahon (1980, pp.37-8). Almost all of the relative standard errors are less than 50 per cent and, in general, only estimates of very small magnitudes have large relative standard errors.
 14. The differences across the groups of both operators and families with respect to age were tested using the chi-square test statistic. The calculated chi-square statistics did not exceed the critical value at the 5 per cent level of significance in either case. The intuitive meaning of the significance is that, with repeated sampling, the null hypothesis of no differences between the groups with respect to the distribution of age, if true, would have yielded a calculated chi-square statistic as great as, or greater than, the critical value only 5 per cent of the time. Accordingly in these cases, the null hypotheses were accepted. The age tables were not reported in order to reduce the volume of results reported.
 15. This is not to say that age is unimportant in the decision to migrate out of agriculture. On the contrary, Sexton (1976) found that age acts as a barrier to migration out of agriculture.

U-shape relationship on off-farm labour supply is much more apparent amongst those farmers engaged in off-farm employment on other farms.

Some farmers employed on other farms had older families, with all children working. Many of these older farmers would have handed some of the farm responsibilities to their sons and would have had more time available for some off-farm employment, either to increase current consumption and/or investment.

The incidence of off-farm investment was relatively higher for families where all children were working.¹⁶ The education expenses for children of those families would have ceased, allowing financial resources to be devoted to investments other than in the family. Few families in the middle stage of the life cycle were engaged in either off-farm employment or investment. The farm families with no off-farm employment or investment were larger families than the families of those with some employment and/or investment off the farm. These results are reported in Table 4.

Table 4: Off-Farm Resource Deployment by Family Structures: Jemalong Shire: 1977-8

Strategy	Percentage of sample (a)	Farm family structure (b)					
		Family size (children and family)			Family life cycle (c) (stage in family life cycle)		
		Fewer than 3	3-4	5 or more	Stage 1	Stage 2	Stage 3
	%	%	%	%	%	%	%
<i>Type of off-farm employment</i>							
On other farms	13.3				49.3	5.9	44.8
In an non-farm occupation	11.6				87.0	6.5	6.5
No off-farm employment	75.1				28.2	22.3	49.5
Chi-square test result		5.41(d)			11.43		
<i>Off-farm employment — investment strategies</i>							
Off-farm employment and off-farm investment	17.5	38.0	43.5	18.5	55.4	7.6	37.0
Off-farm employment only	7.5	57.5	42.5	0.0	90.0	10.0	0.0
Off-farm investment only	47.5	61.0	29.9	9.1	32.0	15.8	52.2
No resources off-farm	27.5	30.4	10.1	59.5	22.9	31.4	45.7
Chi-square test result		21.98			13.24		

(a) Sample of 72 farmers. (b) The percentages reported are row percentages; e.g., 49.3 percent of farmers employed on other farms were in Stage 1 of the family cycle. (c) Single farmers are excluded from the family life cycle variable, therefore reducing the sample size to 63. Stage 1 is early married life; Stage 2 is middle married life; and Stage 3 is late married life, as defined in footnote 7. (d) Family size was not significantly related to the type of off-farm employment; therefore the results are not reported.

16. On the basis of the chi-square test the inference drawn from the results is that the resources available for allocation to different uses vary with the different stages of a family's development.

Whilst the results offer some confirmation of the theory espoused by Nalson (1964), they also offer some general support to the proposition that it is necessary to account specifically for attitudes to time through the stage of the life cycle in order to explain a farmer's decision to invest and/or seek employment off the farm.

4.2 The Importance of Human Capital

As expected, those farmers employed in non-farm occupations had higher levels of formal education, more off-farm work experience and less farm experience than either those farmers who were employed on other farms or employed only on their own farms.¹⁷ These results are reported in Table 5.

Table 5: *Off-Farm Resource Deployment by Type of Human Capital: Jemalong Shire: 1977-8*

Strategy	Percentage of sample (a)	Human capital of farm operators (b)					
		Education (c) (highest level completed)		Farm experience (no. of years farmer has lived on a farm)		Off-farm occupational (type of jobs farmer has had in the past)	
		Primary or some secondary	Higher education	Less than 30	30 or more	None or on other farms	On other farms and non-farm or non-farm only.
	%	%	%	%	%	%	%
<i>Type of off-farm employment</i>							
On other farms	13.3	94.4	5.6	21.1	78.9	70.4	29.6
In an non-farm occupation	11.6	32.3	67.7	72.6	27.4	0	100.0
No off-farm employment	75.1	89.5	10.5	16.5	83.5	83.5	16.5
Chi-square test result		18.20		12.70		25.12	
<i>Off-farm employment – investment strategies</i>							
Off-farm employment and off-farm investment	17.5					23.4	76.6
Off-farm employment only	7.5					72.5	27.5
Off-farm investment only	47.5					85.4	14.6
No resources off-farm	27.5					80.4	19.6
Chi-square test result		na(d)		7.39(e)		18.82	

(a) Sample of 72 farmers. (b) The percentages reported are row percentages. (c) Higher education refers to 6 years of secondary, technical or tertiary education. (d) There were insufficient data in the higher education column to carry out a meaningful chi-square test. (e) Farm experience was not significantly related to off-farm employment-investment strategies (at the 5 per cent level of significance) and therefore the distributions are not reported.

17. The calculated chi-square statistics in each case exceeded the critical values.

Differences in the level of exposure to the farm environment were not observed across the groups when the type of off-farm employment-investment strategy was considered. On the other hand, farmers who both worked and invested off-farm had wider off-farm job experience than other farmers.

4.3 The Importance of Income

Most farmers employed in non-farm occupations had higher off-farm incomes and lower farm incomes than those employed on other farms. Most farmers who did not work off the farm had higher farm incomes than those engaged in off-farm employment. The off-farm incomes of most of those farmers who had some off-farm investment were lower than those who worked off farm only.¹⁸ Farm and off-farm incomes by off-farm resource deployment are shown in Table 6.

Table 6: *Off-farm Resource Deployment by Income (a): Jemalong Shire: 1977-8*

Strategy	Percentage of sample (b)	Income (c)			
		Farm income		Off-farm income	
		Less than \$5000	\$5 000 or more	Less than \$5 000	\$5 000 or more
	%	%	%	%	%
<i>Type of off-farm employment</i>					
On other farms	13.3	32.4	67.6	55.3	44.7
In a non-farm occupation	11.6	61.3	39.7	0.0	100.0
No off-farm employment	75.1	19.7	80.3	—	—
Chi-square test result		6.57		7.25(d)	
<i>Off-farm employment — investment strategies</i>					
Off-farm employment and off-farm investment	17.5	55.9	44.1	23.0	77.0
Off-farm employment only	7.5	22.5	77.5	44.8	55.2
Off-farm investment only	47.5	24.9	75.1	76.3	23.7
No resources off-farm	27.5	11.6	88.4	—	—
Chi-square test result		7.88		12.26(e)	

(a) Total household income was not significantly related to the type of off-farm employment or employment-investment strategies. (b) Sample of 72 farmers. (c) The percentages reported are now percentages. (d) The farmers with no off-farm employment are not included in the chi-square analysis, therefore reducing the sample size to 20. (e) The farmers with no resources off-farm are not included in the chi-square analysis, therefore reducing the sample size to 55.

These results were expected. It may be rational to allocate a part of both labour and investment funds to off-farm uses. This arises naturally if there are diminishing returns to labour or capital employed on the farm. Diminishing returns to inputs will arise with declining incomes, other things being equal.

18. However, the type of off-farm employment or employment-investment strategy undertaken did not lead to significant differences in total household income.

4.4 Non-pecuniary Influences

Farmers' objectives in farming were associated with the type of off-farm employment undertaken.¹⁹ Farmers employed in non-farm occupations emphasized maximizing income, productivity and efficiency as their goals, whereas other farmers were relatively more concerned with the quality of farming life, making a sufficient income or farm maintenance. However, these objectives were found not to influence off-farm employment-investment strategies.²⁰ The results of the investigation of the relationship between these factors and off-farm resource deployment are reported in Table 7.

Table 7: *Off-farm Resource Deployment by Non-pecuniary Factors (a): Jemalong Shire: 1977-8*

Strategy	Percentage of sample (b)	Non-pecuniary factors(c)			
		Farmers' goal orientation		Main reason for becoming a farmer	
		To maximize income efficiency or productivity	To enjoy farm life, make a sufficient income or maintain the farm	Inherited the farm, continue in the family tradition, or no choice	Likes farming life, or a good income and future in farming
<i>Type of off-farm employment</i>	%	%	%	%	%
On other farms	13.3	5.6	94.4	38.0	62.0
In a non-farm occupation	11.6	61.3	38.7	6.5	93.5
No off-farm employment	75.1	20.0	80.0	48.9	51.1
Chi-square test result		8.80		6.01	
<i>Off-farm employment — investment strategies</i>					
Off-farm employment and off farm investment	17.5			24.7	75.3
Off-farm employment only	7.5			20.0	80.0
Off-farm investment only	47.5			37.8	62.2
No resources off-farm	27.5			68.0	32.0
Chi-square test result		2.33(d)		8.33	

(a) Farmers' value orientations and reasons for continuing in farming were not significantly related to the type of off-farm employment or employment-investment strategies. The non-pecuniary factors were measured by asking respondents to select from alternatives developed through pilot testing. The questions were open-ended with an "other" category and the responses were subsequently recoded. (b) Sample of 72 farmers. (c) The percentages reported are row percentages. (d) Farmers' goal orientations were not significantly related to the off-farm employment-investment strategies; therefore the results are not reported.

19. Kerridge (1978, p. 62) defines goals as "states that an individual wishes to achieve". Goals are commonly referred to as objectives or aspirations. The goals referred to in this study are farmers' main objectives in farming. Values are a more permanent characteristic of an individual than goals, representing an individual's underlying beliefs (Gasson 1973; Kerridge 1978). The value orientations referred to in this study are those developed by Gasson (1973) to represent appropriate values in farming.
20. Farmers' value orientations, as developed by Gasson (1973), were found not to influence either the decision to work off the farm or off-farm employment-investment strategies.

The main reason for becoming a farmer was associated with both the type of off-farm employment and off-farm employment-investment strategies undertaken. All farmers placed some emphasis on the farming way of life as the main reason for becoming a farmer. However, farmers who worked on other farms or who did not work off-farm tended to select "continuing in the family tradition", while those who had non-farm jobs had felt there was a good future in farming and good incomes to be earned. Those farmers who deployed part of their labour and/or invested off farm emphasized the farming way of life and a good income and future in farming as their main reasons for originally becoming farmers. Most of those with no resources off farm entered farming because they were continuing in the family tradition.

5. The Motivation for Deploying Resources Off Farm

The way in which several factors influenced the farm family's pattern of off-farm resource deployment does not fully explain why some farm families deploy resources off the farm whilst others do not. More information about the decision to deploy resources off the farm is given when the motivation of such a decision is examined. The results of farmers' main reasons given for off-farm employment and for off-farm investment are reported in this section of the paper, in an attempt to make some conclusions on differences in motivations, if any, between groups of farmers with different patterns of off-farm resource deployment²¹

The importance of off-farm resource deployment is that it may be viewed as one means of adjustment to changing economic conditions, as an aid in ultimately adjusting into or out of agriculture, as a necessity for survival in agriculture or as an alternative option for the efficient allocation of existing farm resources.

The distribution of the reasons given for off-farm employment are shown in Table 8. The major reasons for working off the farm were to increase consumption income or to make better use of farm resources. The provision of funds for carry-on finance and investment capital were also important. There are some important differences in the reasons given for working off the farm when the type of off-farm employment is considered. Farmers who were employed on other farms placed more emphasis on making better use of farm resources than those employed in non-farm occupations. Many of the latter group were part-time farmers, with full-time off-farm jobs as their main occupation and source of income. They placed more emphasis on maintaining income and generating carry-on finance to maintain their farms, or indicated a preference for working off the farm. Both groups attached importance to increasing consumption income.

21 The relative standard errors of the estimates reported in this section are of similar magnitudes to those of the previous section and are reported in detail in Robinson and McMahon (1980, pp.37-8).

Table 8: Percentage Distribution of the Main Reasons Given by the Farm Operator for Working Off the Farm : Jemalong Shire : 1977-8

Main reason (a)	Farmers who worked on other farms	Farmers who worked in a non-farm occupation	All farmers who worked off the farm
	%	%	%
To increase consumption income	43.3	33.9	39.1
To make better use of farm resources	42.1	20.9	32.3
To provide carry-on finance to maintain the farm	6.1	20.9	12.8
To provide investment capital to improve or develop the farm	5.9	6.5	6.0
Off-farm job is the main occupation and source of income	0	11.3	5.3
Enjoy working off the farm	0	6.5	3.0
To reduce debts	2.6	0	1.5
Total	100.0	100.0	100.0

(a) Farmers were asked to select from a given list of reasons or nominate a reason not included on the list.

In the static context, a more efficient use of farm resources would result in higher income which would enable greater consumption and/or investment. In the dynamic context, farmers may choose to trade off leisure now to provide more income for future consumption or investment. The life cycle is important here in determining the slope of the income-leisure isoquant. Unfortunately, sample size constraints did not allow the relationship of the main reasons given to the stage of the life cycle to be investigated.

A different set of reasons were given for off-farm investment, as shown in Table 9. Higher returns and better security from off-farm investment, the need to invest surplus farm income profitably and the desire to obtain income stability were the major reasons given for off-farm investment. The generation of funds for future farm investment or to service debts were also important reasons.

Table 9: Percentage Distribution of the Main Reasons Given by the Farm Operator for Investing Off the Farm : Jemalong Shire : 1977-8

Main reason (a)	Farmers with less than \$5 000 invested off the farm	Farmers with \$5 000 or more invested off the farm	All farmers who had off-farm investments
	%	%	%
Off-farm investment provides a higher return to capital and/or better security than farm investment	3.8	39.8	27.1
To profitably invest surplus income generated from the farm	15.8	24.6	21.3
To stabilise income	21.8	14.3	17.0
To service existing debts	3.2	11.2	8.4
To increase investment capital for future farm development	17.1	3.3	8.2
For children	10.5	5.8	7.5
Force of habit	10.5	0	6.2
For retirement	17.3	3.3	4.3
Total	100.0	100.0	100.0

(a) Farmers were asked to select from a given list of reasons or to nominate a reason not included on the list.

The motivation for off-farm investment appears to differ between those farmers with less than \$5 000 invested and those with larger amounts invested. The farmers with investments of less than \$5 000 were investing primarily to stabilize income, raise capital for future farm development or for retirement. In contrast, those who had invested larger amounts off the farm gave the higher returns and better security of off-farm investment as the main reason for doing so. Other important reasons given by this latter group were the investment of surplus farm income or investing to meet future debt commitments.

Efficient use of resources was a major reason for off-farm employment. Higher returns and better security of off-farm investment were major reasons for off-farm investment. This suggests that many farmers view off-farm employment and investment as an efficient and profitable alternative to the allocation of all resources to farm activities.

The provision of funds to finance on-farm investments was regarded as most important by a small number of farmers in motivating their deployment of investment resources off farm. However, for those with less than \$5 000 invested off farm, it was the second most important reason given.

6. Concluding Comments

Off-farm employment and investment may be perceived as a means of adjustment to both short-term and long-term changes in economic conditions. For some farm families, off-farm employment and/or investment may be a transitory phase, ultimately leading to a complete adjustment out of agriculture. The more usual situation is that off-farm resource deployment acts as a means of increasing current family income in the short term and may act either as a means of financing on-farm adjustments or as a more efficient allocation of existing farm resources in the long term. Off-farm resource deployment may also occur to increase both future income and leisure.

The partial deployment of resources to non-farm activities is widespread in Australian agriculture. Income from the deployment of labour off the farm is the most significant source of off-farm income, although a large proportion of farm families in the grazing industry derived some income from off-farm investments.

The conventional approach to off-farm employment, briefly stated, is that the allocation of labour between farm and non-farm activities is determined by the marginal value product of labour on farm relative to the off-farm wage rate. In this study, human capital was found to be an important influence in the pattern of off-farm employment undertaken. Likewise, the life-cycle stage of the farm family and several non-pecuniary factors were also found to be important in their influence on off-farm employment. More recent studies of off-farm employment have taken some of these factors into account.

The assumption of a single off-farm labour market which is found in most treatments of off-farm employment is questionable. From the evidence presented in this paper, not surprisingly, there appears to be at least two distinctive off-farm labour markets which attract farmers with different socio-economic characteristics. Occupations in the non-farm labour market were mainly full-time and tended to attract farmers with relatively high levels of formal education who had had more off-farm work experience than most other farmers. Most of these farmers had young families with all children yet to start working, and tended to emphasize maximizing their incomes or making efficient use of the resources at their disposal. On the other hand, jobs on other farms were mainly casual or part-time and tended to attract farmers with less formal education and more experience in farming than other farmers who worked off farm. Many of these farmers had either older families with all their children in the workforce or were in the early married life-cycle stage. They also tended to emphasize the quality of life aspects of farming. These results do provide verification of the important influence of different levels of human capital and other economic variables not only on total off-farm labour supply but also on the type of off-farm employment sought.

Resource allocation decisions are influenced by the life cycle, human capital, non-pecuniary factors and the cost of seeking and obtaining off-farm employment on resource allocation decisions. The fundamental structural difference, between non-farm occupations and off-farm employment on other farms should also be recognized. Whilst most of these factors have normally been incorporated in applied studies in many areas of economic analysis, very few studies of off-farm employment have taken account of these factors.

It should also be clear that any explanation of off-farm deployment patterns is not complete if only the supply of resources for off-farm employment is considered. Little has yet been done to explain the allocation of funds between farm and non-farm investment uses. A satisfactory explanation should include an examination of the capital markets and the influence of the farm family and non-pecuniary factors.

The partial deployment of resources to non-farm activities constitutes an important autonomous adjustment and is one means of financing farm development. The current Rural Adjustment Scheme is designed specifically to assist those full-time farmers facing financial difficulties who are able to demonstrate a return of their farms to economic viability with assistance. In cases of hardship, the scheme also provides some funds to farmers, who were refused adjustment assistance, to enable them to cease farming. However, applications for adjustment assistance may be rejected if the applicant is assessed as "not in working occupation of his farm". In some situations, this could create difficulties where applicants, who would normally be assessed as in need of assistance, are working off the farm in an attempt to restore the economic viability of their farms and are rejected for adjustment assistance.

Appendix A

Table A.1: Distribution of Farm-firms by the Level of Off-farm Investment : Grazing Industry

Level of off-farm investment (\$)	Percentage of farm firms	
	1976-7	1977-8
Nil	12.8	14.9
Less than 1 000	13.8	17.4
1 000 and less than 5 000	21.9	22.3
5 000 and less than 20 000	29.4	23.9
20 000 and less than 50 000	16.0	15.2
50 000 and less than 100 000	3.6	4.2
100 000 or more	2.5	2.1
Total	100.0	100.0

Table A.2: Distribution of Farm Operators and Households by Off-farm Income : Grazing Industry

Off-farm income (\$)	1976-7		1977-8	
	Farm operators	Farm households	Farm operators	Farm households
Nil	33.4	13.0	37.9	14.9
Less than 2 500	33.1	35.8	30.8	33.6
2 500 and less than 5 000	14.4	23.0	12.1	17.3
5 000 and less than 10 000	12.1	16.8	12.9	18.5
10 000 or more	7.0	11.4	7.1	15.7
Total	100.0	100.0	100.0	100.0

References

- BAE (1976), *The Australian Grazing Industry Survey, 1973-74*, AGPS, Canberra.
- Becker, G. S. (1965), "A theory of the allocation of time", *The Economic Journal* 75(3), 493-517.
- Birren, J. E. (1955), "Age changes in skill and learning" in W. Donahue (ed.), *Earning Opportunities for Older Workers*, Ann Arbor, University of Michigan Press, 67-74.
- Blinder, A. S. and Wise, Y. (1976), "Human capital and labor supply : a synthesis", *Journal of Political Economy* 84(3), 449-72.
- Bollman, R. D. (1979), "Off-farm work by farmers : an application of the kinked demand curve for labour", *Canadian Journal of Agricultural Economics* 27(1), 37-60.
- Campbell, D. J. (1981), "Welfare and adjustment aspects of off-farm resource use", Attachment D, in BAE, *A Review of Some Policy Aspects of Adjustment, Productivity and Welfare in the Australian Rural Sector*, (forthcoming).
- Clarke, R., Kreps, J. and Spengler, J. (1978), "Economics of aging: a survey", *Journal of Economic Literature* 16(3), 916-62.
- Clemente, F. and Hendricks, J. (1973) "A further look at the relationship between age and productivity", *Gerontologist* 13(1), 106-10.
- Gasson, R. (1973), "Goals and values of farmers", *Journal of Agricultural Economics* 24(3), 521-42.
- Ghez, G. R. and Becker, G. S. (1975), *The Allocation of Time and Goods Over the Life Cycle*, National Bureau of Economic Research, New York.
- Heckman, J. J. (1976), "A life-cycle model of earnings, learning and consumption", *Journal of Political Economy* 84(1), 511-44.
- Hobbs, D. J. and Warrack, A. A. (1968), "Summary of research on the relation of goals, values and attitudes to farm management performance", in F. Justus and J.C. Headley (eds.), *The Management Factor in Farming: An Evaluation and Summary of Research*, Technical Bulletin No. 258, Minneapolis Agricultural Experiment Station, St. Paul.
- Huffman, W. E. (1974), "Decision making: the role of education", *American Journal of Agricultural Economics* 56(4), 85-97.
- _____ (1980), "Farm and off-farm work decisions : the role of human capital", *Review of Economics and Statistics* 62(1), 14-23.

- Kerridge, K. W. (1978), "Value orientations and farmer behaviour — an exploratory study", *Quarterly Review of Agricultural Economics* 31(1), 61-72.
- Larson, D. W. and Hu, H. Y. (1977), "Factors affecting the supply of off-farm labour among small farmers in Taiwan", *American Journal of Agricultural Economics* 59(3), 549-53.
- Lee, J. E. (1965), "Allocating farm resources between farm and non-farm uses", *Journal of Farm Economics* 47(1), 83-92.
- Nalson, J. S. (1964), "Problems of resource use on the family farm", *Australian Journal of Agricultural Economics* 8(2), 46-56.
- Polzin, P. and MacDonald, P. (1971), "Off-farm work: a marginal analysis", *Quarterly Journal of Economics* 47(3), 540-5.
- Riethmuller, P. C. and Spillman, N. D. (1978), "Off-farm employment in the grazing industry", *Quarterly Review of the Rural Economy* Introductory Issue, November, 44-7.
- Robinson, C. and McMahon, P. (1980), Off-farm resource deployment in the Australian grazing industry, Paper presented to the Australian Agricultural Economics Society Conference, Adelaide, February.
- Sadik, A. T. and Johnson, T. (1976), Consuming, learning and earnings: a life-cycle model, North Carolina State University, Raleigh (mimeograph).
- Sexton, R. N. (1975), Determinants of multiple job-holding by farm operators, unpublished Ph.D. thesis, Department of Economics and Business, North Carolina State University.
- _____ (1976), "Labour mobility in the Australian rural workforce", *Quarterly Review of Agricultural Economics* 29(2), 112-36.
- _____ and Plunkett, H. J. (1979), Multiple job-holding by family farms, Paper presented to the Australian Agricultural Economics Society Conference, Canberra, February.