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THE MICRODYNAMICS OF FARM ADJUSTMENT

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THE MICRODYNAMICS OF FARM ADJUSTMENT

The agricultural sector in New Zealand has undergone considerable change in recent years, stemming from three sources – variations in the world market; new directions in domestic agricultural policy; and a substantial restructuring of New Zealand economy as a whole. The agricultural sector has experienced the removal of assistance measures over a very short period of time. The result has been not only a major realignment of prices confronting the farmer, for inputs, production, and items of capital expenditure; but a more fundamental shift in under-lying attitudes, so that farmers can be considered to be facing essentially a new decision-making environment.

This substantial alteration will obviously demand a response from farmers, as they attempt to align themselves with the new market conditions. This paper marks the start of a new project which seeks to identify and measure these responses in the sheep/beef sector. A crucial part of the analysis will look for connections between these various responses and long-run farm viability. The current international concern with agricultural protection, and the effects of reducing such protection, give added significance to this research.

The first step in this research direction, and purpose of the present paper, is to evaluate the contribution made to the study of agricultural adjustment by research undertaken at the farm level using disaggregate (micro-) data. A review of the literature demonstrates the importance of conducting adjustment analysis at this level, and also raises a related issue: even among farms producing similar products there is a heterogeneity which generates a variety of response patterns, and which indicates the need for proper classification of farm and farm operator types.

Thus the present paper seeks to make these two points: the need for farm-level analysis; and the need for farm classification, in the study of agricultural adjustment. Following a review of the literature, these points are illustrated using a small sample of North Island hill-country farms.

American Studies

Most of the work dealing with agricultural adjustment at the farm level has been done in North America. Like New Zealand, farmers in Canada and the U.S. have been facing market and climatic conditions which have placed them under considerable financial stress. The effect of this on the structure of agriculture has been painted with broad strokes as a dichotomisation into large, corporate farming and small, part-time farming. At the 1984 meeting of the

American Agricultural Economics Association, a session was held on "the microdynamics of structural change in agriculture", which sought to probe behind this apparent national trend.

The first paper in this session, by Ehrensaft et al. (1984), made the key point that aggregate data obscured the true story. By linking national and agricultural censuses in Canada from 1966 to 1981, the researchers were able to follow the careers of individual farms, and uncovered a surprising level of activity. For example, between the censuses of 1976 and 1981, there was a 5.9% decrease in the number of farms in Canada. They discovered this to be the net result of an exit of 29.7% of farms and an entry of 25.3%, over just those five years. Further analysis showed patterns within farm size, age, and commodity groupings, some of which refuted previously-held beliefs, for example there was very little upward mobility in farm size.

The second paper (Gladwin and Zabawa, 1984) looked at 51 Florida farmers who, due to social and technological change, had lost their principal crop of shade tobacco. A decision tree model was constructed which attempted to determine the adjustment strategy adopted by each farmer. Nineteen farms expanded in size, tending to be the younger farmers, with higher gross sales and assets but also high debt/asset ratios, and the viability of these farms remained questionable. Eleven farms became smaller, part-time units, and these tended to be conservative farmers wanting to maintain a large share of their assets, with historically low levels of debt. Twenty-one farms exited the industry, twelve retiring, and nine being forced out, many after attempts at diversification had failed because of high capital requirements.

The third paper (Barlett, 1984) examined drought-stricken farmers in Georgia, where it was considered a 40% exit rate was needed to restore sector viability. Barlett also found groups emerging from her single-county sample, with strong correlation between these groups and the farming strategies undertaken. A fifth of the sample were classed as retired/disabled farmers, with small farms, low debt and little off-farm work. Another small-farm group were farmers with full-time off-farm work, just over a third of the sample. The remaining farmers had much larger farms but high debt levels, some critically so. Strategies such as decreasing hired labour were adopted fairly equally by the three groups, while increasing size and using irrigation were strategies adopted by the large farms, and decreasing size was the main strategy of the retired farmer group. Barlett found that the "family farm" class as usually defined (by gross sales) was in fact a highly heterogeneous group, and its members not consistently the worst off. In her sample, it was the large commercial farms and

young farmers starting out, both tending to have a high proportion of rented land, who were under the most stress. Those best off were not necessarily the best managers, but were well-established with low debt. She concludes, "strategies for survival during this period ... reflect the importance of accurate categorization of farm types" (p.836).

Further study of the same county by Barlett (1987) showed the family farms doing well under conservative management strategies, while the newcomers or risk-taking larger farms continued to struggle under high debt loads.

The above Florida and Georgia studies tend to take more of a sociological approach, and can be criticised for their small samples which highlight local issues, as well as for their meagre theoretical foundations. However, they illustrate well the heterogeneity of farm response to change, which is ignored or dismissed at peril. Work of a similar nature by sociologists looks at the role ethnicity plays in differentiating among farmers. Two studies (Flora and Stitz, 1985; Salamon, 1985) contrast the farming styles of German-background settlers ("yeoman") with native-born American farmers ("entrepreneurial"). There is evidence that cultural differences do lead to differences in attitudes and motivation which generate contrasting farm management behaviour.

The need for disaggregation and categorisation is also stressed by Wimberley (1987). Although not dealing with adjustment to a sudden change, he notes that in general work on agricultural structure, farms are usually grouped by a single measure, such as acreage or gross sales. Because divisions made along these unidimensional lines class together widely varying farm types, the results of such research are often disparate or even contradictory. Wimberley instead groups farms on the basis of twenty indicators in five categories: scale, ownership, operation, labour resources, and operator characteristics. Three clear dimensions emerge: corporate/commercial (typical characteristics - corporate ownership, high sales, hired labour); large farm-area (young, resident operator, part owned/part rented, high machinery investment); and small farm (part-time, independent-style operators). Wimberley recommends that farms should be classified using an index constructed along these three dimensions, rather than a unidimensional continuum, in any work on structural change.

A different classification system emerges from the work of Just and Zilberman (1985), in their attempt to test the hypothesis that agricultural policy measures may elicit varying responses among farmers. They classify farms as technologically lagging (often small, part-time); highly leveraged (often young farmers); modern diversified (established); and modern specialized (corporate). They find that "heterogeneity gives rise to different regimes of behaviour among

farmers", so that a different response should be expected from each group. In fact a single policy may elicit opposite reactions from two different groups.

A large-sample study by Smale, Saupe and Salant (1986) overcomes the small sample criticism with a rich database of 1600 family farms in three states. The linking of data from the census with the USDA Farm Household Survey allowed analysis of the farm both as production unit and household. The study constructed a measure termed the 'viability ratio': farm/household income relative to obligations. The sample was divided according to commodity, size, off-farm income, location, and farming objectives. Correlations between these characteristics resulted in a manageable number of groupings. These and other farm characteristics were then regressed on the viability ratio. The researchers find interesting relationships between farm viability and farm characteristics, which differ among groups. For example, education and experience are important determinants of success in dairying, but not other enterprises. Size is important for small farms in Wisconsin, but for large farms in Tennessee/Mississippi. Unfortunately, the study deals only with a single point in time.

European Studies

Some work along these lines has also been carried out in Europe. Edwards (1980) seeks to identify the dynamics which underlie structural change in English farming, by examining parish records. He finds, as Ehrensaft did in Canada, that the aggregate figures hide most of the action, so that changes at the farm level "may be much greater than the generalised statistics suggest, implying considerable and continued dynamism in the farming landscape" (p.250). A study of Italian farming in marginal areas (Marini, 1987), seeking to better target policy measures, analysed farms based on gross output, management structure, off-farm activities, and family composition, producing a typology with seven categories. The differences among types was felt to have significant implications for rural policy. A study of 400 Scottish farms over a 5-year period attempted to link input usage with performance, but found little connection in livestock farming, indicating that high performers were among both those following a high-input and low-input strategy (Wagstaff, 1985). Once again the same key points emerge from these studies: that aggregate data hide much of the adjustment story; that various adjustment strategies may be chosen; and how they are chosen and whether or not they will be successful depends on the nature of the farming enterprise.

Boussard (1985) looks at these issues from a more theoretical point of view. As he states, "Heterogeneity [both technical and of size] is a striking feature of agriculture" (p.531). He sets up a small model to show that there is no optimal size in agriculture, thus accounting for the variety of sizes. However, by reference to the turnpike theorem, Boussard shows that with a long enough time horizon, there is an optimal structure (defined as a vector of factors of production per hectare), which is independent of producer utility (personal motivations, etc.). How then to account for technical heterogeneity? "Farm structure heterogeneity is a consequence of the interactions between a dynamic process of adjustment toward optimal price-dependent structures, and of market constraints which perturb this adjustment." (p.539) It is also affected by risk, technological change, and multi-output farms, which are abstracted from in his model.

The differences observed among farms in their choice of production techniques may then be the result of different stages of adjustment to price signals which are continually changing. This indicates that some useful ideas may be adopted from the human capital literature, which deals with adaptive ability (Huffman, 1977 and 1985; Schultz, 1975). This ability is considered to be an acquired skill, the result of education, training and experience. It is extremely important in times of change and uncertainty, affecting the quality of decisions made regarding production, investment and marketing. "The ability to adapt efficiently to an economic environment that has been altered in a specific way may be a scarce resource in agriculture" (Huffman, 1985:429). This becomes another important consideration in determining which strategies a particular farmer selects, and whether the choice will be a successful one. Huffman notes that farmers possessing poor adaptive skill can be expected to comprise a large share of those forced to exit the industry (p.429). He goes on to conclude that agricultural policy should not seek to slow down adjustment, but rather to boost the adaptive ability of farmers (p.433).

This type of research could also be given a firmer theoretical foundation by application to the farm household models of behaviour, found largely in the development literature. Farm production decisions are an integral part of farm household decisions, and involve the allocation of family resources such as time, effort and ability among farm and non-farm uses. Such models could apply even in the case of corporate farms, where similar on-farm/off-farm decisions must be made.

The studies mentioned above all add their weight in various ways to the main theme of this paper. The characteristics of the farm business (and family) play a major role in determining what strategies will be adopted by that farm in response to external signals. Those strategy decisions in turn determine the viability of that farm over time, and that in turn will determine the changing structure of the agricultural sector. Proper understanding of this sequence becomes particularly important when studying adjustment to a sudden major change. It is also significant to note that a change in structure can produce a change in productivity with no change in technology (Edwards, 1985). The importance of these linkages and the resulting need for research at the farm level, and over time, was stressed just last year at the annual meeting of the Southern Branch of the AAEEA. Skees and Reed (1988), in an invited paper, pointed out the strong evidence for correlation between farm behaviour and farm characteristics, and warned the profession against the past tendency to rely too much on aggregate data.

New Zealand Studies

Investigation into the effects of economic restructuring on the New Zealand pastoral sector is still at a preliminary stage. Monitoring bodies such as MAF and the Meat and Wool Boards' Economic Service (MWBES) have produced some statistics on farm response thus far, as well as predictions of future farm strategies. The MAF Advisory Services Division has found that farmers are selling assets such as capital stock, land and timber, as well as reducing farm labour and seeking off-farm work. In the longer run, they are changing their product mix, away from crops and sheepmeat towards beef and wool. Pastoral production has become more extensive, with inputs and investment dropping far more than livestock numbers (Lattimore, Ross and Sandrey, 1988). There is evidence that longer term adjustment is being held up, as farm sales over the last three years are well below historic levels (MAF, 1988:54).

Work by Davison at the MWBES (1988) underlines the variation in management practices among a similar class of farmers. Working with data from the MWBES Sheep and Beef Farm Survey 1985-86 for Class 4, North Island Hill Country farms, he finds distinct differences in several performance measures between "good" and "bad" managers, ranked by their gross livestock income per stock unit wintered. The analysis becomes even more interesting when the performance categories are further divided into high and low stocking rates. The results are reproduced in Table 1. Those with the lowest unit cost of production

are the most successful, indicating that extensification will not necessarily improve farm profit, unless it lowers the unit costs of production.

TABLE 1
CLASS 4 NORTH ISLAND HILL COUNTRY 1985-86

PERFORMANCE -	LOW		HIGH	
STOCKING RATE	LOW	HIGH	LOW	HIGH
PHYSICAL				
S.U./Ha	8.5	11.4	9.0	11.7
Labour Units	1.5	1.5	1.7	1.6
S.U./Labour Unit	2.280	2.480	2.320	2.250
Wool kg/ha	4.55	3.98	5.33	5.30
Lambing Percentage	90.3	90.3	106.5	109.2
Calving Percentage	80.8	82.7	82.6	85.7
Fertiliser kg/S.U. 1985-86	5.9	3.5	4.9	9.8
4 Year Average	10.3	10.4	13.2	16.4
FINANCIAL				
Gross/S.U.	\$22.10	\$22.60	\$30.00	\$31.30
Gross/Ha	\$188.60	\$258.60	\$269.80	\$367.40
Interest/Ha	\$38.90	\$58.80	\$77.90	\$41.00
Expenditure/Ha ²	\$150.60	\$164.90	\$176.60	\$211.90
Net/Ha ²	\$38.00	\$93.70	\$93.20	\$155.50
Average Unit Cost ³	\$0.80	\$0.64	\$0.65	\$0.58
Land Valuation/Ha	\$886	\$1080	\$850	\$1110

¹Sub-sample, pasture fertiliser

²Before interest expenditure

³Expenditure (excluding interest) per unit of output (\$)

Source: Davison, 1988:Table 9

A sociological study by Fairweather in 1987 sought to determine farmers' responses to restructuring. A survey was conducted by questionnaire of farmers in two South Island counties, felt to be representative of New Zealand pastoral farming as a whole. Most respondents were full-time owner-operators with an average age of 44. In general terms, 20% felt they needed to make a major change in their financial position, 33% in their management strategy, while 8% planned to diversify and 28% already had. Farmers were given a list of strategies: low input policy; increase/decrease farm size; increase/decrease crop area; hire more/less labour; work off-farm; use more unpaid family labour; buy irrigation/other technology; sell stock, plant, trees; or increase/decrease stock carried; and asked to identify which ones they had considered or adopted. Although strategies such as low-input policy and reduced hired labour were chosen by a high percentage of farmers, all strategies were chosen by at least 28 farmers (7% of the sample). The option of decreasing stock numbers was chosen about as often as increasing stock numbers. Financial pressure clearly was being dealt with in a variety of ways.

Fairweather also undertook factor analysis of management strategies and motivation factors (based on statements ranked by respondents), and identified a typology of four management styles: financial manager; productivity increaser; individualistic worker; and lifestyle farmer. Unfortunately, these categories were not linked back to the adjustment strategies selected. However, once again farmers fell into groups with common characteristics and likely similar behaviour patterns.

The main implication from the results is that understanding responses to economic change in terms of single trends overlooks the diversity inherent in any group of people. While it is true that there is a general pattern of cutback in expenditure or disapproval with government policy, for example, on both these issues there is a small group with the directly opposite response. (Fairweather, 1987:40)

The obvious next question is how do we account for that difference; and do some response patterns have more success than others in the longer term?

Another study relevant to the current project was carried out by Attwood (1985), who studied 108 Land Settlement Scheme farmers over a five-year period in an attempt to discover the roles of education, training and experience in farming success. He obtained no clear linkages, and decided that many more factors were involved. However, he also made the point:

The study shows clearly the wide range in the levels of gross output, value added and net farm income per farm that are generated among a group of farmers that would appear to have a greater degree of homogeneity than that to be found generally within types of farming in New Zealand. (p.51)

He also called for research to account for these differences in productivity measures.

A final study which sheds some light on the issues at hand is work carried out by Greer (1982) in reference to farm extension work, on the linkages between farmer motivation and adoption of new practices. This was also based on a survey questionnaire, in a single county. Motivational factors were classified into "orientation to work" categories, and strong links were found between these and five key farm variables: farm size, level of debt, life cycle stage, and experience¹ and management ability² of the farm operator. Management ability was by far the main determinant in shaping orientation to work. The sample

¹ Experience includes upbringing, values, etc.

² This was determined by farmer response to certain management statements in the questionnaire.

was categorised according to these five factors into nine classes, which were tested using cluster analysis. Two main groups emerged, with management ability being the strongest separating factor, but there was also evidence for the smaller groups. Greer concluded that extension workers must recognise the different types of farmers and target their advice accordingly.

The review of the literature has revealed the importance of carrying out work on farm adjustment at the farm level, particularly in order to properly classify farms and their operators. However, the above studies display the use of a variety of techniques in achieving a variety of purposes, without a common theoretical basis or model. Some researchers focus on the adjustment to a sudden shock, some on adjustment to financial pressure, and some simply on adjustment over time. There is no widely-used model for analysing farm-level adjustment. Selection of an appropriate modelling framework will represent a major consideration in the next stage of my research.

An Illustration: North Island Hill-Country Farms, 1978/79-1986/87

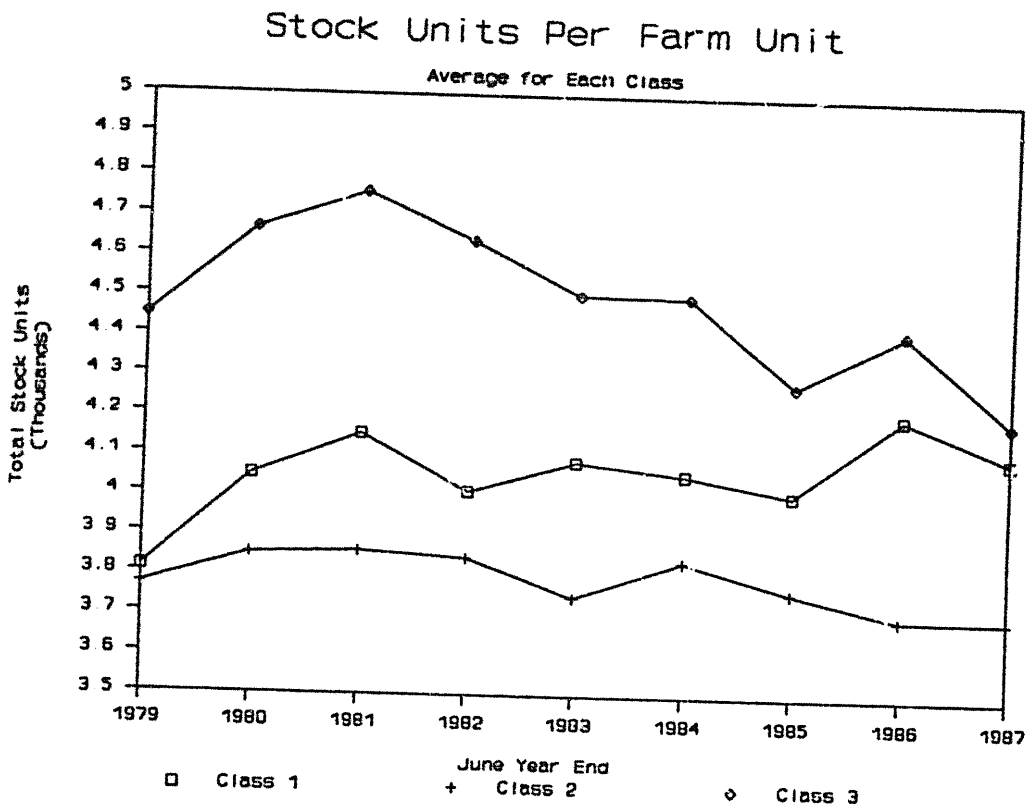
The present paper puts forward no hypotheses to test, but some preliminary work on a data sample reinforces the points raised by the literature review. The sample used involves financial and production data for 42 North Island hill-country farms over nine years from 1978/79-1986/87. It is drawn from data gathered in the New Zealand Sheep and Beef Farm Survey by the MWBES. That survey is based on a "rolling" 500 farm sample drawn from all suitable sheep and beef farms, the turnover rate approximating that which occurs nationally. The present subsample selects farms from survey Class 4 which have been in the survey for the entire period under investigation. This allows us to follow individual farm careers over time, without the distortions created by entrance or exit in the industry. Class 4, North Island hill-country farmers, is the largest class (approximately 145 farms) and considered representative of New Zealand pastoral farming.

The literature review demonstrated the need for categorisation. Although later work will properly analyse relationships between many farm characteristics and sort based on multiple criteria, for the present purposes we have divided the sample according to a single measure. Several studies indicated that managerial skill (variously defined) represented a major dividing factor among farms. It also represents more of a constant than physical characteristics which are all to some extent choice variables of the farm operator. However, the concept of managerial skill is one difficult to define in concrete terms. The measure used in

the present analysis is termed "managerial income", constructed from gross farm income less working expenses (=net income + interest + standing charges), as a measure of efficiency of input use. It also closely resembles a measure of value added (= net income + interest), being the return to farm capital and operator labour/management (Attwood, 1985: 27). Farms were grouped into three even classes (14 farms in each) based on their average "managerial income" over the nine years.

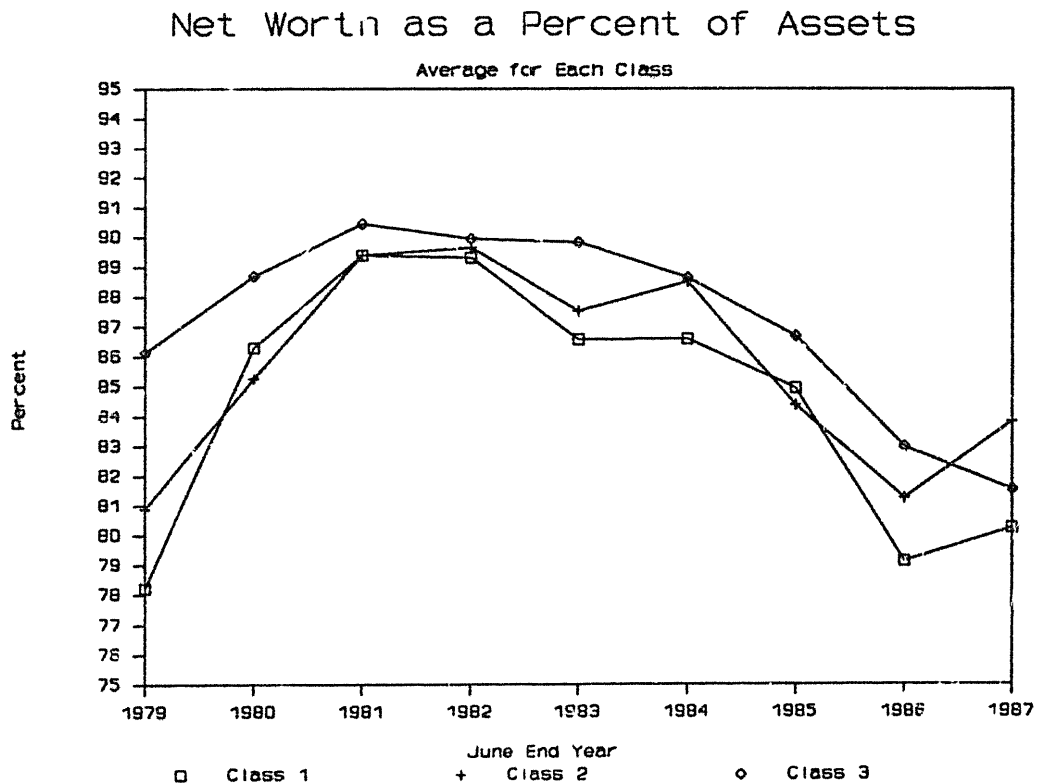
The basis of comparison used is the farming unit, with no scaling done for size, etc. Size is, after all, to some extent a choice variable of the farmer, especially over the longer term. Figure 1 investigates possible size effects of using this measure for classification. Size is here defined as number of stock units wintered. Clearly, those with the highest levels of "managerial income" (Class 3) have the largest operations. However, the "poor" managers (Class 1) have the next largest farms, while Class 2, experiencing higher returns, have the smallest operations. Obviously managerial income as here defined is not merely a function of size.

Figure 1



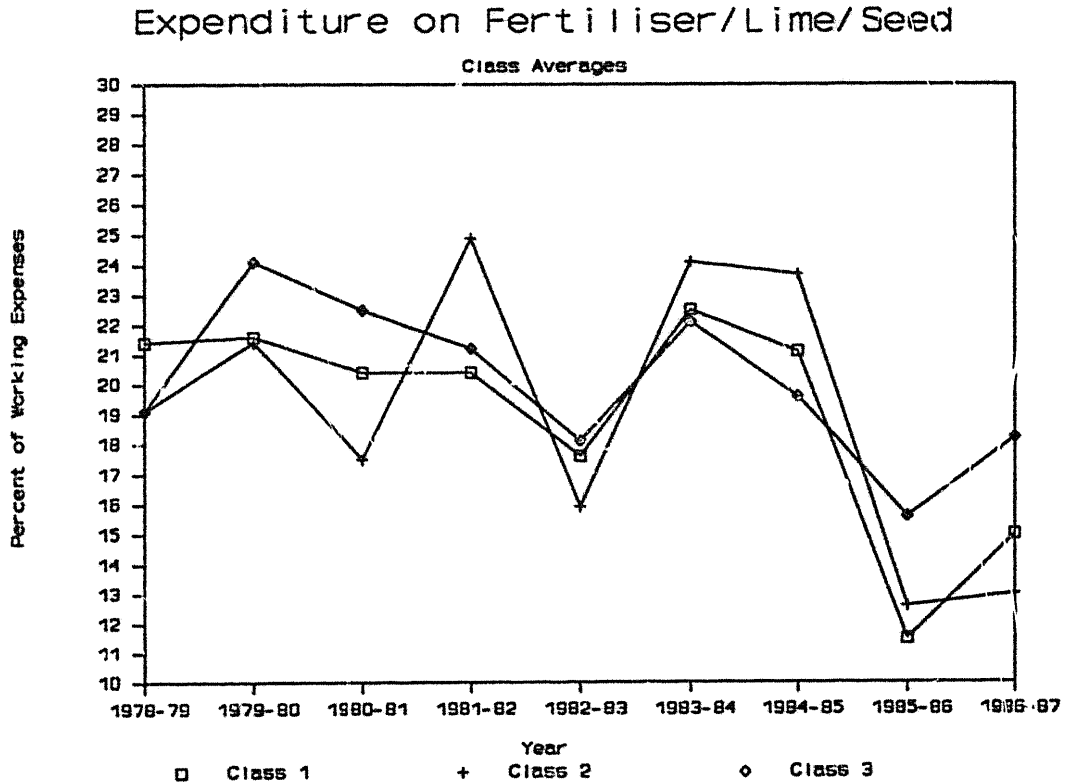
Farm leverage is generally considered to be a major factor in determining farm performance. This relationship is examined in Figure 2. Although our "managerial income" measure removes the effects of interest payments, we would still expect a relationship between performance and the debt/asset ratio. The expected pattern does in fact emerge, with the poorer managers having the highest debt ratios. However, what is striking is the small range in equity ratios between the three classes. It would thus seem that debt level is not as much of a determining factor in farm performance as generally believed.

Figure 2



We now turn our attention to looking for signs of different behaviour among the three classes. This is done first by examining expenditure on two key categories – fertiliser, and repairs and maintenance. In Figure 3, showing the average expenditure on fertiliser, lime and seed, Class 3 demonstrates the most consistent expenditure pattern over time. Of particular interest are the last two

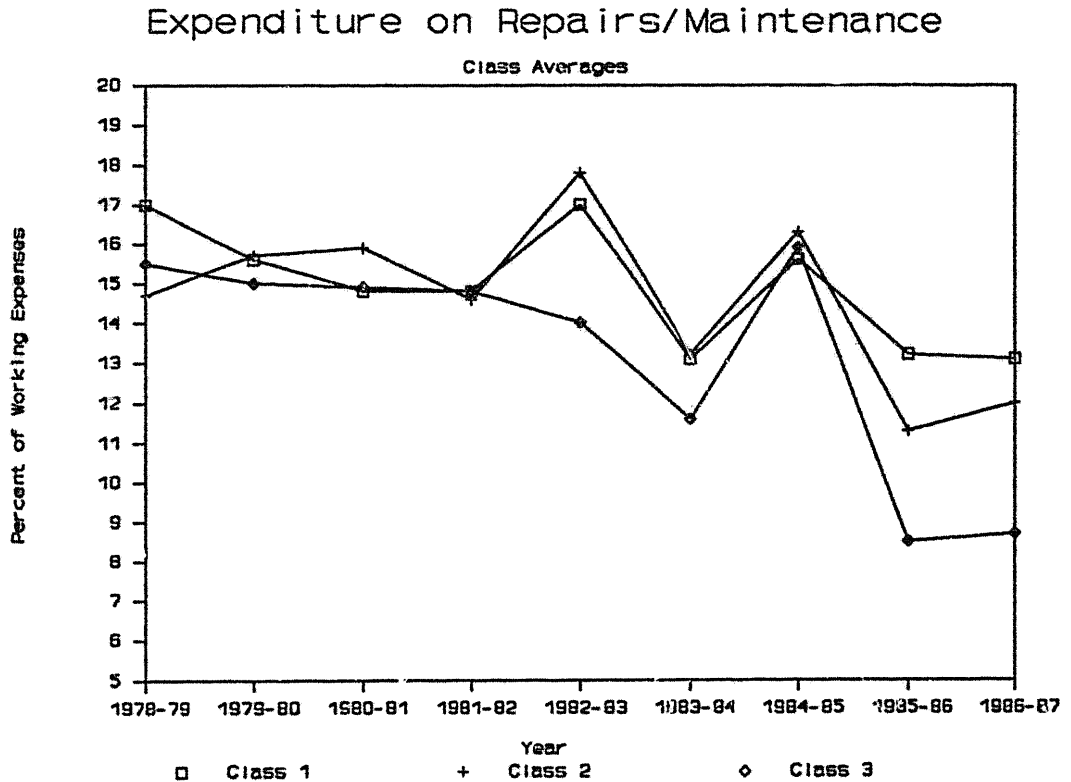
Figure 3



years, when farmers are experiencing the changed economic environment. While all farmers cut costs by cutting back expenditure on fertiliser, this reduction is far more severe for Classes 1 and 2. Figure 4 shows the reverse pattern. In general, expenditure on repairs and maintenance follows closely the pattern of net income. However, during the last two years Class 3 farmers cut back far more on repairs and maintenance than their colleagues with lower managerial incomes. Thus good managers under pressure have opted to cut repairs and maintenance proportionately more than fertiliser, while poor managers have followed exactly the opposite strategy.

A parallel can be drawn between Class 3 farmers and the high performance farmers of Davison's analysis (Table 1), who maintain relatively higher levels of fertiliser use. This contributes in turn to the maintenance of their higher production and higher returns.

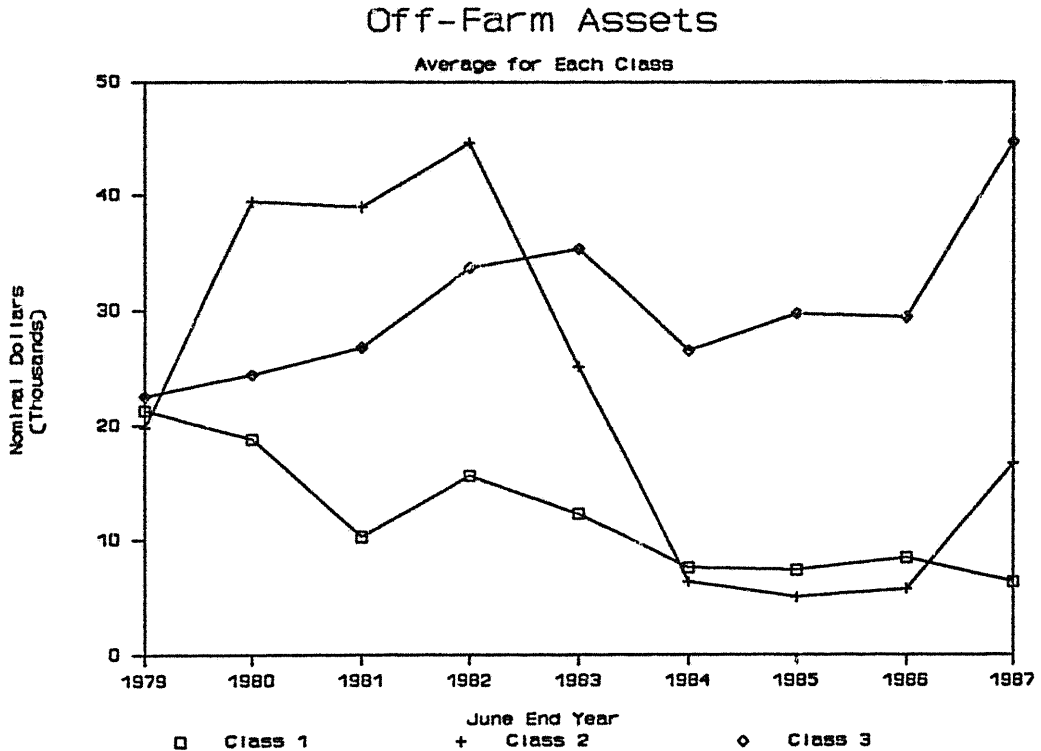
Figure 4



Another side of adjustment is diversification into alternative enterprises. It is interesting to note that of four farms moving into deer, two were from Class 2 and two from Class 3. Four farms also diversified into goats, again two from each of Classes 2 and 3. No Class 1 farms diversified in this manner.

The final figure (Figure 5) shows the average level of off-farm assets, and here once again different patterns are shown for each of the three classes. There is a sharp distinction between the accumulation of off-farm assets by Class 3 farms, and the divestment by Class 1 farms. Class 2 shows a striking sale of off-farm assets from 1982 to 1984, in a pattern far different to the other two classes. It is interesting to note how sensitive the level of off-farm assets is to farm performance. This draws attention to the increasing importance of off-farm financial decisions, and the need to consider this side of the farm business in any work into adjustment to change.

Figure 5



Conclusion

Both the literature review and some simple data analysis on a sample of New Zealand sheep and beef farmers demonstrate the importance of undertaking adjustment research at the farm level, in order to fully understand the mechanics of the adjustment process, and also to be able to identify varying adjustment behaviour patterns.

This is, however, only the first step in a much larger research project. One consideration in future research will be a fuller investigation of the relationships between various farm characteristics, and management strategies. This obviously will require a larger and richer data set than the small sample used here for illustrative purposes. Further work will also be carried out on various measures of managerial skill, and a clearer understanding gained of what exactly "good management" signifies.

The major consideration of further work will be the selection of an appropriate modelling framework on which to base the research. The household behaviour models of development literature may have much to offer in this

way, although concepts and techniques may also be adopted from the human capital literature, as well as from some of the studies mentioned above.

By employing these various methods, we seek to gain better insight into the adjustment process of New Zealand sheep and beef farmers, as they endeavour to adapt to a sudden and significant change in their economic environment. This will in turn help to answer questions currently being raised around the world concerning the impacts of reducing agricultural protection. Policy-makers in other nations wish to know to what extent, and how quickly, such reductions can be made, and whether in fact they may be made at all without incurring untenable adjustment costs. It is hoped that the intended research project will serve to help provide answers to these important questions.

REFERENCES

- Attwood, E. A.
1985 Economic Aspects of Agricultural Education and Training in New Zealand. Discussion Paper No. 95, Agricultural Economics Research Unit, Lincoln College.
- Barlett, Peggy
1984 Microdynamics of Debt, Drought, and Default in South Georgia. American Journal of Agricultural Economics 66(5):836-843.
- 1987 The Crisis in Family Farming: Who Will Survive? In Farm Work and Fieldwork: American Agriculture in Anthropological Perspective. M. Chibnik, ed. Pp. 29-57. Ithaca, N.Y.: Cornell University Press.
- Boussard, Jean-Marc
1985 Changing Environment and Structural Heterogeneity in Agriculture. In Agriculture in a Turbulent World Economy (Proceedings: Nineteenth International Conference of Agricultural Economists). Allen Maunder and Ulf Renborg, ed. Pp. 531-541. Aldershot, Hants.: Gower Publishing Co. Ltd.
- Davison, R.M.
1988 A Review of Current Financial Trends and Farm Incomes in the New Zealand Sheep and Beef Industry. Address to the Meat and Wool Boards' Electoral Committee Meeting, 31 March 1988, Wellington (MWBES).
- Edwards, C.J.W.
1980 Changing Farm Size and Land Occupancy in Central Somerset: - A Note. Journal of Agricultural Economics 31(2):249-251.
- Ehrensaft, Philip, Pierre LaRamee, R.D. Bollman, and F.H. Buttel
1984 American Journal of Agricultural Economics 66(5):823-828.
- Edwards, Clark
1985 Productivity and Structure in U.S. Agriculture. Agricultural Economics Research 37(3):1-11.
- Fairweather, J.R.
1987 Farmers' Responses to Economic Restructuring: Preliminary Analysis of Survey Data. Research Report No. 187, Agribusiness and Economics Research Unit, Lincoln College.
- Flora, J.L. and J.M. Stitz
1985 Ethnicity, Persistence, and Capitalization of Agriculture in the Great Plains During the Settlement Period. Rural Sociology 50(2):341-360.
- Gladwin, Christina H. and Robert Zabawa
1984 Microdynamics of Contraction Decisions: A Cognitive Approach to Structural Change. American Journal of Agricultural Economics 66(5):829-835.
- Greer, J.P.
1982 Motivation and Other Factors Influencing the Adoption of Practices by Sheep Farmers in Oxford County. Unpublished M.Agr.Sci. thesis, Lincoln College.

Huffman, Wallace E.

1977 Allocative Efficiency: The Role of Human Capital. Quarterly Journal of Economics 91:59-80.

1985 Human Capital, Adaptive Ability, and the Distributional Implications of Agricultural Policy. American Journal of Agricultural Economics 67:429-434.

Just, Richard E. and David Zilberman

1985 Risk Aversion, Technology Choice, and Equity Effects of Agricultural Policy. American Journal of Agricultural Economics 67:435-440.

Lattimore, Ralph, Bruce Ross and Ron Sandrey

1988 Agricultural Policy Reforms In New Zealand, 1984. Paper presented at the International Agricultural Economics Association Meetings, 24-31 August 1988, Buenos Aires.

Marini, M.

1987 A Typology of Farm Families in Southern Italian Marginal Areas. In Multipurpose Agriculture and Forestry (Proceedings of the 11th Seminar of the European Association of Agricultural Economists (EAAE) 28 April-3 May). Pp. 261-276.

Ministry of Agriculture and Fisheries (MAFCorp)

1988 Situation and Outlook for New Zealand Agriculture. Wellington: MAFCorp.

Salamon, S.

1985 Ethnic Communities and the Structure of Agriculture. Rural Sociology 50(2):322-340.

Schultz, Theodore W.

1975 The Value of the Ability to Deal With Disequilibria. Journal of Economic Literature 13:827-846.

Skees, Jerry R. and Michael R. Reed

1988 The Restructuring of Southern Agriculture: Data Needs for Economic and Policy Research. Southern Journal of Agricultural Economics 20(1):33-40.

Smale, Melinda, William E. Saupe and Priscilla Sarant

1986 Farm Family Characteristics and the Viability of Farm Households in Wisconsin, Mississippi and Tennessee. Agricultural Economics Research 38(2):11-27.

Wagstaff, H.

1985 Variations in Input Usage and Performance on Scottish Farms 1978/79 - 1983/84. Farm Business Outlook 18:19-28.

Wimberley, Ronald C.

1987 Dimensions of U.S. Agristucture: 1969-1982. Rural Sociology 52(4):445-461.