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3

The Evaluation of Agricultural Loans:

A case study of Development Bank
financed cattle projects in the
Markham Valley of Papua New
Guinea

P. Desmond Brunton

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P. Desmond Brunton

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A B S T R A C T

This study is concerned with developing a system of loan evaluation for use by a development bank, focussing on the extent to which the loan recipients experienced improvement in their financial position. It is suggested that such financial improvement is a necessary condition for the success of any credit program.

The evaluation system developed uses the 'owner's' net present value or work as the decision criterion to judge whether financial success had, in fact, occurred. Fourteen small-scale beef cattle farmers, operating in the Markham Valley of Papua New Guinea, and financed by the Papua New Guinea Development Bank, were used as cases to test the adequacy of the system and the criterion used.

The major conclusion of this study is that the net present value criterion is adequate as a definitive measure of financial improvement. It incorporates the time value of money, is relatively simple to apply and is able to take into consideration particular constraints (e.g., a minimum income constraint) facing the entity for which the analysis is being performed. It is also capable of incorporating the different time preference rates (and risk return preferences) of different individuals by reflecting these differences in the discount rate chosen. Finally, the net present value is a valid maximizing objective, thus improving its usefulness as an evaluation criterion.

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CHAPTER 1

INTRODUCTION

1.1 The Role of Credit in Agricultural Development

In the 1950s and 1960s many newly emerging countries placed heavy emphasis on the establishment of public or quasi-public credit institutions as essential ingredients in the agricultural development process. An OECD publication in 1967 (Nylart, 1967) listed some 340 development banks and finance companies in developing countries. International lending agencies¹ actively supported this approach and found such institutions to be useful channels for making international funds available to small farmers of developing countries. Indeed, some of these international agencies may have been instrumental in the establishment of such institutions (e.g., Papua New Guinea).

Hyami and Ruttan (1971) suggest that this emphasis on credit was based primarily on four assumptions namely:

- (i) that innovation is the critical element in economic development and credit is the essential organizing instrument which allows the innovator to compete successfully for resources;
- (ii) that there exist significant elements of middleman monopsony in the rural sectors which result in continuous exploitation of the farmer;
- (iii) that a public credit institution is part of an overall package designed to encourage farmers to adopt modern techniques of production; and

¹ Notably the Agency for International Development (AID); the International Bank for Reconstruction and Development (IBRD); and the Inter-American Development Bank (IDB).

- (iv) that credit is an income transfer mechanism which removes inequities in income distribution in the rural areas.

But after many years and much expenditure of resources, the performance of a majority of these credit institutions and their attendant programs has been far from good. Indeed, the overall results have been so disappointing that serious questions have been raised as to the validity of the assumptions on which the credit programs were based, and a re-examination of the role of credit in the agricultural development process has been advocated.

A detailed treatise on the role of credit is beyond the scope of this study but it may be useful to outline, albeit rather briefly, some of the more important lessons learned from the experiences of a number of different countries (see *AID Spring Review of Small Farmer Credit*, 1973).

In the first place it appears that the abovementioned assumptions while not being false, *per se*, vary in their relative importance in any particular socio-economic environment. And credit policies based on the complete acceptance of these assumptions, in the absence of environmental-specific investigation and research, could have disastrous results.

Secondly, regardless of the political attractiveness of the 'credit philosophy', which may have largely accounted for its ready acceptance by the governments of many newly independent countries, credit is no panacea for raising the productivity and incomes of the rural population. Without the necessary infrastructure in terms of markets for crops and livestock products, in terms of supplies of inputs at the required times and, most importantly, in terms of the existence of new technology which farmers perceive as being profitable, a small farmer credit

program would easily lead to the waste of already scarce capital resources.

Thirdly, government financed credit programs, which include the majority of small farmer credit programs in the developing countries, tend to become bureaucratized and over-centralized with the result that the program coverage is severely curtailed. More significantly, many programs seem to concentrate on the larger, more commercially oriented farmers, in direct contradiction to the 'equity' grounds on which many of the programs are supposed to be based.

Fourthly, it seems that while governments have been quick to adopt credit programs and establish credit institutions, few concerted attempts have been made to mobilize savings in the rural areas. A number of authors¹ have suggested that credit, in the early stages of agricultural development, may be decidedly unproductive given the conditions of traditional agriculture, but that the generation of rural savings could have high payoffs particularly when capital resources in the public sector are scarce. It is also suggested that the capacity to save among the rural population is frequently under-rated.

An overriding theme that seems to come out of much of the literature is the need for constant monitoring of the performance of credit programs in order to ensure that the stated goals are being met. In part, this need for continuous 'feed-back' is a result of the inability to specify, beforehand, a particular program design that would suit a specific socio-economic environment. Indeed, one may argue that such specification is undesirable since a credit program should be so implemented as to meet the needs of a changing environment, and therefore must change accordingly.

¹ Notably Penny (1968) and Howse (1974).

1.2 A Digression on Goals and Objectivity in Evaluation Research

Within the context of economic inquiry, the idea of 'evaluation' implies the existence of some 'reference point' against which the outcome of an economic event or program could be judged. In most instances this reference point takes the form of a set of goals and objectives and it is by assessing the extent to which goals are realised and by identifying the factors associated with successful or unsuccessful outcome, that evaluation research assists decision-makers to make choices among future courses of action.

But evaluation is an exercise that takes place within a political context, and failure to recognise the presence of political considerations could seriously limit the effectiveness of evaluation research (Weiss, 1975). Thus, the goals and objectives which are written into the official document of a development bank are frequently the product of political processes and it is not uncommon to find that inflated promises are made 'in the guise of programme goals' (Weiss, 1975). Also, goals are often stated in very broad terms and lack the clarity that evaluation criteria should have. What this means is that the evaluator is faced with the difficult task of trying to decipher which are real goals and which represent 'window dressing'.

In addition, given the nature of development banks' goals, conflict between goals is often the rule rather than the exception. In the process of evaluating the attainment of goals, therefore, judgments have to be made as to what is an acceptable level of trade-offs between goals and this leads to the whole question of objectivity in evaluation research. For the mere fact that the evaluator has to ask specific questions and make judgments on certain issues indicates the existence of a value or political stance. This does not invalidate the potential contribution of evaluation research, but it does

indicate that an evaluator must be constantly aware of his own and others' political considerations if he is to be as useful as he should be. And as far as possible, the value premises on which judgments are based ought to be made explicit.

1.3 The Concept of Loan Evaluation

The development bank is the main type of institution utilized by governments in the less developed countries to implement agricultural credit programs. Such institutions, while differing widely in ownership, sources of finance, degree of dependence on government, specific objectives and methods of operations (Diamond, 1957) have one common feature, and one which distinguishes them from other finance companies, in that they incorporate a 'developmental function' in their goals. This implies that any attempt to evaluate the performance of a development bank should be based on a measurement of the extent to which it has achieved its development objectives.

But the assessment of development objectives is not a straightforward task for it involves variables that are 'notoriously difficult to measure' (Fisk, 1975a). Being concerned with broader purposes than those associated with more commercial-type institutions, development banks frequently operate in areas of much higher risk and can also involve themselves in investment activities which may not represent best financial use of resources on the rationale that the national interest is being sought.

In an evaluation exercise one could therefore conceptualize two viewpoints. In one instance a development bank would be concerned with success from the borrower's point of view, which, by a simplifying assumption, could be represented by financial success of the loan-financed asset or enterprise. Secondly, the bank is also concerned

with success from the point of view of the economy as a whole, which may or may not coincide with success from the borrowers' viewpoint. For this reason, and as pointed out by Fisk (1975a), the separate consideration of these two views is of utmost importance, as without such separation wrong conclusions could be drawn. Somewhat implicit in the Fisk argument is the suggestion that 'failure' from the point of view of even a significant percentage of the clients of a small farmer program does not necessarily imply that the program is a failure, if it could be ascertained that the nation as a whole has benefited.

Without discounting the importance of 'national objectives' and the logic of the Fisk argument, it seems obvious that unless a reasonable proportion of the participants of a small farmer credit program perceive (and eventually realize) adequate benefits to themselves, it is doubtful whether success from the national interest viewpoint could be attained. As to what represents a reasonable proportion of the participants would depend to a large extent on the circumstances of the program and in particular on the nature, if any, of the technological changes involves.

But a more conceptual argument in favour of focussing on client improvement, hinges on one of the basic objectives of small farmer credit programs. In many instances a central theme in credit programs is that of increasing production of a specific commodity or community group. By concentrating on this objective (i.e., as opposed to economic improvement of the small farmer) there is the tendency to allocate funds among the top groups of small farmers since marginal analysis would suggest allocating scarce resources first to them (Baker, 1973). On the other hand, by concentrating on economic improvement of the client, the lending institution is 'forced' to

compare changes in economic status that can be gained by lending to these farmers in the lower as opposed to the upper levels of the small farmer profile.¹ This is not to say that many credit programs do not have notions of improvement in small farmers' economic status as important goals. But experience has shown that given the complexities of extending development credit, many development banks become extremely selective in their loan assessments and end up restricting credit to the upper ranges of the small farmer profile. By so doing, loan management is simplified and default problems reduced.

Further, even when economic improvement of the small farmer is a consciously recognised goal, the assessment of this objective is frequently limited to pre-loan approval stages with little concerted effort being made to ascertain the extent to which the objective is being met. In part, this stems from staff and other resource restrictions which plague many development banks and which is aggravated by a seeming preoccupation with the granting of loans, stemming frequently from the political environment in which the bank was established. But the lack of post-approval evaluation may also result from the absence of a generally accepted and easily implemented system of assessing client improvement. On a more general note, much of the literature on project evaluation deals with 'projections' of the future, with very little time devoted to performance evaluation. It is almost as though there is an implicit assumption that once a project is properly analysed, it would perform adequately.

¹ It should be mentioned, in this context, that I am not suggesting lending to those farmers who cannot, even with favourable credit terms, approach commercial viability. Such farmers are probably better helped by other types of programs. My reference is to that group of small farmers (quite large in some countries) who could be made commercially viable by favourable credit and other incentives. Further, making relative comparisons does not necessarily imply not lending to the larger smallfarmers, but it does provide for a more even distribution of loan funds.

The need for a system of assessing client improvement is therefore critical. Without a reasonably accurate means of doing this, the management of a development bank is unable to determine the extent to which its operations are, in fact, reaching the smaller farmers. Also, program reach is one thing but just as important is whether the bank's operations are really benefiting the farmers lower down in the small farmer profile. It may be, for instance, that certain policies of the bank are working against the interest of the smaller borrowers. The absence of a post-approval evaluation system precludes the identification of such situations in sufficient time for effective remedial action.

1.4 The Meaning of Economic Improvement of the Small Farmer

Part of the problem too, stems from the difficulty involved in identifying whether economic improvement has, in fact, occurred. In a strict theoretical sense, the notion of economic improvement includes aspects of both finance and sociology. Thus, one is concerned, not only with whether a given enterprise has resulted in financial improvement, but also the way in which social relationships are adjusted and redefined among the participating individuals or groups (Evans, 1975).

The definition of economic improvement alluded to above highlights the complexity of the problem and underscores the frequent need to make simplifying assumptions concerning the criteria chosen. In the context of the present study, therefore, economic improvement of the small farmer would be measured by the extent to which the farmer has experienced an improvement in financial status. While recognising that this is a very simplifying assumption, indications are that such a measure may still give useful insights. In the first place and as will be shown in a later section, a significant proportion of the farmers who formed the basis of this study indicated that a major

reason for their involvement in the particular enterprise was to improve their income situation. Measurement of the extent to which this has occurred is, therefore, quite relevant from the individual farmers' viewpoint. Secondly, overall economic improvement (i.e., as opposed to financial) of an individual would involve estimation of unique utility preferences, and attempting such a measure, in the absence of unacceptably broad generalizations, may well prove impossible. Finally, this study is concerned with attempting to develop a system of individual loan evaluation that could be easily implemented by a development bank; it follows that practicability, without undue sacrifice of accuracy, is an overriding consideration.

1.5 Objectives of the Study

The basic objective of the study is to develop a system of evaluating agricultural (development) loans, focussing on the extent to which the recipients have improved in economic status, as a result of the loans. The study is therefore concerned with the period after a loan is granted, but it is hoped to show how the information obtained in such an exercise could assist policy-makers and administrators in deciding on better methods of pre-approval loan appraisal.¹

In a real sense, the study has a very practical bias and this stems largely from the basic objective mentioned above. No contribution to the theory of evaluation research in agricultural finance is attempted. Rather, the more modest aim is to show how existing theory could be incorporated into an evaluation system that takes (explicitly)

¹ Here, and in other parts of this study, the term 'evaluation' when used in connection with an agricultural loan refers to a post-approval situation. Appraisal, on the other hand, is used in reference to the pre-approval analysis, on the basis of which a loan is granted.

into consideration, the constraints impinging on the operations of a development bank.

This practical orientation initially caused me certain misgivings concerning what may be termed the 'academic respectability' of the study. This stemmed partly from pre-conceived and to some extent misplaced notions of what academic respectability entailed. In a sense, I had rationalised that in order for something to be 'academic' it must be abstract and that anything without a high level of abstraction could not be considered acceptable, according to academic standards. But after considerable mental 'trauma' I have come to the conclusion that research in the 'action' setting (which is what I mean by a 'practical' bias) though it may differ in design, initiation and conduct from the more abstract type research, is no less acceptable, provided it is based on a sound theoretical background and the incorporation of the real constraints and concerns of the institution which is the subject of the research. is made explicit.

Another somewhat indirect objective arises from the fact that the study utilises information from a developing country with a large, semi-subsistence rural sector. To the extent that subsistence agricultural production represents a significant proportion of the national product of many developing countries (at least in the Pacific region) it is hoped that the investigations would throw some light on the way in which a semi-subsistence farm is adapting to the environmental forces which impinge upon it.

Such insights are important for two related reasons:

- (i) The operating characteristics of the semi-subsistence farm may be decidedly different from those of the fully commercial farm, suggesting that indiscriminate application of theory based on the commercial farm model could give erroneous or misleading results, and

- (ii) Many developing countries with semi-subsistence farm sectors have adopted the concepts of supervised credit as an essential element in an agricultural development strategy. Any insight as to the effect of this approach on the operation of the semi-subsistence farm would seem a useful contribution.

1.6 Approach Adopted

The basic information utilised in the study was obtained over a period of two months (January and February, 1977) spent in Papua New Guinea. The major information sources were:

- (i) Individual loan files and accounting records of the Papua New Guinea Development Bank;
- (ii) Project files of the Department of Primary Industry of Papua New Guinea, and
- (iii) Discussions with officials at various levels of both the Papua New Guinea Development Bank and the Department of Primary Industry.

In addition, the study utilises 14 Development Bank financed small-holder beef cattle projects located in the Markham Valley (Morobe Province) of Papua New Guinea, as case studies. These cases were used to test the adequacy of a method of loan evaluation which utilises the concept of net present value as the criteria to decide whether an individual farmer has benefited as a result of the acquisition of a cattle loan.

Given the complexities of evaluative research alluded to in an earlier section, it seemed that some perspective of the cattle situation in the Markham Valley was necessary. In order to do this,

data from a sample survey of cattle projects in the valley (conducted during December 1975 and January 1976) was utilised. This data had, in fact, not been previously analysed and it was necessary to extract it from the raw survey forms. Much of the data was of a qualitative nature and its use in this study suffers from the fact that it was designed, and the data collected, with objectives completely different from my own. Nevertheless, some useful background information was provided.

In order to 'back-up' information provided on the files and also to get a 'feel' of the situation in the field, visits were paid to all of the 14 cattle farmers. At these visits, with the aid of a Bank officer acting as interpreter, questions were put to the farmers concerning such things as calving rates, mortalities and use of operating inputs.

As indicated previously, the research was performed in an 'action' setting and takes explicitly into account the constraints and concerns of the institutions involved in delivering credit to smallholders. Thus, on the question of developing a system of loan evaluation, discussions with Bank and Department of Primary Industry personnel indicated that any acceptable system must be such as to require as little additional paperwork as possible, without sacrificing effectiveness. It was felt that the current reporting system utilized by the institutions provided a wealth of information and the real problem was one of developing a means of adequately analysing this data. Incorporating these concerns in the research strategy meant examining the current reporting system to ascertain to what extent the information collected was, in fact, adequate for the purposes of evaluation. As another example of explicitly recognising the institutional constraints, the complexity of the system developed had to be viewed in light of the skills of the staff expected to operate it.

1.7 Justification of the Study

Much of the earlier discussion in the chapter was by way of justification for the study. In a more specific sense, initial discussions with a number of persons involved in the cattle industry of Papua New Guinea indicated that smallholder cattle development had slowed down considerably¹ and the real reasons for this were not clear. This lack of knowledge stemmed from the limited emphasis placed on the evaluation aspects of the cattle development strategy. To the extent that the country was still a net importer of beef (see Table 2.13) it was felt, however, that there still existed considerable potential for increasing domestic beef production, suggesting that the apparent decline in interest by smallholders may stem from certain characteristics of cattle farming in Papua New Guinea, working against the interest of the small producer. From this point of view, an evaluation system which could provide continuous information on the smallholders' position *vis à vis* the whole industry seemed particularly relevant.

¹ Indicated, for instance, by the significant decline in new cattle loans granted by the Papua New Guinea Development Bank (see Appendix A, Table A.2).

CHAPTER 2

SOME BACKGROUND PERSPECTIVES

2.1 The Economy of Papua New Guinea

Papua New Guinea is a large but sparsely populated underdeveloped country, only recently emerging from a history of colonialism. Like many other ex-colonial societies, the existing economic structure is a reflection of this history and to some extent the imprint of colonial administration is more pronounced in Papua New Guinea given the infancy of the country as an independent nation.¹ At the same time, however, the circumstances of its colonialism has resulted in certain features which serve to differentiate Papua New Guinea from many other former colonial countries. Thus, the relatively short period of colonial rule, occurring as it did in what may be considered a more enlightened period of history, meant that the large-scale implantation of colonial institutions did not occur to the same extent as in the older colonial societies, e.g., the West Indian countries. This is reflected, for instance, in the fact that though there has been plantation development, it has not occurred on the same scale nor resulted in the same widespread alienation of land, as has happened in other areas.² Slavery and wholesale importation of indentured labour, of a different cultural background, also did not occur to the same extent.

¹ Papua New Guinea received internal self-government in 1973, and political independence in 1975.

² The very favourable land/labour ratio is a significant factor in this context.

Significant in this context, too, is the fact that the period of Papua New Guinea's contact with the international economic, social and cultural world is comparatively short.¹ This has a number of consequences, both negative and positive, on the capacity of the economy to promote rapid economic transformation, a capacity determined by fundamental political and social processes and attitudes and reflected in its ability to apply innovations and adapt to changing situations (Demas, 1965).

Thus, an interesting and, from a developmental standpoint, significant feature of the economy, is the continuing importance of non-monetary (subsistence) production, a reflection of the relatively short period of external contact. Table 2.1, showing expenditure on Gross Domestic Product for the five years 1972-75, indicates that this component, though declining relatively, still represents a significant proportion of GDP, amounting to approximately 16 per cent in 1975 and 1976. And it has been suggested that given the amount of land and labour within the subsistence sector, its importance is much greater than is reflected in the accounts, and represents a potential for development far in excess of its monetary value (Fisk, 1966). At the same time, its inherent characteristics impose certain constraints on the manner in which the development process could be directed.

Another significant feature of the economy is the importance of government spending. Over the period covered by Table 2.1, government final consumption expenditure represented between 27 per cent and 33 per cent of GDP. This, however, does not fully reflect the

¹ For example, the Highland Regions of Mainland Papua New Guinea, the most densely populated area, was only penetrated in the 1930s.

TABLE 2.1
 PAPUA NEW GUINEA - EXPENDITURE ON GROSS DOMESTIC PRODUCT
 AT CURRENT PURCHASERS' VALUES
 (year ended 30 June - million kina*)

Item	1972	1973	1974	1975	1976
Government final consumption expenditure	207.1	228.0	270.1	331.0	319.1
Private final consumption	407.4	427.9	446.0	518.0	545.5
- Market component	258.3	265.9	287.6	356.7	380.1
- Non-market component	149.1	161.9	158.4	161.3	165.4
Increase in stocks	8.5	19.0	3.7	28.8	25.8
Gross fixed capital formation	241.7	129.8	130.5	178.8	174.1
- Market component	240.3	126.6	129.4	177.4	172.6
- Non-market component	1.4	3.2	1.2	1.4	1.5
Exports of goods and services	157.2	290.4	530.5	434.3	418.0
<u>Less</u> Imports of goods and services	383.8	308.2	328.7	486.2	481.9
Statistical discrepancy	7.3	1.8	-11.4	4.6	12.5
<u>Gross Domestic Product</u>	645.4	788.8	1040.6	1009.1	1013.2
M - Market component	494.9	623.6	881.1	846.5	846.2
- Non-market component	150.5	165.2	159.5	162.6	167.0

Source: Papua New Guinea Bureau of Statistics - National Accounts Statistics - Bulletin No.2 - Consolidated Accounts for the Nation 1971/72 - 1975/76.

* \$A1 = K 0.8789 (at 4.1.1977)

importance of the public sector, for included in the components of gross fixed capital formation would be items that are the responsibility of government.¹ Further, Table 2.2 shows the sources of government revenue over the same period covered by Table 2.1 and highlights the fact that external aid is the major single source of revenue accounting directly for between 28 per cent and 43 per cent over the period.² These two factors, the importance of government spending and the significance of aid as a source of such spending, are reflections of the stage of development but they are also indications of the strict limitations that exist on the flexibility of the economy to adjust to changing internal and external conditions.

In common with many less-developed economies, Papua New Guinea exhibits a heavy dependence on foreign trade, a dependence illustrated in the proportion of GDP absorbed by the export and import components (Table 2.1). Exports of the country are heavily concentrated in primary products, and Table 2.3 indicates that nine primary commodity groups accounted for between 77 per cent and 98 per cent of total domestic exports over the 1972-76 period. But perhaps the more significant feature illustrated by Table 2.3 is the overwhelming importance of one commodity, copper. Thus, since 1972, the increases in export incomes that have occurred are largely the result of increases in production of copper ore and concentrates. To some extent, this

¹ For example, for the years 1971, 1972 and 1973, fixed capital formation by government accounted for 16 per cent, 23 per cent and 36 per cent respectively of gross fixed capital formation. And these were the years when there was heavy private investment in copper mining (PNG Bureau of Statistics - Summary of Statistics 1972/73).

² Indirectly, the importance of external aid is much greater than suggested in these figures, given the multiplier effects associated. To this extent, removal of the aid component would have an extremely far-reaching effect on Gross Domestic Product.

TABLE 2.2

PAPUA NEW GUINEA - SOURCES OF GOVERNMENT REVENUE
(year ended 30 June - million kina)

Source	1972	1973	1974	1975	1976
Customs and Excise	33.0	33.9	40.0	50.0	55.3
Other Taxation	40.1	44.4	61.4	89.5	89.6
Australian Government Grant	69.9	85.9	135.3	156.3	119.4
Loans	45.3	35.5	41.4	50.3	60.4
Other Revenue	22.2	14.7	35.0	45.1	103.9
Total Revenue	210.5	214.4	313.0	391.2	428.5
Total Expenditure	209.8	216.2	304.7	400.3	429.0

Source: Papua New Guinea Bureau of Statistics - Abstract of Statistics 1973-1976.

TABLE 2.3⁺

PAPUA NEW GUINEA - VALUE OF EXPORTS BY MAJOR COMMODITIES (f.o.b. values)
(year ended 30 June - million kina)

Commodities	1972	%*	1973	%*	1974	%*	1975	%*	1976	%*
Copper ore and concentrates	22.3	24.0	125.6	62.6	311.9	68.9	236.7	69.7	199.5	58.4
Copra and products	16.9	18.2	15.2	7.6	38.9	8.6	44.3	13.0	20.5	6.0
Cocoa	0.6	0.6	11.2	5.6	23.3	5.1	40.1	11.8	28.6	8.4
Coffee	20.5	22.0	23.4	11.7	28.9	6.4	33.6	9.8	42.2	12.3
Rubber	1.9	2.0	1.9	0.9	3.6	0.8	2.6	0.8	2.7	0.8
Tea	1.5	1.6	2.1	1.0	2.6	0.6	3.9	1.1	4.0	1.2
Timber and products	9.0	9.7	10.7	5.3	20.3	4.5	13.6	4.0	12.2	3.6
Palm oil	-	-	-	-	2.7	0.6	6.8	2.0	6.8	2.0
Fish	4.9	5.3	4.4	2.2	13.6	3.0	10.1	3.0	6.4	1.9
Other	15.5	16.4	6.0	3.0	7.2	1.6	8.0	2.4	19.0	5.6
Total Domestic Exports	93.1		200.5		453.0		339.8		341.9	
Re-exports	34.1		29.1		30.7		23.7		25.2	
Total Exports	127.2		229.6		483.0		423.5		367.1	

Source: Papua New Guinea Bureau of Statistics - International Trade 1971/72 - 1973/74 and Abstract of Statistics, December 1976.

+ The format of the table was adopted from Fisk (1966).

* As percentage of Total Domestic Exports.

dependence on a limited number of commodities is to be expected given the country's stage of development, but it does highlight one of the more serious problems facing the country, namely, that its rate of growth is heavily influenced by the terms of trade, which are given (i.e., the country is a price-taker). The increase in GDP during the 1973-74 financial year was mainly a result of rapid increases in the prices of copper ore and other primary products in world markets. Similarly, the decrease in 1974-75 was due to an almost equally rapid falling-off of prices resulting in a large decrease in the value of exports, mainly copper (see Tables 2.1 and 2.3).

The composition of imports is also indicative of the country's stage of development. Table 2.4 gives the disposition of visible imports for the 1972-76 period. It indicates the high relative importance of food and other consumer goods,¹ a fact related to the limited development of the manufacturing and industrial sectors. The importance of food imports is singularly significant, reflecting the country's concentration on export agriculture, a feature that is characteristic of the colonial pattern of development. At the same time, the large volume of food imported provides a potential area for import substitution and this is probably one of the easier opportunities to exploit in the early stages of development.

Another aspect of this external dependence is that illustrated in Table 2.5 showing the country's balance of payments for 1972-76. It is seen that property and entrepreneurial income payable abroad represents a significant and increasing proportion of total current

¹ If it is assumed that items marked with an asterisk in Table 2.4 are consumer goods, then between 50 and 57 per cent of total imports are represented. Also, a substantial proportion of machinery and equipment imports would include items going to final consumers (cars, household appliances).

TABLE 2.4

PAPUA NEW GUINEA - DISPOSITION OF VISIBLE IMPORTS
(year ended 30 June - percentage)

Commodity Group	1972	1973	1974	1975	1976
Food and live animals*	17.7	20.9	25.1	20.0	20.9
Beverages and tobacco*	2.3	2.2	1.9	1.6	1.7
Crude materials - inedible except fuel	0.4	0.3	0.3	0.3	0.3
Mineral fuels, lubricants, etc.	5.0	4.9	8.9	10.7	13.7
Animal and vegetable oils and fats*	0.1	0.2	0.2	0.2	0.2
Chemicals	5.0	5.4	6.0	6.4	5.5
Manufactured goods*	16.1	17.1	17.0	17.2	14.2
Machinery and transport equipment	36.3	32.1	26.9	31.4	31.4
Miscellaneous manufactured articles*	9.3	9.5	9.7	8.4	8.1
Miscellaneous commodities and transactions	5.0	5.9	3.0	2.6	3.1
Outside packages	1.4	1.5	1.3	1.1	1.0

Source: Papua New Guinea Bureau of Statistics - International Trade 1971/72 - 1973/74, and Abstract of Statistics, December 1976.

* See footnote 1, page 20.

TABLE 2.5

PAPUA NEW GUINEA - BALANCE OF PAYMENTS - CURRENT ACCOUNT
(year ended 30 June - million kina)

Item	1972	1973	1974	1975	1976
<u>Current Receipts:</u>					
Exports of goods and services (f.o.b.)	143.9	272.3	510.8	410.2	388.4
Transfers					
Property and entrepreneurial income					
from rest of world	5.5	6.5	11.6	15.3	15.4
Other current transfers	132.1	138.3	155.1	166.5	185.6
Total Current Receipts	281.5	417.1	677.5	592.0	589.4
<u>Current Disbursements:</u>					
Imports of goods and services (f.o.b.)	330.8	256.3	262.8	402.9	379.6
Transport and insurance services (net)	39.7	33.9	46.3	59.2	72.6
Transfers					
Property and entrepreneurial income					
to rest of world	40.9	43.9	90.7	83.9	54.9
Other current transfers	14.0	16.8	25.1	18.0	23.1
Total Current Disbursements	425.4	350.9	424.9	564.0	530.2
Balance on Current Account	(143.9)	66.2	252.6	28.0	59.2

Source: Papua New Guinea Bureau of Statistics - National Accounts Statistics - Bulletin No.2 - Consolidated Accounts for the Nation, 1971/72 - 1975/76.

disbursements and this is indicative of the country's dependence on foreign skills and entrepreneurship. Further, not reflected in the balance of payments, is the fact that many technical and managerial jobs both in the government and private sectors are held by resident expatriates whose remuneration would be included as part of the domestic product, but who represent, in fact, imported skills. The balance of payments table also illustrates the importance of transfers, mainly in the form of aid, mentioned earlier.

As is to be expected in an underdeveloped economy such as Papua New Guinea, agriculture is the predominant sector. Thus in 1971-72 (the most recently available figures), agriculture accounted for 34 per cent of GDP and 91 per cent of the population were engaged in this activity (see Table 2.6). This figure also reflects, however, another characteristic of the colonial development pattern, namely the existence of dualism in the economy. Dualism here refers to the situation whereby different economic sectors and/or regions use techniques of production of widely different productivity such that the marginal products of identical factors of production differ greatly. The proportionate contribution of an economic sector to GDP, in relation to the population engaged within the sector, is therefore a measure of the degree of dualism and Table 2.6 illustrates this quite clearly. Within the sectors themselves, dualism is evident to the extent that every major industry in Papua New Guinea is characterized by a few large enterprises producing a significant proportion of output with the remainder being produced by numerous small units. Further, a characteristic of economic life in Papua New Guinea is that separation of any industry into large and small enterprises is effectively a separation into expatriate and nationally-owned enterprises. One implication of this is that the dualism that exists is not only economic but social

TABLE 2.6

PAPUA NEW GUINEA - GROSS DOMESTIC PRODUCT BY ECONOMIC SECTOR, 1971/72 -
AT CURRENT PRODUCERS' VALUES

Sector	Product value (million kina)	% GDP	% population engaged in sector
Agriculture and related industries	219.5	34.0	90.8
- market component	73.8	11.4	12.6
- non-market component	145.6	22.6	78.2
Mining and quarrying	13.6	2.9	0.2
Manufacturing and utilities	45.8	7.1	0.8
Construction	94.9	14.7	1.1
Wholesale and retail trade	43.4	6.7	0.7
Transport and communications	39.9	6.2	0.6
Services	67.3	10.4	1.6
Public authority, n.e.i. and defence	69.7	10.8	0.6
Other	46.3	7.2	3.6
Total	645.4	100	100

Source: Papua New Guinea Bureau of Statistics - Summary of Statistics, 1972/73.

and cultural as well, a situation which represents a source of potential social conflict.

To summarise this rather brief description, the picture that emerges is that of an underdeveloped, predominantly agricultural economy just emerging from a history of colonialism, and in which the effects of colonial development are still evident, as is reflected, for instance, in the presence of social and economic dualism. At the same time, the relatively short period of colonialism and the favourable land/labour ratios existing in most parts of the country mean that the effects of colonial development were not as pervasive as in many other colonial nations. It is an economy heavily dependent on foreign trade and aid, in which government spending represents a very significant proportion of GDP, and in which subsistence production in the rural areas is still relatively important, posing special problems for the development planners. With the recent attainment of political independence, one would expect changes to occur but it is yet too early to tell whether these changes would be reflected in the structural features of the economy.

2.2 Agricultural Credit in Papua New Guinea

2.2.1 Non-institutional credit

To a large extent the structure of agricultural credit in Papua New Guinea derives from the particular characteristics of the economy, discussed in the previous section. Thus, unlike many Asian and Latin American countries, Papua New Guinea has not yet witnessed the development of a money-lender class and this stems from the comparatively recent introduction of the monetary economy on a subsistence based, traditional structure. The only significant form of non-institutional credit to small farmers is that represented by the provision of labour

by members of the extended family or clan, on the basis of reciprocity. And Crellin (1971) has indicated that there has been, in recent times, a reduction in the availability of this traditional credit (i.e., with respect to cash enterprises) as labourers show a preference for cash payments.

Credit from suppliers of agricultural inputs and marketing firms, which exists only to a limited extent, is restricted to the larger, expatriate-owned farm enterprises (Crellin, 1971). The only possible source of such credit to small farmers would be the small trade stores, established in some villages bordering the main urban centres. These outlets, however, do not carry significant amounts of agricultural supplies,¹ and, in any event, tend to be under-capitalised,² suggesting that credit would not represent a significant proportion of sales. But another, probably more compelling reason for low volumes of trading enterprise credit stems from the limited demand from small farmers for purchased agricultural inputs which, in turn, is related to the low technological level of small farm agriculture in Papua New Guinea. Shand and Straatmans (1974), in a study of the factors influencing the transition from subsistence to cash crop development, indicated that:

. . . the development of cash crop gardens had involved little investment of money capital The investment of labour in the establishment phase was of primary significance . . . [and] . . . where outside assistance was obtained, payment was often non-monetary and in kind. Coupled with the low technological level is the fact that as yet in Papua New Guinea there is very little development in annual crops, further reducing the demand for purchased inputs.

¹ See, for instance, Shand and Straatmans (1974), particularly Chapter 6, pp.137-176.

² Personal communication, Mr Barry Shaw, Senior Advisor, Papua New Guinea Development Bank.

2.2.2 Institutional credit

Commercial bank agricultural credit is also limited mainly to expatriate-owned enterprises and Table 2.7 indicates that over the period 1969 to 1973 advances by the Trading Banks for agriculture, grazing and dairying represented an average of 9 per cent of total business advances.¹ More recently, there have been official attempts to encourage commercial banks to increase their agricultural portfolios but it is doubtful, given the nature of their operations, whether the level of rural lending by these institutions could make a significant impact on rural development. Also, even with lending to Papua New Guineans (i.e., as opposed to expatriates) there would be a tendency for emphasis to be placed on larger type enterprises (e.g., finance for the take-over of foreign-owned plantations by nationals).

Savings and loan societies² represent another possible source of agricultural credit to smallholders. Here too, however, the low effective demand for purchased inputs limits the amount of credit that is utilised for agricultural purposes. Table 2.8 gives an indication of the loans granted by societies over the period 1963-1975 by purpose of loan. Assuming that the items marked with an asterisk could be classed as 'agricultural', 10 per cent of the loan value and 15 per cent of the number of loans were advanced for agricultural purposes with an average loan size of K162.00. Also, the specific nature of the agricultural items financed tends to underscore the low technological level of small farm agriculture,

¹ There are four commercial banks operating in Papua New Guinea.

² The first society was established in 1962 under sponsorship from the Reserve Bank of Australia. As at June 1975, there were 62 societies (decreasing by consolidation from 314 in 1972) with a membership of 63,545, and with total assets of K7.5 million.

TABLE 2.7

PAPUA NEW GUINEA - TRADING BANKS
 CLASSIFICATION OF BUSINESS ADVANCES TO RESIDENT BORROWERS
 (as at July of the respective year - million kina)

Classification	1969	1970	1971	1972	1973
Agriculture, grazing and dairying	3.5	3.9	4.0	4.3	5.3
Manufacturing	1.1	2.2	3.0	2.9	3.6
Transport, storage and communication	1.8	1.7	1.7	1.7	2.0
Commerce	8.9	9.3	13.3	14.6	16.9
Building and construction	2.0	2.1	2.0	2.0	3.9
Other business	4.2	4.9	73.3*	81.2*	62.2*
Unclassified	0.3	0.4	0.4	0.5	0.4
Total business advances	21.8	24.4	97.6	107.0	94.2

Source: Papua New Guinea Bureau of Statistics - Summary of Statistics, 1972/73.

- * The very substantial increases in this 'other business' classification from 1971 is probably related to investment in copper mining.

TABLE 2.8

PAPUA NEW GUINEA - SAVINGS AND LOANS SOCIETIES
NUMBER AND PURPOSE OF LOANS GRANTED 1963-1975

Purpose of Loan	Number of loans	Amount (K'000)
Agricultural equipment and tools*	435	36.5
Building materials and tools	4715	877.7
Cattle*	366	61.6
Coffee machines*	297	133.1
Copra driers*	366	72.7
Education expenses	1342	124.2
Fencing wire*	768	66.1
Outboard motors*	400	154.8
Purchase of land	617	286.1
Purchase and repair of vehicles	3196	2416.8
Purchase of consumer durables	1372	114.5
Trade store goods and trading	5723	940.7
Hire of labour*	1274	107.3
Other	6004	1034.1
Total	26875	6432.2

Source: Papua New Guinea Bureau of Statistics - Summary of Statistics 1972/73 and
Federation of Savings and Loans Societies Ltd - Annual Report, 1974/75.

* See text page 27.

for conspicuously absent are such 'modern' agricultural inputs as fertilizers and plant protection chemicals.

Indications are that the societies have encountered repayment problems, which are partly related to member attitudes (Crellin, 1971). But this is not to underrate the potential of such institutions as being very effective instruments in the rural development process. Well managed village or local level operations, formulated so as to ensure effective participation by all members and adapted to meet the needs of a particular district or region, can go a long way towards financing rural development in an equitable fashion. Indeed, a major criticism of the agricultural credit structure in Papua New Guinea is the lack of appreciation of the real potential of such organizations.

2.2.3 The Papua New Guinea Development Bank

By far the major source of agricultural credit in the country is the Papua New Guinea Development Bank, established in 1967:

. . . to supplement existing financial institutions in providing medium and long term finance to the private sector on terms and conditions that would meet the requirements of Papua New Guinea. (IBRD, 1965).

Apart from capital in the form of government grants (totalling approximately K24.2 million at the end of the 1975-76 financial year), the Bank took over the assets of two unsuccessful loan schemes - The Native Loans Board and the Ex-Serviceman's Credit Scheme. Repayments made by borrowers from these schemes are added to the Bank's capital. External finance is provided by (i) the International Development Association to the extent of \$US10.5 million and (ii) the Asian Development Bank, providing \$US4.5 million (Papua New Guinea Development Bank, 1975-76). The Bank operates in all economic sectors and in its 9½ years of operation (i.e., to the end of December, 1976)

invested some K64 million over a total of 15,292 loans and investments, with the agricultural sector accounting for 33 per cent of the loan value and 62 per cent of the number of loans (see Table 2.9). In the remainder of this section, only the Bank's activities in the agricultural sector will be discussed.

Before proceeding with an analysis of these activities, however, it may be useful to indicate briefly the conditions prevailing at the time the Bank was set up in order to appreciate the patterns that have emerged. Establishment of the Papua New Guinea Development Bank arose directly from a recommendation made by the International Bank for Reconstruction and Development, as part of a comprehensive economic report to the then Australian Administration (IBRD, 1965). In that report, the World Bank mission recommended that agricultural development strategy should involve rapid expansion of cash cropping and livestock development (mainly beef cattle) under the nucleus estate principle. This principle involved the encouragement of expatriate development of large estates and ranches to support centralised processing facilities in the case of crops and to serve as sources of quality breeding stock in the case of livestock. It was argued that smallholder development by nationals could proceed much more rapidly under the influence of the nucleus estates particularly if such development was concentrated in the areas of greatest potential.

The World Bank approach was well received by the administration for it fitted in well with their 'progressive farmer' strategy which sought to create a class of rural elite (McKillop, 1976a). From its inception, the Bank was viewed as a means of promoting this strategy, a role which was facilitated by the fact that extension staff of the

TABLE 2.9
PAPUA NEW GUINEA DEVELOPMENT BANK
CLASSIFICATION OF TOTAL LOAN APPROVALS BY SECTOR
(Total over 9½ years)

Sector	Number of loans	% of total	Amount (K'000)	% of Total
Commercial	4965	33	28748.3	45
Industrial	800	5	14336.7	22
Agricultural	9527	62	21133.4	33
Total	15292	100	64218.4	100

Source: Papua New Guinea Development Bank - Annual Report and Financial Statements, 1975/76 and Summary of Net Approvals 1976/77 (6 months).

Department of Agriculture, Stock and Fisheries¹ were made agents of the Bank and were, therefore, in a position to influence who should receive loans. The fact that many of the extension officers (and Bank staff) were expatriates with very definite views as to what represented 'proper farm development' is a significant factor in this context.²

The Bank vigorously pursued a policy of lending to individuals despite the communal nature of most traditional economic activities, and stressed the supervised credit concept, whereby credit is provided along with extension advice and education. It will be shown in a later section that the high level of supervision associated with loans, at least in the case of beef cattle development, has resulted in a 'paternalistic' approach to the development process, with serious effects on the long term prospects of a viable beef industry.

Figure 2.1 shows the total number and value of agricultural loans granted by the Bank over the period 1967-68 to 1976-77.³ It illustrates a rapid increase in the number of loans from 1967-68 to a peak (the highest over the entire period) during the 1971-72 financial year. Figures 2.2 and 2.3, which show the number and value of loans over the same period but for different loan categories, show that this pattern for total loans is very similar to that exhibited by cattle and oil palm loans, two enterprises which account for over

¹ Since 1976 responsibility for forestry and mining were incorporated and the department re-named the Department of Primary Industry.

² Notions of the economic-sized family farm, characteristic of Australia and other Western countries, are examples of these views (see McKillop, 1976a).

³ The data for 1976-77 is an estimate made by multiplying by 2 the actual figures for the first six months of the financial year.

FIGURE 2.1
PAPUA NEW GUINEA DEVELOPMENT BANK
TOTAL NUMBER AND VALUES OF AGRICULTURAL LOAN APPROVALS
1967/68-1976/77

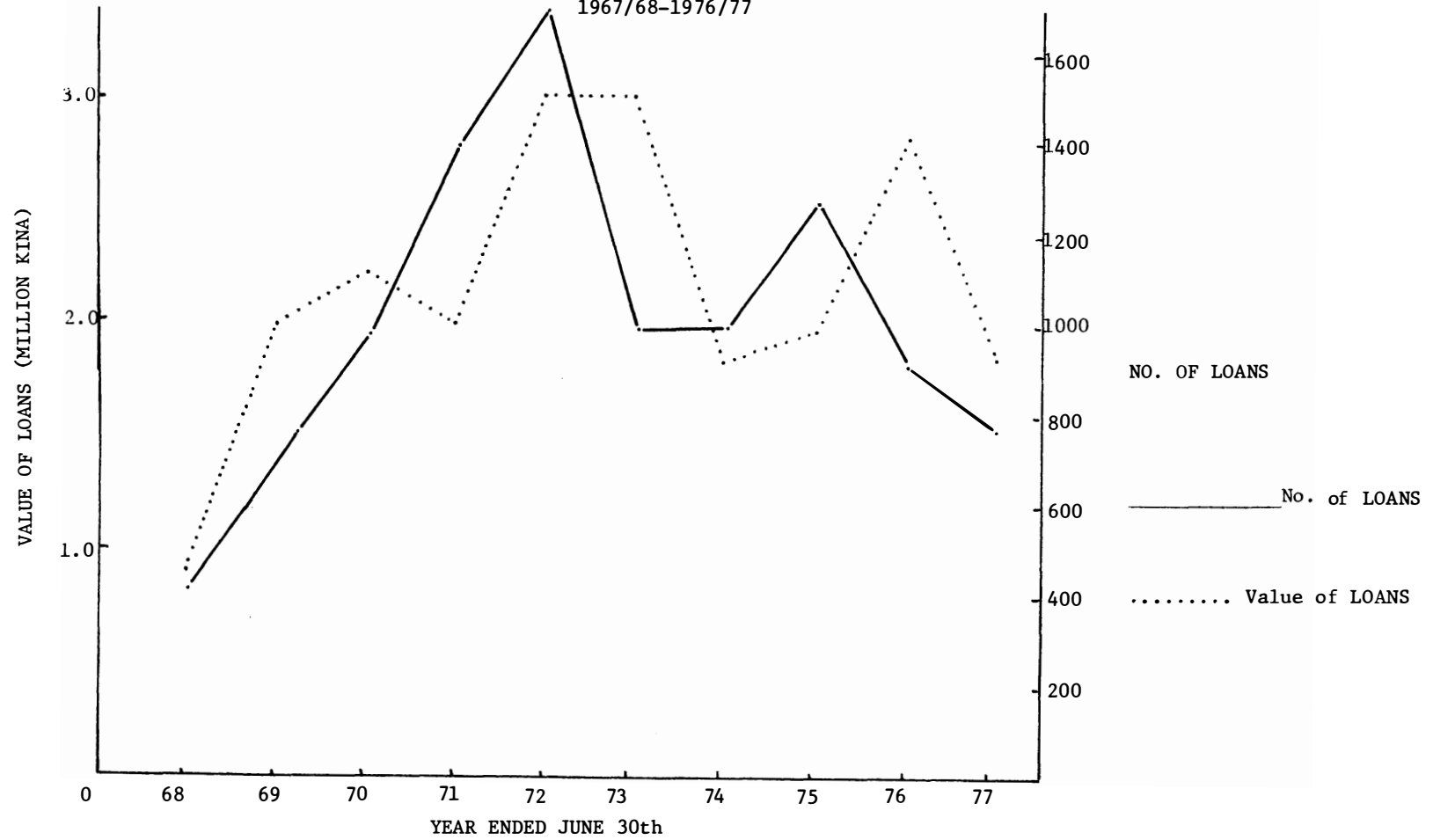


FIGURE 2.2
PAPUA NEW GUINEA DEVELOPMENT BANK
NUMBER AND VALUE OF AGRICULTURAL LOANS - SIX LOAN CATEGORIES
1967/68-1976/77

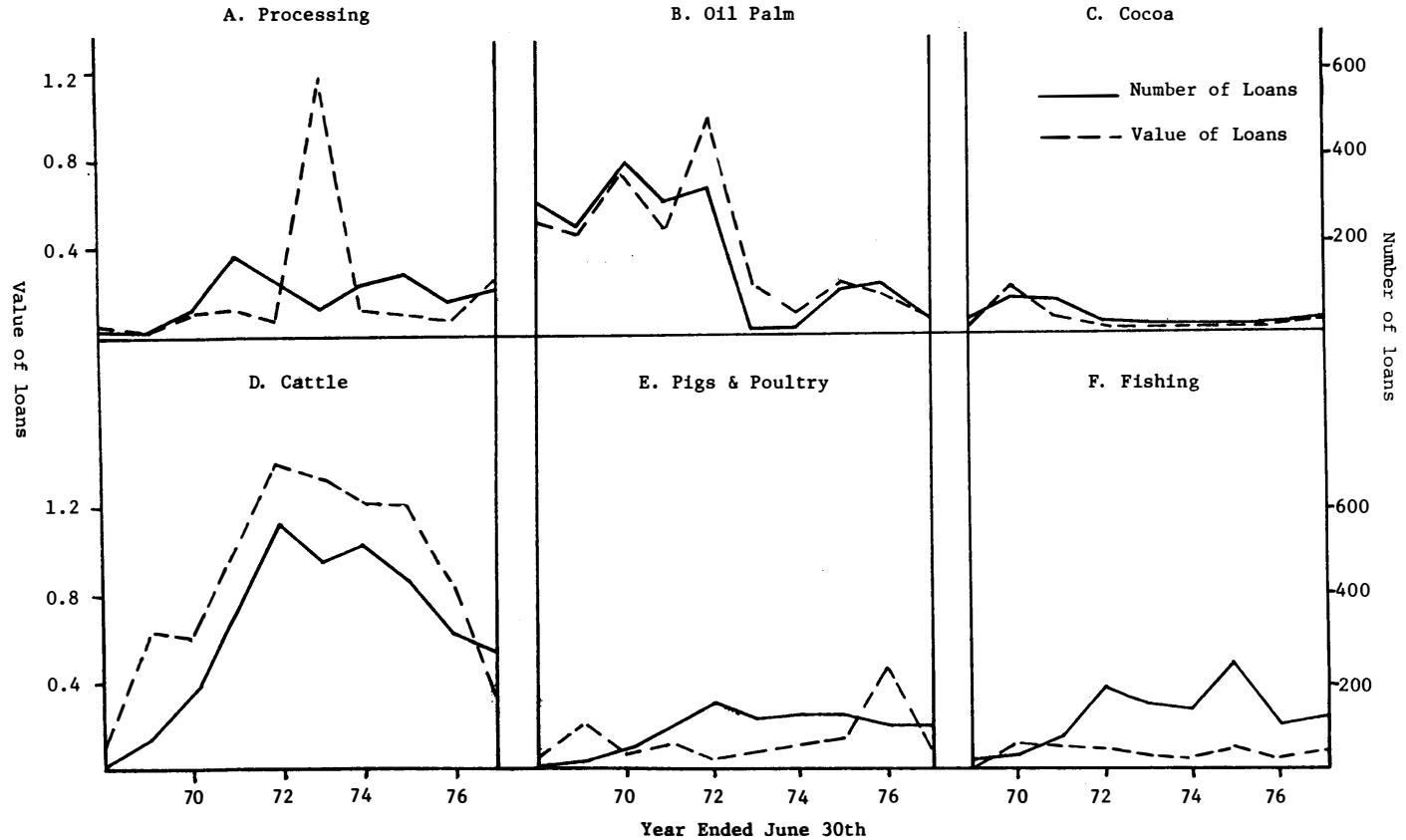
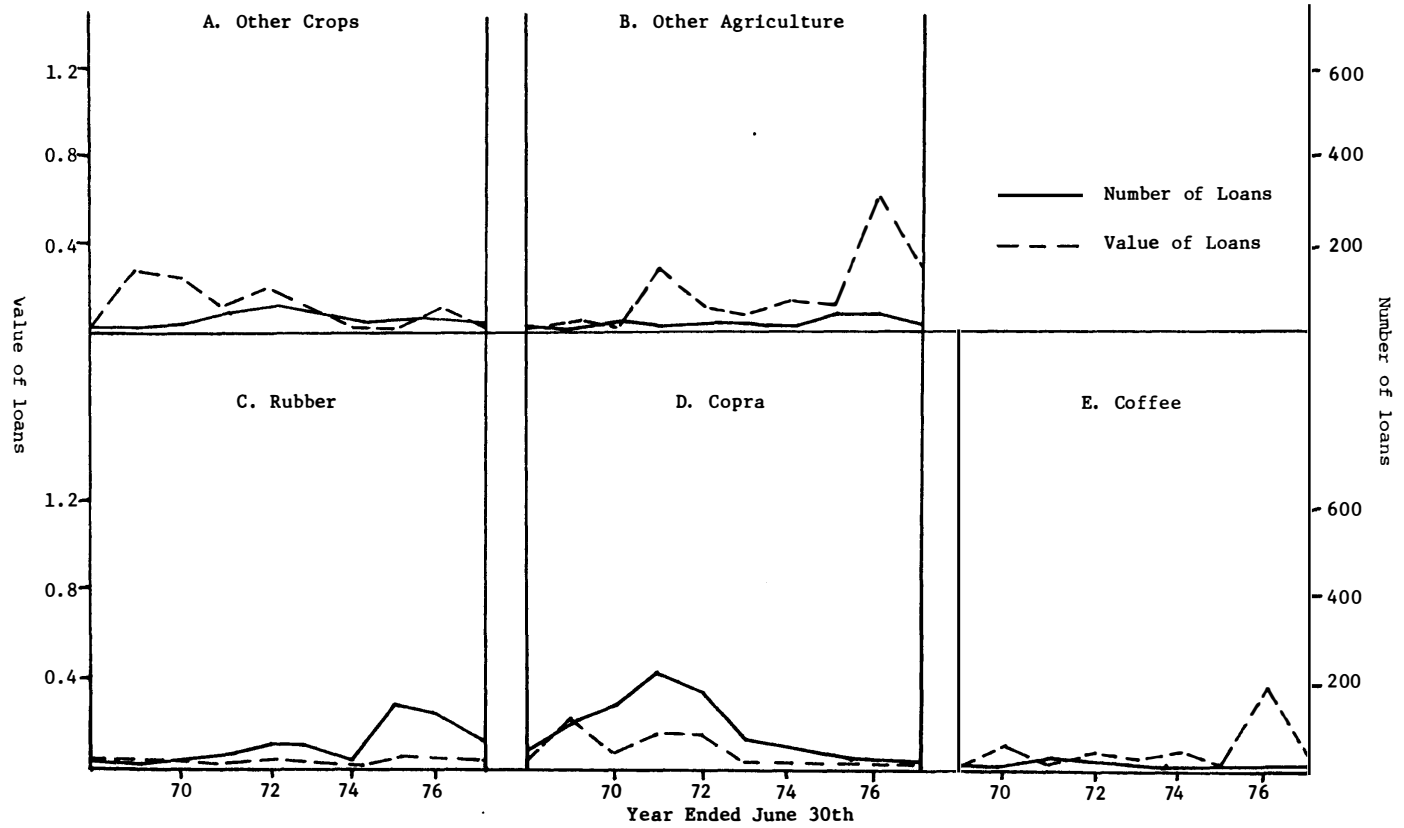


FIGURE 2.3
PAPUA NEW GUINEA DEVELOPMENT BANK
NUMBER AND VALUE OF AGRICULTURAL LOANS - FIVE LOAN CATEGORIES
1967/68-1976/77



50 per cent of the number of loans and 58 per cent of the value of these loans over the 10-year period (see Appendix A, Table A.2). Thus, the peak in 1971-72 for total loans corresponds to a peak in cattle lending in the same year and a similar peak (though lower than the 1969-70 level) in oil palm loans. The effects are also seen (particularly with respect to oil palm) in the loan value curves, with the peak in cattle and the significant increase in oil palm loan values corresponding with the value peak for total loans in the same year.

Cattle and oil palm production, therefore, represented important activities, particularly in the early years of the Bank's operations and this was directly in keeping with the views of the World Bank and the government. The majority of oil palm loans are associated with land settlement schemes¹ with the individual farmer being provided with a package of services and with the enterprise being conducted on an 'economic-sized' holding under a family type farming situation.

Further, the oil palm settlement scheme was associated with a large company which produced a substantial acreage of the palm and operated a mill for processing. The Development Bank had both loan and equity finance in this company, and the high level of processing loan values recorded in the 1972-73 period was mainly due to additional debt finance to the company for expansion of processing facilities.

Similarly, cattle loans made by the Bank were channelled initially to large expatriate ranches, as is reflected in the high

¹ In West New Britain and more recently at Popondetta on the New Guinea Mainland.

average loan sizes in the early years (see Appendix A, Table A.1). Indeed, the cattle component of the first IDA¹ loan acquired during 1969-70 was specifically for the establishment and expansion of large scale holdings to provide stock for smallholders. The vigour with which smallholder cattle loans were pursued is partly a result of the fact that the type of cattle development envisaged, with its delineation of land areas by fences and structured production organization, fitted in well with the concept of a viable family type farm system then prevalent. But the steady decline in new cattle loans, particularly since the 1973-74 financial year, has begun to raise questions on the adequacy of the strategy being followed. This aspect will be discussed in a later section of this chapter.

This general pattern, starting with a small number of large loans to expatriates, followed by large numbers of small loans to nationals, is repeated in a number of different enterprises, and is the reason why average loan sizes, in most categories, tend to decrease with time. This lending pattern has reinforced the structural characteristics of Papua New Guinea's agricultural sector, being one comprising large numbers of smallholders on the one hand and relatively few large estates and livestock holdings, mainly owned by non-nationals, on the other. The dualistic structure is well illustrated in Table 2.10 which provides a classification of agricultural loans by recipients over the 9½ year period ending in December 1976 and, perhaps more vividly, by Table 2.11, showing the relative distribution of loans over the same period. The average size of loans to Papua New Guineans was K1500, compared with K84,000 for

¹ International Development Association, an affiliate of the International Bank for Reconstruction and Development.

TABLE 2.10

PAPUA NEW GUINEA DEVELOPMENT BANK - CLASSIFICATION OF AGRICULTURAL LOANS
BY TYPE OF ENTERPRISE AND CLASS OF RECIPIENT - 1967/68 - 1976/77 (6 months)

Category	No.	<u>Nationals</u>		No.	<u>Joint Enterprises</u>		No.	<u>Non-nationals</u>	
		Value	(K'000)		Value	(K'000)		Value	(K'000)
		Total	Av.		Total	Av.		Total	Av.
Cattle	2963	6490.3	2.2	8	479.0	59.9	55	1343.6	24.4
Pigs and Poultry	779	750.7	1.0	3	250.5	83.5	14	252.1	18.0
Fishing	965	333.3	0.3	2	97.6	48.8	9	124.1	13.8
Processing	750	514.4	0.7	2	1108.0	554.0	20	215.8	10.8
Oil Palm	1811	3277.7	1.8	4	365.7	91.4	6	390.0	65.0
Cocoa	283	184.6	0.7	—	—	—	37	290.8	7.9
Rubber	452	186.6	0.4	1	23.8	—	6	65.6	10.9
Copra	853	533.1	0.6	6	12.7	2.1	16	187.7	11.7
Coffee	65	484.4	7.5	1	28.2	28.2	16	270.5	16.9
Other crops	227	283.5	1.2	2	201.6	100.8	23	605.5	26.2
Other agricultural	138	598.7	4.3	8	550.6	68.8	42	635.7	15.1
Total	9286	13637.3	1.5	37	3117.7	84.3	244	4378.4	17.9

Source: Papua New Guinea Development Bank - Annual Report and Financial Statements 1975/76 and Summary of Net Approvals, 1976/77 (6 months).

TABLE 2.11

PAPUA NEW GUINEA DEVELOPMENT BANK - DISTRIBUTION OF AGRICULTURAL LOANS
 BY TYPE OF ENTERPRISE AND CLASS OF RECIPIENT - 1967/68 - 1976/77 (6 months)
 (percentages)

Category	<u>Nationals</u>		<u>Joint Enterprises</u>		<u>Non-nationals</u>	
	% of Loan Nos.	% of Loan Values	% of Loan Nos.	% of Loan Values	% of Loan Nos.	% of Loan Values
Cattle	98	78	0.2	6	1.8	16
Pigs and Poultry	98	60	0.3	20	1.7	20
Fishing	99	60	0.2	18	0.8	22
Processing	97	28	0.3	60	2.6	12
Oil Palm	99.5	81	0.2	9	0.3	10
Cocoa	88	39	-	-	12.0	61
Rubber	98.5	68	0.2	9	1.3	23
Copra	97	73	0.8	2	2.2	25
Coffee	79.3	62	1.2	4	19.5	34
Other crops	90	26	0.8	19	9.2	55
Other agricultural	74	34	4	31	22.0	35
Total	97	64	0.4	15	2.6	21

Source: Papua New Guinea Development Bank - Annual Report and Financial Statements 1975/76 and Summary of Net Approvals 1976/77 (6 months).

for joint enterprises and K17,900 for expatriates. Similarly, over the period, 97 per cent of the loan numbers were provided to nationals but this accounted for only 64 per cent of loan funds. On the other hand, non-nationals received 2.6 per cent of loans but 21 per cent of the loan funds. The relevant figures for joint-ventures are 0.4 per cent of loan numbers and 15 per cent of loan funds.

The essential point in this context is that the pattern that has emerged was deliberate and was based on certain definite views on how the agricultural development process should proceed. In this sense, it would not be unreasonable to assess the performance of the bank as good.¹ In its 9½ years of operation, it has advanced in excess of K21 million to the agricultural sector of a country in which non-monetary agricultural production still represents a very significant proportion of total agricultural output. Many of the clients were experiencing their first exposure to monetary credit when they received loans from the Development Bank. Much time had to be devoted to training relatively inexperienced staff in the complexities of development credit. And this good lending performance has not been at the expense of high rates of arrears and default, a problem plaguing many Development Banks.² Further, such a repayment performance is of particular significance in Papua New Guinea, given the type of security obtained for loans to smallholders. In Papua New Guinea, the majority of land is under customary tenure and the bank provides loans on the basis of usage rights (so-called Clan Land

¹ Evans (1975) has suggested, for instance, that by the usual criteria used by international lending agencies, the Papua New Guinea Development Bank must be one of the more successful of such institutions.

² Currently arrears represent approximately 6 per cent of total balances outstanding in accounts of less than K10,000.

Usage Agreement) which has no legal validity. Mutual trust plays a significant part in the loan agreements.

But the real question that needs to be asked is whether the strategy that has been pursued was, in fact, in the best interest of the country's development. A full discussion on this aspect, involving as it does a number of value judgments, is beyond the scope of this study. At the same time, the advent of Papua New Guinea's independence in 1975, following self-government in 1973, has raised a number of questions concerning the advisability of the dual developmental pattern. Thus, in the government's 'eight-point improvement plan' the notions of a self-reliant economy, equality in income distribution and a rapid increase in the proportion of the economy under the control of Papua New Guineans implies that past (colonial) development strategies are no longer considered desirable by the new national leaders.

Questions have been raised concerning the advisability of the policy of lending to individuals¹ in view of the communal nature of traditional organization. Evans (1976) suggests that a major risk in this approach is that such individuals:

. . . will gradually become alienated from their traditional sources of support for their economic activities . . . since they have found a new one in the form of institutional credit.

¹ Officials of the Papua New Guinea Development Bank have indicated that though loans in the earlier years were written in the name of individuals, they were, in fact, the responsibility of groups. While this may be so, the point is that extension officers and Bank staff have tended to direct their activities to one or two individuals in a group (because they may have been more articulate or identified as village 'big men') with the result that the other members of the group identified the project with one or two individuals. See also Holzknecht (1974), particularly p.40.

One direct economic manifestation of this alienation is seen in the problems experienced by some cattle project owners in obtaining labour on a traditional basis. And the inability to obtain labour on traditional terms could have a significant effect on a project's survival, because the Development Bank discriminates against labour as a less acceptable use for loan funds (see section 3.6, Chapter 3).

It has also been argued¹ that the nature of institutional credit available is resulting in the social and economic stratification of a previously egalitarian society. But as pointed out by Evans (1976), credit itself:

. . . should not be 'blamed' for this since it is merely one manifestation of the phenomenon of monetization.

This highlights, however, one of the more perplexing problems facing the planners in Papua New Guinea. For the introduction of monetary credit into the traditional economy of necessity implies the introduction of other facets of Western economies since credit 'can only be delivered wrapped in the packaging of an alien economic order' (Evans, 1976).

To some extent, a historical analysis of the Bank's operation can do little justice to the post-independence period which witnessed certain significant changes in Bank policy, changes which are only just being reflected in the lending patterns. Thus, since 1975, the Bank has been restricted to lending the equivalent of no more than 25 per cent of the paid-up capital of any foreign-owned enterprises.²

¹ See Dumont (1972) and Howlett (1973).

² More recently, under the NIDA (National Investment and Development Authority) regulations, foreigners cannot engage in new agricultural activities.

This effectively limits the proportion of loan funds going to non-nationals and is reflected in the fact that during the 1975-76 financial year, only two of the 923 loans approved went to non-nationals and this accounted for 2 per cent of the total loan funds.

In recent times too, the Bank has become more appreciative of the traditional forms of economic organization in Papua New Guinea. Group lending is, therefore, accounting for an increasing proportion of loans to Papua New Guineans and this has been facilitated by recent legislation which seeks to incorporate traditional organizations into legal entities with little restriction on the internal workings of the group.¹ The Village Economic Development Fund, established in 1974, is also designed to assist economic activities based on traditional forms of organization and particularly to stimulate development in the less developed areas, in direct contradiction to the earlier view that development effort should be concentrated in the areas of greatest potential. With this fund, grants are provided (only to groups) to a maximum of 40 per cent of the total capital costs of a proposed project, the balance being supplied by loan and/or group contribution.

The above analysis of the lending performance of the Papua New Guinea Development Bank is necessarily somewhat superficial and can do little more than raise issues which seem pertinent. The pattern that has emerged was based on certain views of the development process and as these views change, so too would the lending structure. The fact that significant policy changes have only come since independence means that some time must pass before one can determine

¹ The Business Groups (Incorporation) Act of 1974 is an example of such legislation.

the overall effect of these changes. In a later section, in the process of describing the cattle industry in Papua New Guinea (and particularly in the Markham Valley) an attempt will be made to consider in more detail the effects of the agricultural credit structure on the conditions existing in this industry and the implications for the future. Before doing this, however, it may be useful to outline briefly the credit delivery system utilized by the Papua New Guinea Development Bank. This is necessary since, in a country like Papua New Guinea, agricultural credit of the kind available has a complex of attributes, which are reflected in the method of delivery, and which can have a pervasive influence on the structure of the industry being financed.

2.3 The Credit Delivery System

The credit delivery system outlined in this section is based mainly on the writer's observation of cattle loans. The general features, however, apply to all enterprises financed by the Bank.

Extension officers of the Department of Primary Industry (DPI) act as agents for the Development Bank and provide the major links between the farmers and the lending institutions. Applications for loans are made through the extension agents, who are considered to be in the best position to determine the viability of the proposal and most importantly, to assess the ability of the client(s) to implement the proposed program successfully.

For a cattle loan, for instance, an individual or group may approach an extension officer and indicate their desire to become involved in a cattle project. Before an application is accepted, however, the agent visits the site of the proposed project and makes a physical inspection to determine its suitability for a beef cattle

enterprise. Once this is satisfactory, the prospective clients are informed of the requirements necessary to obtain a loan. In particular, given that the majority of potential clients have very limited financial resources,¹ the Bank expects a contribution in the form of labour in the establishment phase (so-called sweat capital). For a cattle project, this means the erection of posts for boundary fencing, the construction of a stockyard and some start towards the sub-divisional fencing. Depending on the existing vegetation, such sweat capital may also involve clearing of land for pasture.

It is only after the extension officer is satisfied with the progress in these preliminaries that an application for finance is submitted (see Exhibit B.1, Appendix B). The application is accompanied by a form which provides basic information on the proposed project (Exhibit B.2, Appendix B), including indications of the amount of work completed and details of the proposed program. Also accompanying the application is a third form (Exhibit B.3) which gives the officer's opinion of the client's character, health and the ability in relation to the program. The forms are then sent to the approving officer who, depending on the loan size, may be a District Rural Development Officer, a Provincial Livestock Officer or the Provincial Rural Development Officer. The Bank receives the application after it has passed through the approval stage.

Upon receipt of the application by the Bank, the loan dossier is checked for completeness and consistency and after passing through a number of procedural stages, the client is informed of its approval.

¹ Indeed, the cattle project may represent the first major excursion into the monetary sector.

The Bank, of course, may not agree with the approval decision in which case the relevant DPI officers are contacted with a view to reaching some agreement on the fate of the proposal. In practice, less than 1 per cent of the loan proposals submitted by the extension officers are rejected by the Bank.

Disbursement of loan funds is also the responsibility of the extension agents and the majority of proceeds are advanced by payment in kind. Thus, when the officer is satisfied that the clients have erected the fence posts, constructed an adequate stockyard and cleared the area (if necessary), funds are disbursed, on the basis of local purchase orders (LPOs) for the acquisition of fencing wire and tools. When this is completed, stock is supplied to the farmer either directly from a Government station or purchased on behalf of the farmer, from another cattle owner. Funds provided for veterinary expenses and mineral licks are also disbursed on the basis of LPOs as and when required. Perhaps the only loan funds disbursed in cash would be that needed to pay labour. And even in the small number of loans for which such funds are provided, the amount actually involved is frequently quite low, proportionately.

The manner in which repayments are effected can also be considered as part of the delivery system. Sales of stock in most areas are made through Government abattoirs to recognised agents in the urban centres. Stock are collected on the farm, mostly by a government-owned vehicle, and proceeds of such sales are sent directly to the Development Bank on behalf of the relevant farmer. The Bank then credits a certain amount to the account, depending on the repayment schedule, and returns the balance, if any, to the farmer. In instances where breeding stock are sold, these are also controlled by the Department of Primary Industry, and the Bank also receives the sale proceeds.

The Bank utilises a system of six-monthly reviews on all loans and, with cattle loans, an essential input into this is the six-monthly cattle progress reports prepared by the extension officers (see Exhibit B.4, Appendix B). These reports are designed to provide an up-to-date picture, mainly from the technical point of view, of the progress achieved by the project owners over a period. They describe the number and condition of stock, pastures, fences and stockyards and make recommendations on production practices and whether disbursements of loan funds should continue.

Perhaps the most significant feature of the delivery system outlined above is the degree of control exercised by the extension officers over nearly every aspect of the farm operation. Some of these controls may be useful in the initial period of a credit program where the smallholders have to learn the complexities of a credit system of which they have little or no experience. The need is perhaps even more understandable when the enterprise financed by the credit (e.g., cattle) is alien to the traditional agricultural system.¹ But the real danger is that the people exercising the controls may not see them as being interim measures, with the result that they continue to be enforced long after their usefulness is apparent. In fact, there are indications that some of these measures are now counter-productive and act as disincentives to the farmer who must experience them as part of the 'credit package'.

The existence of excessive control by extension agents is suggested by recent studies. Von Fleckenstein (1975) in a case study

¹ See, for instance, Harris (1975) on the possible value of 'some degree of compulsion in the first stages of introducing new crops and techniques'.

of a cattle project in the Eastern Highlands Province suggests that the extreme level of control exerted by extension officers resulted in the villagers learning very little about cattle rearing in the five years over which the study was conducted and accordingly the project fell far short of its original goals. Langness (1975), in another case study of a cattle project, also in the Eastern Highlands, this time with an anthropological bias, highlights the point somewhat more forcefully when he states:

Nothing was in their hands except the most basic instruments of labour - not the money, not the records, not the control of the cattle and not even, for the most part, the scheduling of their own time.

McKillop (1976b) further emphasises this transfer of decision-making from the farmer to the extension agency and suggests that villagers tended to develop a psychological dependence on the extension agent.

Indications are that the farmers too have found the level of control excessive. Tovue (1974), in a survey of farmer attitudes towards the extension service, found that (i) loan repayments and (ii) control of loan funds and knowledge of loan procedures ranked second and fourth respectively in the list of farmers' complaints and that there was widespread feeling that extension officers directed rather than advised them.

An interesting, and somewhat paradoxical feature in this context, is that extension officers themselves have complained about the time and 'paper work' required by Development Bank activities (Sawanga, n.d.) and there have been instances of conflict between the Bank and the Department of Primary Industry. McKillop (1975), in a questionnaire survey among the extension officers in 1973, reported that between 30 per cent and 50 per cent of officers' time was devoted to Development Bank activities and this, coupled with other administrative and

servicing functions, left only 12 per cent to 15 per cent of available time for the educational role. In my own experience, officials of both the Bank and the Department of Primary Industry felt that any acceptable system of evaluation should require as little additional paperwork as possible, and this is indicative of a concern about the time requirement of the credit function.

While the credit delivery system in Papua New Guinea has functioned adequately in terms of channelling funds to large numbers of smallholders over a relatively short period, and has not resulted in unmanageable arrears levels, the above discussion shows that it is still subject to criticism. The evidence suggests that the system is implemented in such a way as effectively to remove the decision-making function from the farmers to the extension agents, with far-reaching effects on the ability of the farmers to survive without such supervision. Moreover, this level of supervision is already of such high cost that serious doubts exist as to the practicability of its continuance.

2.4 The Beef Cattle Industry in Papua New Guinea

Prior to World War I, most of the cattle in Papua New Guinea were associated with coconut plantations where they were used to keep down grass and to provide a supply of meat and small amounts of milk (Anderson, 1962). The majority of these animals were killed during the war and the post-war years saw the industry developing along different lines. The Australian Administration pursued a policy of active encouragement with the provision of free veterinary and advisory services, freight subsidies on approved stock importation and the provision of large areas of land as pastoral leases to selected settlers. By June 1960, the national herd comprised some 17,478 head,

of which about 288 belonged to nationals, and there was an actual turnover in the 1959-60 financial year of 698 head (Anderson, 1962). By this time, however, the land tenure system, which sought to prevent indiscriminate alienation of native land, was restricting rapid expatriate expansion.

The desire ultimately to achieve self-sufficiency, coupled with restrictions on expatriate expansion, made it desirable that cattle should be introduced into the traditional economy. Initially it was felt that small scale cattle husbandry should be on the basis of day-time herding with fenced paddock at nights, the intention being to establish communal herds and gradually to integrate cattle into the subsistence pattern of production. This system, of necessity, implied a relatively slow rate of national herd increases but one which was seemingly less disruptive of the existing agricultural patterns. The World Bank mission of 1963, however, recommended that the industry develop 'at a rate which would bring a tenfold increase in cattle head . . . in ten years' (IBRD, 1965). A system of day-time herding¹ was, therefore, no longer feasible and an ambitious program of cattle development, envisaging commercially viable, family type holdings, was embarked upon. This program was facilitated by the establishment of the Papua New Guinea Development Bank in 1967 and available statistics suggest that a reasonable degree of success has been achieved.

¹ Certain technical problems of overgrazing, poor stock conditions, high disease incidence, and high mortality have also been advanced as evidence of the unsuitability of the system (see Phillip, 1975). However, it has not been possible to locate empirical evidence to support this contention.

From 17,381 head in June 1960, the national herd increased to 133,381 head in June 1974 (see Table 2.12), with the greatest proportionate increase occurring in small scale ownership by nationals. Turn-off (i.e., slaughterings) increased from 698 head in the year ended 30 June 1969 to 13,751 head during 1973-74. Table 2.13, which shows the annual composition of national beef consumption between 1969-70 and 1976-77 indicates that domestic production represents an increasing proportion of total consumption, moving from 33 per cent in 1969-70 to 63 per cent in 1973-74. In fact, the figures suggest that though Papua New Guinea is still a net beef importer, there has been a reduction in the absolute volumes of imports since 1971-72.

In spite of this relative success, however, much criticism has been made concerning the manner in which the industry has developed. As with other agricultural industries in Papua New Guinea, and for reasons indicated in section 2.2.3, the cattle industry is characterized by a few large, expatriate-owned ranches and relatively numerous smallholdings owned by nationals. Over and above this, it has been argued that the way cattle have been introduced into the traditional economy has led to social and economic stratification of a type that did not exist in the entirely non-monetary situation. This is partly a product of the whole process of monetization, but it is also related to the 'progressive farmer' strategy alluded to in section 2.2.3 which sought to create a class of rural elite that would act as demonstrations for other smallholders to follow (McKillop, 1976a). Further, the credit delivery system outlined earlier, which removes much of the decision-making from the national cattle owners, has resulted in an industry heavily dependent on technical and managerial support from the Department of Primary Industry for its survival.

TABLE 2.12

PAPUA NEW GUINEA - BEEF CATTLE NUMBERS AS AT JUNE 1974

	Government	Smallholders	Ranch	Province Total	As % of National Total
Central	2,200	1,781	8,589	12,570	9.4
Gulf	26	94	243	363	0.3
Western	40	35	226	301	0.2
Milne Bay	51	1,000	1,723	2,774	2.1
Northern	181	3,721	3,165	7,067	5.3
Southern Highlands	70	2,015	711	2,796	2.1
Morobe	2,978	13,160	41,184	57,322	43.0
Madang	150	2,167	10,651	12,968	9.7
West Sepik	-	538	642	1,180	0.9
Eastern Highlands	801	3,592	4,040	8,433	6.3
Chimbu	4	1,433	472	1,909	1.4
Western Highlands	4,794	1,138	6,522	12,454	9.3
East New Britain	242	12	13,111	1,565	1.2
West New Britain	24	-	113	137	0.1
New Ireland	55	72	1,647	1,774	1.3
Bougainville	144	615	729	1,488	1.1
Manus	1	48	91	140	0.1
East Sepik	1,784	4,018	2,338	8,140	6.1
Total	13,545	35,439	84,397	133,381	

Source: Cairns, I. (n.d.), 'An Economic Analysis of the Papua New Guinea Beef Supply', unpublished mimeograph, Department of Primary Industry, Konedobu, Papua New Guinea.

TABLE 2.13
 PAPUA NEW GUINEA - COMPOSITION OF NATIONAL BEEF CONSUMPTION
 (year ended 30 June - tonnes)

Item	1970	1971	1972	1973	1974
Total consumption	25 38	3060	3360	3548	3504
Domestic production	848	10 38	1244	1648	2200
Imports	1690	2022	2116	1900	1304

Source: Cairns, I. (n.d.). 'An Economic Analysis of the Papua New Guinea Beef Supply', unpublished mimeograph, Department of Primary Industry, Konedobu, Papua New Guinea.

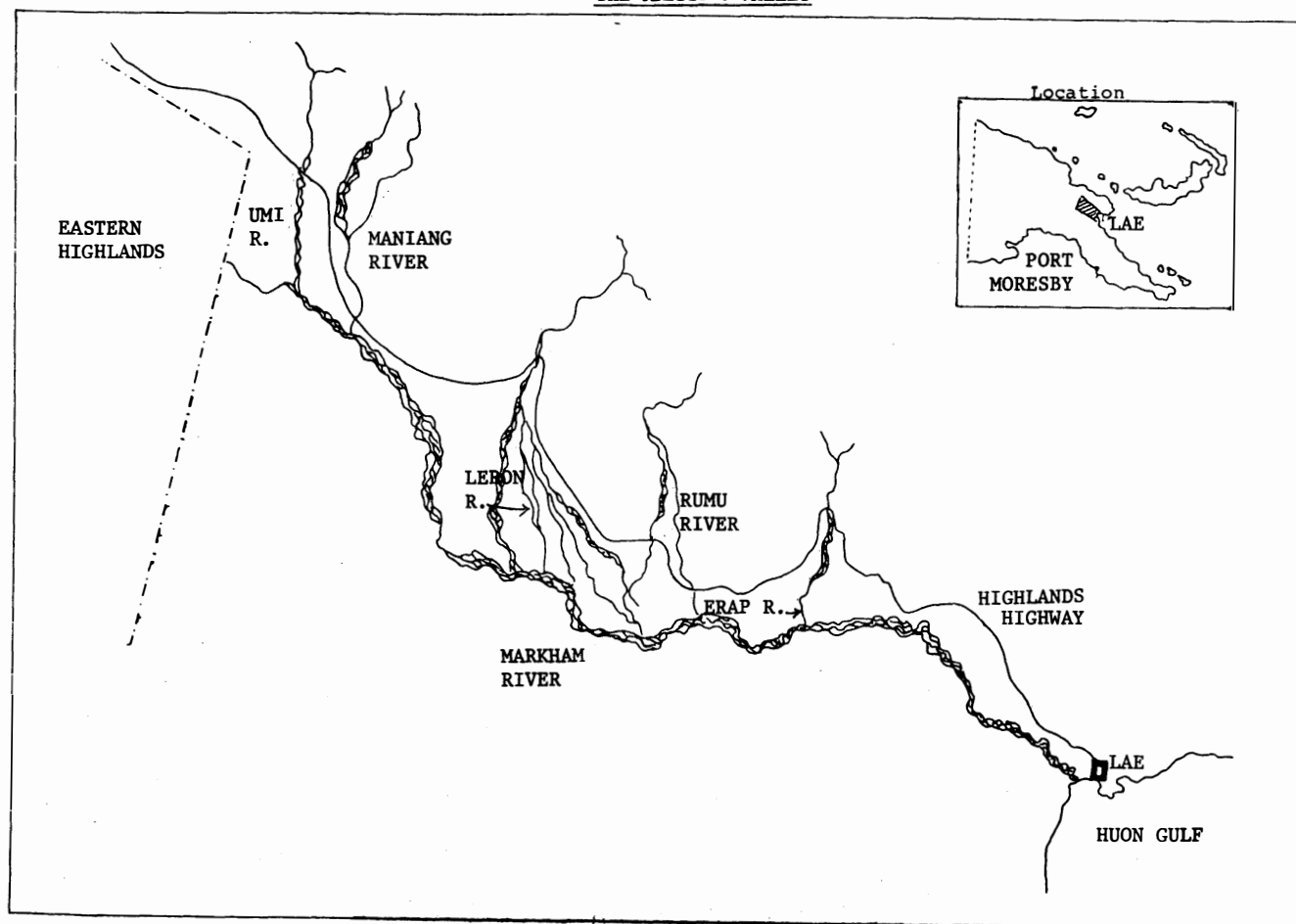
In the following section, the cattle industry in the Markham Valley of Papua New Guinea will be considered with a view to highlighting some of the problems currently being experienced and the implications of such problems to the future of the Valley as a major beef producing area.

2.5 Beef Cattle Production in the Markham Valley

This vast valley system of the Markham River runs in a north-westerly direction from its mouth at the Huon Gulf, dividing the mountain ranges of the Huon Peninsula from the ranges of the Highland Plateau (Holzknecht, 1974). The wide savannah plains characteristic of the valley lie to the east of the Markham River and are dissected by numerous tributaries, the most important being the Erap, Rumu, Leron, Umi and the Maniang Rivers (see Figure 2.4). Geographically, the valley is relatively unstable and seasonal flooding of the tributaries results in a significant proportion of the land being unusable for agriculture. In spite of this, however, the large areas of natural grassland makes the area extremely attractive for beef production.

Table 2.12, showing the distribution of beef cattle by province as at June 1974, indicates that the Morobe Province is the most important beef producing region in Papua New Guinea, accounting for 43 per cent of the total national herd. The Markham Valley, which forms part of the Morobe, accounts for all of the expatriate-owned cattle and between 50 per cent to 60 per cent of the smallholder cattle population of the entire province. The valley itself is, therefore, a very significant beef producing region. Such significance also extends to research and planning, since some of the oldest cattle projects in the country (both expatriate and smallholder) are located there.

FIGURE 2.4
THE MARKHAM VALLEY



By the end of 1975, there were some 324 small scale cattle projects in the Markham Valley, of which 190 were situated on the grassland (savannah) areas and 134 in the rainforest areas. During December 1975 and January 1976, the Department of Primary Industry made a sample survey of these projects in order to investigate the structure of the small scale sector of the industry and to gather relevant farm management information (see Appendix E for details of the aims and methods used in this survey). The survey used a stratified, random sampling technique with an overall sampling size of 67 farms (i.e., 20.7 per cent of the population). The grassland stratum included 40 farms (21 per cent) and the rainforest stratum 27 farms (20 per cent).

Based on the survey results, the smallholder cattle population in the Markham Valley at the beginning of 1976 was estimated to be 10,217 head, of which 7,323 were located on grassland areas and 2,894 on rainforest. The total area fenced for small scale cattle production was 13,124 hectares, with the grassland areas accounting for 10,949 hectares and the cleared rainforest for 2,175 hectares. Of the grassland projects (in the sample), 78 per cent were breeding and fattening enterprises, with 22 per cent steer fatteners. The corresponding figures for the rainforest projects were 74 per cent breeders and 26 per cent steer fatteners.

Table 2.14, which provides some of the sample statistics obtained from the survey, indicates some interesting implications. The average fenced area per farm was 57.48 hectares for grassland projects and 16.11 hectares for rainforest projects. These figures suggest that though we are dealing with small scale projects, the actual land areas concerned are quite substantial, reflecting the extensive type of production practised, and the standard deviations suggest a highly

TABLE 2.14

SELECTED STATISTICS ON CATTLE PROJECTS IN THE MARKHAM VALLEY

Project	Mean	Standard Deviation	n
<u>Fenced Area (hectares)</u>			
Grassland	57.48	41.83	40
Rainforest	16.11	17.61	27
<u>Herd Size (heads)</u>			
Grassland	38	24	33
Rainforest	21	19	25
<u>Stocking Rate (hectares/steer equivalent)</u>			
Grassland	1.23	0.82	23
Rainforest	0.59	0.22	15
<u>Loan Size (kina)</u>			
Grassland	4270	2130	35
Rainforest	3610	1440	24
<u>Loan Period (years)</u>			
Grassland	5.73	2.35	35
Rainforest	6.81	2.37	24

Source: Department of Primary Industry - Smallholder Cattle Survey in the Markham Valley, 1975/76 - compiled from raw survey forms.

skewed distribution. But a more significant aspect of these farm sizes is the continuing availability of sufficient land so that any national interested in cattle could, in fact, establish a project. For, while it is true that land in the Markham Valley is nowhere as scarce as it is in other parts of the country (e.g., the Highlands), it is equally true that, given the land requirements for cattle, there is a limit to the number of cattle projects that could be established, a limit that stops far short of the possible demand based on the population. Holzknacht (1974) indicates in this context that there is already developing a distinction between the 'haves' and the 'have-nots' and that jealousy has led in one case to the burning of a project.

It can be argued that the situation may not be as critical as suggested, if many of the projects are group owned, so that the benefits are spread over a greater number of people. However, in the survey, 51 per cent of the projects were recorded as being owned by one man (i.e., with immediate family), 43 per cent owned by a sub-clan and 6 per cent by a clan. There were no village (i.e., groups of clans) projects in the sample. Further, while it is true that more emphasis is now being placed on group ownership, group lending is not without its problems, and it is not uncommon to find instances where many of the original participants of a group project have lost interest, leaving only one or two individuals to continue. Indeed, one of the reasons for the bank's initial reluctance to get involved with group lending was a recognition of this very possibility.

In the grassland areas, 62 per cent of the sample farmers were recorded as showing poor pasture management, with 30 per cent being graded as fair, and 8 per cent as good. The corresponding figures for the rainforest area were 56 per cent, 36 per cent and 8 per cent

respectively. These figures are significant when viewed in relation to the stocking rates indicated in Table 2.14. Unimproved grasslands in the Markham are estimated to have a carrying capacity of one steer equivalent (S.E.) to 1.5 hectares. A stocking rate of 1 S.E. to 1.23 ± 0.82 hectares suggests, given the generally low level of management, that at least 20%-30% of the farmers are seriously overstocked. In the rainforest areas a higher carrying capacity is expected, if improved pasture species are planted. However, under the low level of management indicated (an indication supported by my own visits to six farms in the rainforest areas where weed and secondary forest growth were prevalent to varying degrees in all the farms) a stocking rate of 0.59 ± 0.22 hectares implies serious overstocking.

The large majority of small cattle projects in the Markham Valley, as indeed in other parts of Papua New Guinea, were financed by the Development Bank, and a significant percentage of these were set up using funds from the International Development Association as part of a small scale livestock project. In the cattle component of this project the aim was to establish 15 cow breeder units on about 60 hectares (of which 20 were to be semi-improved) with an initial cash investment (loan) of about K5000 and with a 12-year repayment period. The sample figures indicate that the average loan size for small scale cattle projects in the Markham was $K4270 \pm K2130$ for grassland farms and $K3610 \pm K1440$ for rainforest farms. The average sizes, though lower than the IDA model budget estimate, are substantially higher than the overall average size for cattle loans given by the Development Bank (see Appendix A, Table A.1), which suggests that, on the average, the cattle projects in the Markham Valley are larger than those in other parts of Papua New Guinea.

The more significant statistic in this context, however, is the average loan periods of 5.73 ± 2.35 years for farms in the grassland areas and 6.81 ± 2.37 years for farms in rainforest areas. These loan periods, which are substantially lower than the IDA projections,¹ imply that the repayment schedules employed by the Development Bank demand a much higher proportion of sales than was suggested in those projections, a fact which seems supported by the 14 case farms used in this study (see Chapter 4) where repayments represented between 64 per cent and 96 per cent of gross annual sales.

There are several reasons for this high repayment rate. In the first place, the bank has been able to exercise substantial control over sale proceeds, as has been shown in the discussion of the credit delivery system (section 2.3). Secondly, and somewhat related to the first, the bank was aware of the repayment problems experienced by so many development banks, and has been extremely vigilant in preventing the creation of negative repayment attitudes among clients. A third reason, and one which, though not a direct result of repayment policy, can have a far-reaching effect, relates to the manner in which repayments are effected. In most instances, when a farm sells stock, the total sale proceeds are sent directly to the relevant branch of the bank. On receipt of these proceeds, the bank officer checks the farmer's repayment schedule to see if any payments are due. If, for example, the stock sale realised K1000 and the farmers' schedule indicated that repayment of K800 was due, such a repayment would be

¹ It is true that some of the Markham projects were set up prior to the IDA finance. However, the IDA projections were presumably based on available information on the performance of the then existing smallholder projects.

effected and K200 refunded to the client. But, it may be that the K800 scheduled repayment was based on estimated sales of K2000 for the year, and the farmer's K1000 sale could have, in fact, represented his entire annual sales.

An important feature of this tight repayment scheduling is the effect it has on the net cash available to the farmer. In Chapter 3, a theoretical argument will be advanced to suggest that unless the farmer receives some minimum acceptable level of net cash income, the incentive to devote family labour resources to the cattle enterprise could easily be lost. For the time being, it may be sufficient to indicate that the high repayments effected by the bank can, in fact, so reduce the net cash surplus available as to act as a serious disincentive. As already indicated in the survey of farmers' attitudes to the extension services (Tovue, 1974), the control of loan funds and the loan repayment periods were listed as significant complaints. The case studies by Langness (1975) and von Fleckenstein (1975) also indicated farmer dissatisfaction with the manner in which repayments were effected and Evans (1975) showed that, for cattle projects in the Goilala, repayment of loans ahead of schedule did not improve their financial viability.

Some of the survey results also point to a dissatisfaction with the level of returns obtained from cattle. Twenty-six per cent of the sample farmers expressed dissatisfaction with the money obtained from cattle sales and 53 per cent of these suggested that this was because of the level of repayments. Sixty-eight per cent of the grassland farmers and 41 per cent of the rainforest farmers were also involved in other forms of cash activities, not including off-farm work. This is significant when viewed in relation to a generally low level of management, and to the fact that the availability of labour for maintenance (of fences and

pastures) has been voiced as a major problem by many of the farmers.¹ These other enterprises may have been taken up by the farmers to supplement the low income levels in cattle. But the fact that they would compete for labour resources implies a type of vicious circle in which other cash earning activities supplement income, but these reduce the labour input into the cattle project which would further reduce net income from cattle sales.

The general level of management on smallholder cattle projects in the Markham Valley is low and is reflected in the standards of pasture management, in the level of maintenance of fences and stock-yards and in the fact that only 3 per cent of the farmers kept useful records. To some extent, this could be explained by the fact that the techniques of beef cattle production were completely new to the Papua New Guineans and some time period is required for the learning process, a time period which may be relatively long, given the rigid requirements of cattle farming compared to those of the subsistence enterprises. But it may also be partly explained by the 'paternalistic' nature of the extension input, exaggerated by the type of credit delivery system utilised, which has militated against the creation of opportunities for the farmers to learn for themselves - a suggestion supported by the case studies mentioned earlier. The high rate of repayment is also a factor in this context, by removing the incentive for farmers to devote sufficient resources to the project for it to operate at a viable level.

¹ Tovue's survey also listed labour availability as a major complaint.

The low management levels of small scale cattle farmers are not, to my mind, the result of behavioural characteristics suggested by some expatriate extension officers, such as an inherent laziness of the Markham people. It is rather a very rational response to factors which impinge on the economic and social environment. These factors will eventually lead to a serious weakening of the industry in the Markham, for not only will existing farmers tend to get out of cattle production, but also new entrants will be discouraged. In fact, there is evidence to suggest that this is already occurring. The increasing incidence of wild cattle in the Valley, resulting from failure adequately to maintain fences, and from infrequent yarding, is one manifestation of the disillusionment of existing farmers. This problem has become sufficiently serious to warrant the Department of Primary Industry embarking on a program, at considerable expense, of killing off the wild stock. Up to February 1977, some 20 loans¹ had been repaid by sales of wild cattle. Further evidence of discouragement to potential cattle-owners in recent years is found in the noticeable reduction in the rate of establishment of new cattle projects: in the Morobe Province as a whole, smallholder loan approvals for cattle decreased from a peak of 159 loans in 1972-73 to 66 loans in 1975-76.

¹ Personal communication, Mr Hugh Potts, Senior Loans Officer, Papua New Guinea Development Bank, Lae Branch.

CHAPTER 3

SOME THEORETICAL PERSPECTIVES

3.1 Introduction

In Chapter 1, a conceptual argument was put forward to justify the goal of economic improvement of the farmer as a central objective in small farmer credit programs. Some indication of the complexity involved in measuring economic improvement was also suggested, and it was argued that given this complexity, financial improvement would be assumed to represent a reasonable proxy. An indication of the type of criteria that could be used to measure financial improvement may, therefore, be relevant.

In this context, it may be useful to establish certain axioms which form the basis of the measurement criteria (Johnson, 1970). These axioms represent assumptions about normative behaviour and are, essentially, value judgments. In the final analysis, the validity of the assumptions could be judged by the extent to which actual behaviour accords with predicted behaviour and in a later section an attempt will be made to make such an assessment, in relation to the farmers in the study. For the time being, it may be sufficient to note that they are, in fact, value judgements but are necessary if one is to make any headway in formulating quantitative means of evaluating improvement.

The first of these axioms is that the larger the differential between costs and returns, *ceteris paribus*, the greater is the financial improvement. Secondly, early benefits are preferred to later benefits. That is, an outlay that generates benefits early is

preferable to one that generates benefits of a similar magnitude later. And finally, certain consumption is more desirable than uncertain opportunities for consumption. Or, in other words, the more risky the investment, the less favourably is it considered.

It may also be useful, for the purposes of this study, to make a distinction between investment evaluation, which is 'backward looking' in perspective and investment appraisal with its forward looking perspective. In a sense, these different perspectives are really two sides of the same coin, but a distinction still seems necessary, given the purposes for which they are performed. Investment evaluation is done to ascertain the extent to which estimates, made at the time of the investment, are being realised and to explain the reasons for any variances as a guide to future action. In evaluation, therefore, the investment has already been made. Investment appraisal¹, on the other hand, is performed with a view to choosing between alternate investments and it attempts to arrive at a means of ranking.

3.2 Measuring Economic Improvement

It was previously suggested that one of the difficulties involved in measuring economic improvement concerned the problems of defining and quantifying individual utility, to the extent that the maximization of economic improvement implies the maximization of utility. By simplifying this to financial improvement, what we are in

¹ In actual fact, in the context of many small farmer credit programs, the notion of choice may not be realistic. Thus the appraisal could be performed simply to decide whether a particular investment is profitable or not. To the extent, however, that if the investment appears unprofitable, alternatives may be sought, the connotation of choice still exists.

fact assuming is that the improvement in financial status is approximately equivalent to improvement in utility.

Even with this simplifying assumption, however, one is still faced with the problem of defining what is meant by improvement in financial status, within the context of the firm. It is generally assumed that the owners of a firm expect to earn a surplus over and above what they have invested. The extent to which this surplus increases over time may therefore seem a reasonable measure of improvement.

But in order for this surplus to increase over time, capital must be accumulated since the firm's earning is a function, *ceteris paribus*, of its capital. For this reason, it has been argued (Baker and Hopkin, 1969; Johnson, 1970) that if the wealth, as measured by the market value of the owners' net worth or equity, increases, it is reasonable to assume that financial improvement has occurred. For, as Johnson (1970) states:

. . . by maximizing their wealth, we provide individuals with the opportunity to adjust their incomes and investment portfolios to maximize their [own] utilities.

This, however, assumes that the individuals are, in fact, able to 'adjust their incomes and investment portfolios'. In the case of the owner-occupied farm, for instance, it assumes that the farmer is able to trade in capital assets (say by using them as collateral for a loan) at will, if he wishes to increase his present consumption. Or alternatively, it assumes he is able easily to vary his investment mix depending on his risk return preference. Neither of these assumptions appear feasible in a small scale farming situation.

Thus, while the Johnson argument may be valid in cases where a highly developed capital market allows such free trading, it is highly questionable whether it applies in underdeveloped economies or even in the rural sector of developed economies where the family farm predominates. In the family-type farm, capital accumulates at the expense of current family consumption, and it is not possible to maximize one without significantly reducing the other. This applies even in cases where capital accumulation occurs by application of unpaid family labour. For family labour is utilized at the expense of leisure and leisure could be considered a consumption item.

In a theoretical sense, the conflict between capital accumulation or investment on the one hand, and consumption on the other, is handled by the technique of discounting. Investing now means foregoing present consumption on the expectation that the future consumption generated by the investment would compensate for the sacrifice. Thus, a discount rate is applied to the future flows of benefits and the sum of these discounted flows compared with the initial investment (i.e., the foregone present consumption). If the present value of future flows exceeds the present value of the investment, the sacrificing of present consumption is deemed to be justified. In this sense, investment is regarded, as in Fisherian analysis, not as an end in itself, but as a process for distributing consumption over time, or more specifically as a means of increasing future consumption by foregoing present consumption.

The major practical difficulty in this approach is that of determining a discount rate which adequately reflects the individual's time preference. This concept of time preference is frequently conceived as a subjective rate of interest defining an individual's

preference for present, as opposed to future consumption. It depends not only on tastes and personality (i.e., reflections of age and social situation) but also on the total amount of income currently earned and on expectations of future earning possibilities. Thus, while it is conceivable that a time-preference rate could be determined by posing relevant questions concerning the desirability of income now as opposed to income, say, one year from now, the fact that the time preference rate would vary with income makes this an extremely difficult task. This is made even more difficult by the fact that it has to be done for each individual as there is no reason to believe that the time preference rate of different individuals would be similar.

In a highly developed capital market (without imperfections) the average rate of time preference would equate to the rate of interest, at equilibrium. This is because an individual will postpone consumption and lend on the capital market as long as the rate of interest earned exceeds his rate of time preference. Also, if firms invest up to the point where the rate of return on investment (marginal efficiency of capital) is equal to the rate of interest (the decision rule in neo-classical theory), then at equilibrium the rate of time preference will be equal to the rate of return (Bannock, Baxter and Rees, 1972).

These propositions could be illustrated graphically using Fisher's indifference curve analysis (Feldstein, 1972; Hirschleifer, 1958 and 1970). The axes in Figure 3.1 represent the amount of income available for consumption in each of the two successive periods. The investor is assumed to have a preference function relating consumption in periods 1 and 2. This preference function is represented by utility

indifference curves U_1 .¹ The lines QQ' , PP' represent borrowing-lending possibility lines (or market lines) and are equivalent to the budget lines in consumer analysis.² They are defined by the condition that a sacrifice of one dollar in period 1 yields $1 + m$ dollars in period 2. These market lines are, therefore, lines of constant present value and the slope of lines (say m) indicates the interest rate.

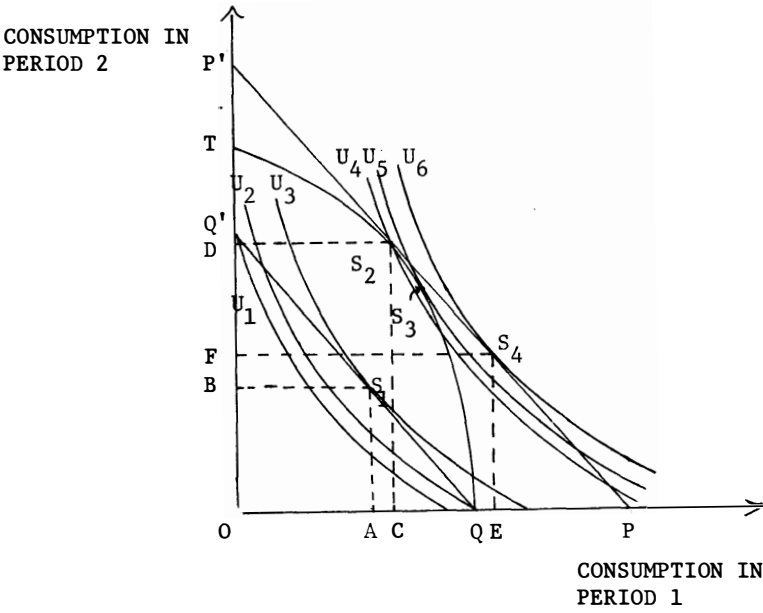
The problem facing the individual is to choose, from available opportunities, an optimal time pattern of consumption. The individual starting at Q , for instance, may redistribute consumption by moving to any point on the QQ' line. Thus, he may consume OQ in period 1 and nothing in period 2, placing him on indifference curve U_2 . Alternatively, he may consume OQ' in period 2 and nothing in period 1, in which case he would be on a lower indifference curve U_1 . The individual who has no direct investment opportunities can only redistribute consumption by borrowing and lending and reaches his highest indifference curve by moving to point S_1 , where he lends (or saves) amount QA and consumes OA in period 1 and OB in period 2, placing him on indifference curve U_3 . Likewise, an individual with starting point P would face similar opportunities along the PP' , but at different magnitudes.

The curve QT indicates the range of productive investment opportunities (in real terms) available to an individual with starting point Q . It is the locus of points attainable to the individual as he

¹ These indifference curves are drawn such that positive time preference is exhibited, i.e., the marginal rate of substitution of consumption in period 2 for consumption in period 1 is greater than unity. It is also possible to conceive of (i) neutral time preference where the $MRS_{2-1} = 1$ and (ii) negative time preference when the $MRS_{2-1} < 1$.²⁻¹ In the rest of this chapter, the existence of positive time preference is assumed as this appears the more realistic assumption in the context of investment evaluation.

² The lending rate is assumed to be constant and equal to the borrowing rate.

FIGURE 3.1
FISHER'S INDIFFERENCE CURVE ANALYSIS

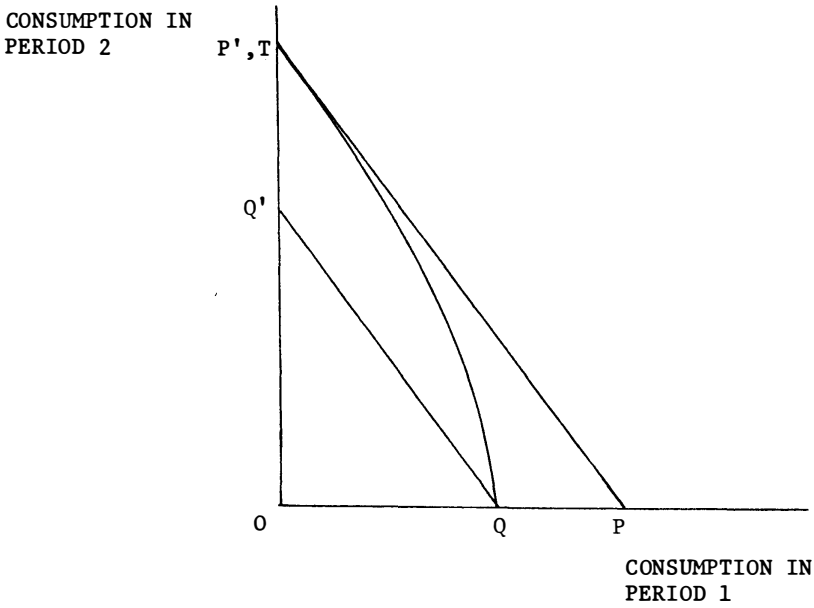


sacrifices more and more of period 1 consumption by productive investments yielding consumption in period 2. These productive investments are reflected by movement from Q to the left along the period 1 axis. The slope of the curve represents the rate of the transformation of present goods into future goods and the rate decreases as the quantity of investment increases. Also, in this two-period example, the marginal internal rate of return is measured by the slope of the curve minus unity.

In this analysis, an implicit assumption made by both Feldstein and Hirshleifer (and Fisher) is that before income (or endowment) is exhausted by investment, the rate of return on investment falls below the market rate of interest (i.e., there exists a point of tangency between the market line and the production possibility curve). This need not necessarily be so, as suggested by Figure 3.2. However, for the model to be consistent, a redefinition of the investment possibility curve is necessary, such that it is taken to represent investment possibilities under given conditions.¹ In the context of smallholder cattle projects the QT curve (Fig. 3.2) could, therefore, be interpreted as reflecting different combinations of unpaid labour and capital that could be combined to set up a project on a fixed acreage. In fact, with such a redefinition of the investment possibility curve, Q depends not on the individual's own asset position but on the rate of return on investment such that at T the rate falls to zero.

¹ I am grateful to Mr E.K. Fisk and Mr S. Jayasuriya for identifying the necessity for this assumption.

FIGURE 3.2
INTERTEMPORAL INVESTMENT POSSIBILITY
CONFIGURATION - NO TANGENCY TO MARKET LINE



If the investor invests up to the point where his marginal¹ internal rate of return is equal to the interest rate (Fig. 3.1) he will move to point S_2 on the QT curve, where it is tangent to PP' . At point S_2 he will be on indifference curve U_4 , consuming OC in period 1 and OD in period 2, and investing QC. Point S_2 is also the point where the investment consumption combination has maximum present value, given the range of opportunities open to the investor. The present value of the two-period stream represented by S_2 is OP, since as mentioned earlier, PP' represents points of constant present value. Any point on QQ' represents a lower present value.

This point S_2 , while representing maximum present value, is still not optimum in terms of utility.² An examination of the diagram shows that the investor could move to a higher indifference curve by still investing QC and then borrowing the amount CE along the line PP' . At this point S_4 , the investor will be on a higher indifference curve U_6 .

The indifference curves in the diagram represent two-period preference functions and the slopes indicate the marginal rates of substitution of present for future goods, i.e., the time preference rate between two years. Thus maximum utility is attained when the time

¹ There is some confusion in the literature in terms of the definition of the internal rate of return rule. Mathematically, the optimum point is where the interest rate equals the marginal rate of return defined as that discount rate that equates the present value of the increment to future receipts with a unit increment to investment. The internal rate of return referred to in project appraisal literature is, in fact, an average not a marginal rate.

² Actually, investment at point S_3 , where QT is tangent to indifference curve U_5 , is better from a utility viewpoint than S_2 . This, however, only applies if borrowing is not possible. Thus, the ability to borrow allows the individual to 'neglect' his time preferences and finance the investment at point S_4 , then moving to a higher indifference curve, U_6 .

preference rate for the individual is equal to the borrowing-lending rate, which is, in turn, equal to the marginal efficiency of capital.

It seems therefore that the problem of determining a time preference rate is avoided by the assumption of a perfect capital market. This is not entirely so, however, as the internal rate of return rule indicates the amount to invest, but it says nothing about the financing to reach a final optimum at S_3 (Hirshleifer, 1958). Moreover, even if one is concerned only with the investment decision, the assumption of a perfect capital market, while it may have some relevance in a highly developed, monetized economy, seems woefully unrealistic in underdeveloped economies with highly imperfect capital markets (if a capital market exists at all); this is even more so in economies where non-monetary production still represents a significant proportion to total national product.¹

Another approach involves the concept of an opportunity cost of capital. Again, under the assumptions of a perfect capital market, the opportunity cost of capital² expressed as a rate would be equal to the rate of interest and hence to the time preference rate. It is also possible to extend the opportunity cost principle to an imperfect market situation but like the time preference rate, it is determined endogenously. That is, the opportunity cost of funds depends on the available choice of investments, so that unless one is able to look

¹ Hirshleifer (1958) extends the Fisher analysis to include instances where the capital market is less than perfect and shows how the Fisherian approach using iso-function analysis integrates the investment decision with the general theory of choice. But while recognizing that this approach is theoretically superior, Hirshleifer admits that it does not solve the problem of determining a discount rate, for the '... rate used is not an external opportunity but an internal shadow price which comes out of the analysis'.

² Feldstein (1964), in dealing with the problem of a discount rate from a social viewpoint, suggests a method of incorporating both a time preference rate and an opportunity cost rate. This approach also has conceptual validity in the private investment situation but still requires the time preference rate to be exogenous.

some time into the future (and include the incidence of technological change which would influence the range of available investments) we are unable to know the rates at which future investments should be discounted (Upton, 1976).

From the foregoing analysis, it would seem that while there are many theoretical postulates concerning what a discount rate should reflect, there is little guidance as to how one goes about estimating it, if indeed such an estimation is possible. This means that the individual researcher is left to make various approximations (perhaps better described as guesstimates) if he is to get on with the business of analysing an investment. But such approximations may still be acceptable if one is able to take into account certain important relevant features of the situation under study. An example may help to clarify this point.

In underdeveloped rural economies, particularly those which are now emerging into monetary activities, there are reasons to think that the rates of time preference are substantially higher than in countries at later stages of development (Bell and Todaro, 1969). In the first place, the average levels of cash income are low, which directly implies a higher degree of time preference. Secondly, for farmers now venturing into cash activities, it is not unreasonable to assume that their minimum cash expectations are relatively very high for, in fact, it is these expectations that provide the incentive for engaging in cash activities. Such high expectations again imply greater positive time preference. Finally, the 'imposition' of a consumer oriented cash economy on a traditional social structure inevitably leads to a 'revolution of rising expectations' (Bell and Todaro, 1969) resulting in the consumer's intertemporal indifference curve becoming steeper as he desires to avail himself of the amenities of modern life in the shortest possible time.

3.3 The Relevance of Cash Flows and the Use of Discounting

In the introduction to this Chapter, a distinction was made between investment evaluation, which is historical in emphasis, and investment appraisal with its forward-looking perspective. Given this concern with past performance, it may seem that the historical nature of the accounting approach makes it directly applicable to the evaluation of performance. However, certain features of the accounting process and its system of accrual suggest that it is ill-suited to reflect the kinds of things we are concerned with in this study. In accounting, for instance, recorded profits over any time span do not represent actual cash surpluses but include inventory changes over the accounting period. Also, capital expenditures are not included in the estimation of profit but are accounted for by using depreciation allowances. But the owner of a farm can only withdraw, for consumption or capital accumulation, surpluses that are in the form of cash. Accounting profits, to the extent that they represent bookkeeping allocations, are not always directly available for disposal.

The cash flow concept, on the other hand, attempts to determine the residual, after deducting all associated costs, that is available to owners of the project. In deriving the cash flow, all outflows from the enterprise are considered, involving (i) capital expenditure at the time when it is incurred; (ii) cash operating expenses and overheads including the value of family labour and (iii) interest and principal payments on external debt. Depreciation provisions are not deducted from gross benefits, as replacement of capital items are treated as outflows at the time when they occur. Similarly, all cash inflows are considered including the inflow of loan funds from external creditors, but non-cash income associated with inventory

changes are excluded. At the same time, in order to take into account real income changes, the salvage value of assets is included as an inflow in the last year of the evaluation. With respect to the projects used in this study, this amounts to including the project's net worth (i.e., asset value net of liabilities) as part of the cash flow, in the final evaluation year. Inclusion of this net worth figure involves the implicit (and quite reasonable) assumption that it measures, in the final evaluation year, the present value of all future cash flows for the remaining life of the project. Also, by including the net worth in the final evaluation year, projects operating for different time periods may be compared.

The cash flow that is calculated in this way measures the net return to the owners' equity in the project and thus appears a more relevant measure of financial improvement, at least in the sense in which it is defined in this study. Also, the cash flow figure is more amenable to application of discounting techniques, than are accounting profits, since the actual time periods over which cash movements occur are important considerations in the calculation.

It should be noted that this method of deriving the cash flow is different from that used by some project analysts when appraising the worthwhileness of proposed investment alternatives. In such instances, the analysis is performed primarily to determine which investment gives a better return to capital, and debt service (interest and principal) is not deducted from gross benefits. Such a cash flow thus measures the return to total capital, both owned and borrowed, and reflects the efficiency of capital in the different alternatives.

In the earlier discussion on measuring financial improvement, it was indicated that discounting was a theoretical means used to deal

with the conflict of present as opposed to future consumption (i.e., investment). In the broader (and stricter) theoretical sense, discounting is a technique which enables flows of monetary values occurring at different points in time to be compared on a present value basis, and is based on the notion that money has a time value such that a dollar today is worth more (today) than a dollar received some time in the future.

In its normal application, discounting is used in project appraisal in order to compare the expected future costs and benefits of an investment, as a means of assessing its desirability as compared with other possible investments. But the discounting is also applicable to evaluation, since the comparison of monetary values occurring at different points in time is still necessary. Thus, in evaluation, though the data inputs are historical, we are, in a sense, placing ourselves backward in time and comparing the position when the investment was made with the position at present, as seen from the earlier point in time. Viewed in this way, the only real difference between evaluation and appraisal is that with evaluation, risk and uncertainty are not relevant considerations.

3.4 Evaluation Criteria

Of a number of different discounted measures of project worth, the two most frequently used are the Net Present Value (NPV) and the Internal Rate of Return (IRR). The Net Present Value is the sum of the net benefits (i.e., outflows minus inflows) over the life of an investment, discounted at the time preference or opportunity cost of capital rate. If the NPV is positive, the investment is considered desirable since it means that the future consumption generated by the investment exceeds the foregone present consumption.

Mathematically, the Net Present Value could be expressed as:

$$(1) \quad NPV = \sum_{t=1}^n \frac{I_n - O_n}{(1+r)^n}$$

where I_n = inflows in each year

O_n = outflows in each year

r = rate of discount

n = number of years

The Internal Rate of Return is that rate of discount which when applied to a cash flow stream would make the present value of the inflows equal to the present value of the outflows (i.e., make the present value of the cash flow equal to zero). The IRR determined in this way is compared to a time preference or opportunity cost of capital rate, considered in this context as cut-off rates,¹ to determine whether the investment is worthwhile. If the IRR is greater than these 'cut-off rates', the investment is deemed desirable. Mathematically, the Internal Rate of Return is that discount rate, r' , such that:

$$(2) \quad \sum_{t=1}^n \frac{I_n - O_n}{(1+r')^n} = 0$$

where the symbols I_n , O_n and n have the same meaning as in (1) above, and where r' is the discount rate that reduces the cash flow to zero. There has been much debate over which of these measures gives a better result.² A major reason advanced for favouring the IRR

¹ By cut-off rate is meant some pre-determined rate, below which the investor would consider the investment unattractive.

² See, for instance, Aplin and Casler (1973); Gittinger (1972); Hirshleifer (1958); Johnson (1970); Lindsay and Sametz (1967); Turvey (1963).

is that it allows projects to be ranked, whereas the NPV, since it is an absolute measure, does not enable such ranking (Gittinger, 1972). For my own purposes, however, it would seem that the Net Present Value criterion is the relevant measure for assessing improvement. As was suggested earlier, the evaluation proposed in this study is not concerned with choosing between alternative investments, but simply to investigate whether a particular investment choice resulted in the investor experiencing an improvement in financial status. As such, a measure which represents a monetary value seems more appropriate than a percentage figure.

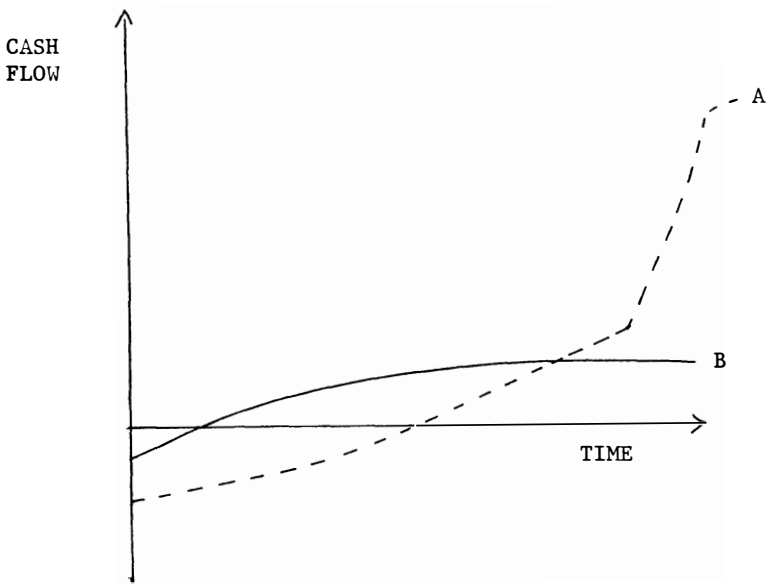
3.5 The Need for Side-constraints

Particularly under the conditions of semi-subsistence agriculture, where one is trying to evaluate an investment that may represent an individual's first major excursion into the monetary sector, the NPV criterion may still not take fully into account consumption expectations early in the project's life. An example may help to clarify.¹

Figure 3.3 is a schematic representation showing the changes in cash flows over time for two projects, A and B. Project A has a very low cash flow for the first, say, seven years and then increases rapidly. Project B, on the other hand, experiences reasonable positive flows from quite early in the project's life and such flows remain constant throughout. Now, depending on the relative magnitudes of the flows, it is entirely possible for project A to show a higher net present value than does project B, discounting at the same rate of

¹ I am grateful to Dr Dan Etherington for this approach to the exposition of the argument.

FIGURE 3.3
SCHEMATIC SHOWING CHANGES IN CASH FLOWS
OVER TIME FOR TWO INVESTMENT PROJECTS



discount. But does that make project A preferable to project B? The individual farmer may well find project B more attractive because of the shorter period of low or negative returns. Of course, it may be argued that if a correct time preference rate is chosen this situation would not arise; however, the time preference rate itself is not sufficient to reflect the concept since two quite separate issues are involved. One is the time preference rate, which would tend to vary with income, and the other is the minimum cash flow which is independent of rise in income. For this reason, it does seem plausible to supplement the net present value criterion with certain side-constraints which reflect some minimum acceptable level of cash flow.

The significance of a minimum net cash flow could be further illustrated by reference to a model developed by Fisk (1975b) to explain 'the response of non-monetary production units to contact with the monetary exchange economy'. In this model, Fisk describes the relationship between the subsistence and monetary enterprises in situations where the production unit still obtains the majority of its living essentials from subsistence production, and identifies the factors which determine the level of labour input and hence production in the monetary enterprise. Without going into the details of the Fisk model, it may be useful to summarise certain features which are relevant to the present argument:

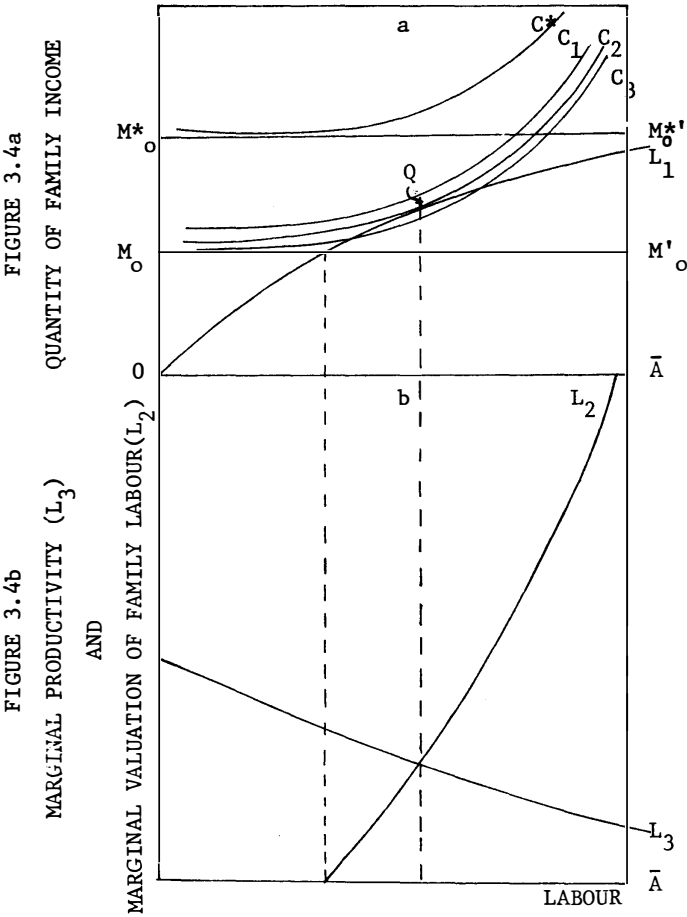
1. In conditions of subsistence affluence, defined as a situation where a favourable land/labour ratio means that the essentials of life could be produced with the expenditure of a relatively small amount of labour, there is a relatively large residual labour resource which can be devoted to cash activities.

2. But given the high labour productivity resulting from a favourable land/labour ratio, the 'effort-cost' of activity in the monetary enterprise is high compared to that in the subsistence activity. This implies that the monetary incentive necessary to produce a satisfactory labour input into the cash enterprise is relatively large.
3. Thus, even with a low demand for money (which in any event would tend to rise with time) there is some minimum income level which is necessary to call forth and maintain a labour input (i.e., into the monetary enterprise).

Fisk illustrates his arguments using an adaptation of a model developed by Nakajima (1969) and shown in Figures 3.4a and 3.4b. In Figure 3.4a, the quantity of family income is measured on the vertical axis and the horizontal axis measures the quantity of family labour available for use in the monetary enterprise, i.e., the residual after deducting labour used in the subsistence enterprise, and the vertical line on the right of the figure marked $\bar{A}$, is the physiological limit of family labour available. The curve OL_1 , is the production possibility curve with labour as the only variable input and C_1 are indifference curves relating family labour

FIGURE 3.4

MODIFIED NAKAJIMA MODEL SHOWING EFFECT
OF MINIMUM INCOME CONSTRAINT ON LABOUR EQUILIBRIUM



in the cash enterprise to family cash income. The horizontal line $M'_0 M'_0$ represents a minimum level of cash income necessary to make a monetary enterprise worthwhile and could be conceived to consist of two components: (i) a minimum expected level of money income available for consumption by the family, (ii) the minimum money income necessary for production, as for example the purchase of essential operating inputs in a cattle enterprise.

The first thing of significance with this minimum income line is that its intersection with the production possibility curve OL_1 determines the point of origin of curve L_2 ; on Figure 3.4b, which represents the marginal valuation of family labour reflecting 'the marginal increment of money income the family requires to make the marginal unit of family labour just worthwhile' (Fisk, 1975b). Thus, income levels below $M'_0 M'_0$ are unacceptable and have no utility: i.e., the indifference curves are asymptotic to the minimum income line.

The indifference curves are also asymptotic to the maximum labour line and equilibrium is obtained when the production possibility line is tangent to an indifference curve. This equilibrium point, labelled Q in Figure 3.4a is also the point where the marginal valuation of family labour is equal to the marginal productivity of family labour and is shown in Figure 3.4b as the point of intersection between the marginal valuation curve, L_2 and the marginal productivity of labour curve L_3 .

Figure 3.4a also shows a horizontal line $M^* M^*_0$. This is drawn to represent a situation where another component is added to the minimum income requirement, namely interest and principal repayment on a loan, such that the line is forced above the production possibility boundary. Under such a situation the

indifference curves, represented by C^* in this instance, are nowhere able to fall tangential to the OL_1 curve. The significant point in this context is that while the repayment itself may not be beyond the production potential of the enterprise, it becomes so when added to the minimum income expectations of the family unit. And the existence of such a situation is not unlikely in conditions of many small farmer credit programs where the setting of repayment schedules on loans seldom takes into consideration the income expectations of the family unit, especially when their minimum food needs are adequately covered from the subsistence sector.

Further, in instances where formal monetary credit is a relatively new institution an ex-ante assessment may not reveal this situation to the extent that the minimum income level expected by the family may not fully reflect the level of repayments required. In other words, the family's inexperience with the relatively rigid requirements of the institutional credit could lead to an under-estimation of the level of repayments,¹ with the result that though the investment is made, the ex-post cashflow flow experience could be so disappointing as to lead to a withdrawal, or at least a substantial reduction in, family labour input. This is particularly so in cases where the lending agency is able to effect substantial controls over the manner in which repayments are effected, thereby preventing the farmer from reducing his payments in order to meet his consumption expectations.

¹ It is significant in this context, that in the sample survey utilized in Chapter 2, 42 per cent of the farmers indicated that they had no idea of their level of repayments and the amounts still owing to the Development Bank.

A further illustration of the significance of this concept is shown in Figure 3.5. In this simplified diagram, the intertemporal indifference curve C , is drawn such that it is asymptotic not to the axes but to the vertical line $M_1M'_1$ and the horizontal line $M_2M'_2$. These lines reflect minimum income levels in the two periods, and their existence rule out investment possibilities, shown by the QT curve, to the left of $M_1M'_1$ and below $M_2M'_2$. Optimal investment would be at point Y , where C is tangent to QT . The horizontal line $M^*_2M'^*_2$ reflects the situation where loan repayments raise the minimum income requirement in period two. The effect is to make investment at Y unfeasible, to the extent that the minimum income requirement (represented by $M^*_2M'^*_2$) would not be attainable. The investor is thus forced to a corner point (Z) or a lower indifference curve (C^*), if he is to meet the minimum income. One interesting implication in this context is that depending on the configuration of the QT curve, a high rate of repayment, by forcing up the minimum income requirement, could make the investment very unattractive (from the utility viewpoint). In an ex-post situation, this could be manifested in a withdrawal of labour, reflecting a higher utility of leisure under the constraints imposed.

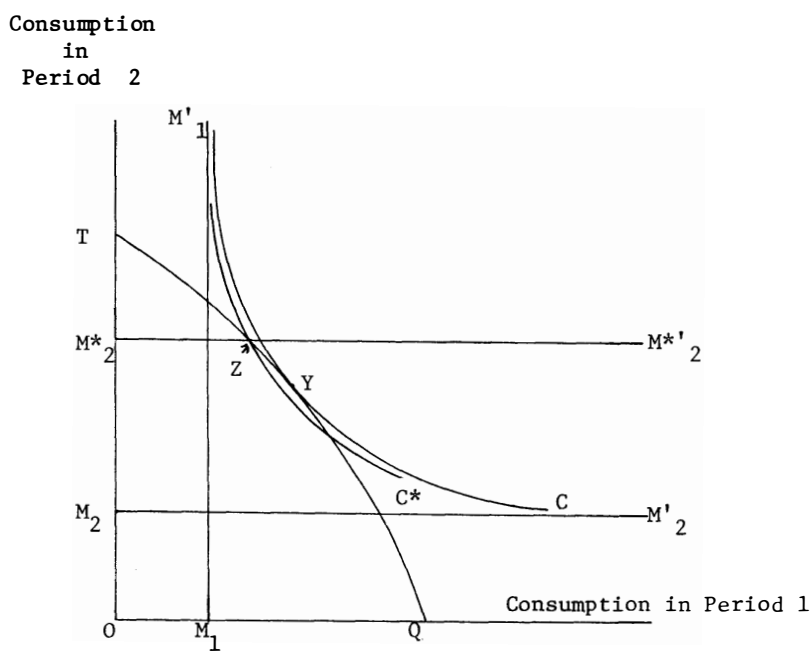
3.6 Credit and Production Organization¹

In basic production theory it can be shown that under conditions of constrained optimization (e.g., an upper limit to funds available), the marginal rate of substitution between two inputs is equal to the inverse price ratio.

¹ Much of this section is based on Baker (1968).

FIGURE 3.5

INDIFFERENCE CURVE ANALYSIS SHOWING EFFECT
OF MINIMUM INCOME CONSTRAINT ON OPTIMUM INVESTMENT



$$(1) \quad - \frac{dx_2}{dx_1} = \frac{P_1}{P_2}$$

where x_i represent inputs in a production function of the type $Y = y(x_1, x_2)$. This function is single valued and continuous with continuous 1st and 2nd order derivatives.

P_i prices of the inputs.

In effect, equation (1) states that best operating conditions occur when the isocost (budget) line is tangent to the iso-product curve.

Assume that the purchase of x_1 and x_2 must be financed with loan funds, equation (1) becomes:

$$(2) \quad - \frac{dx_2}{dx_1} = \frac{P_1 + F_1}{P_2 + F_2}$$

when F_i is the cost of finance for each marginal unit of x_i .

If the ratio F_1/F_2 is equal to P_1/P_2 , there is no reduction in efficiency in the sense of departure from the expansion path,¹ though there may be a failure to reach an optimum if total finance is insufficient.

If, however, the terms under which the finance is obtained are such that one input (say, x_2) is favoured over the other, a sub-optimum allocation is likely. Baker postulates that such discrimination can take either of two forms:

- (i) the interest rate may be lower on a loan to finance x_2 than it is to finance x_1 . Thus, the numerator on the right hand side of the equation (2) increases

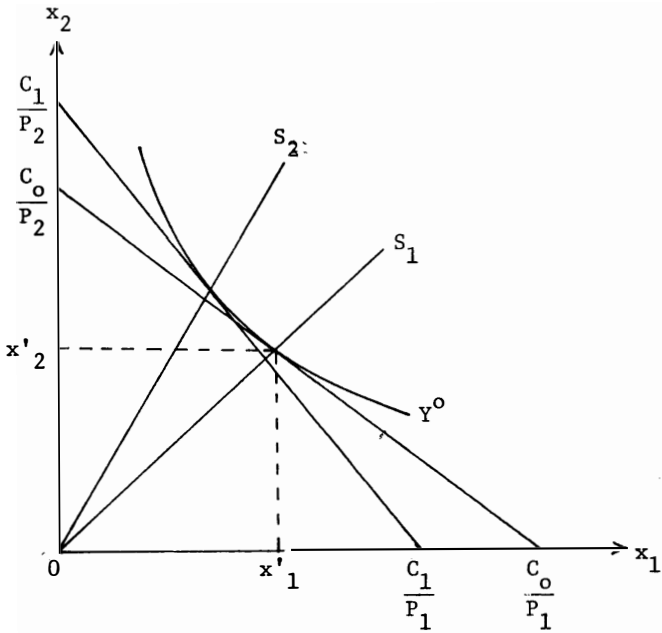
¹ The expansion path is the locus of points generated by (1) and it defines the cost minimizing combination of x_1 and x_2 for given levels of output Y .

relative to the denominator. To retain the equality requires an increase in the left hand side - x_1 must be reduced relative to x_2 .

- (ii) the same interest rate applies, but the loan limit to finance x_1 is less than that to finance x_2 . In other words, credit, defined as the capacity to borrow, is absorbed at a rate that is greater for x_1 than it is for x_2 . Once we assume that credit remaining in reserve has a value greater than zero, F_1 exceeds F_2 and the optimum quantity of x_1 will be reduced to x_2 .

These propositions are illustrated in Figure 3.6 below. In the diagram, the axes measure the quantities of inputs x_1 and x_2 . The curve Y^0 represents a fixed output produced by different combinations of x_1 and x_2 (i.e., Y^0 is an isoquant). The cost of producing Y^0 is minimized with x_1' units and x_2' units of x_2 , if inputs are not financed with loan funds or the cost of credit per unit of input is equal. If, under such circumstances, the total production cost of Y^0 is C_0 and P_1 represents the prices of x_1 and x_2 , the line $\frac{C_0}{P_1} \frac{C_0}{P_2}$ reflects, in effect, the budget line and its tangency to the isoquant curve indicates the least cost combinations of x_1 and x_2 . OS_1 is the expansion path (least cost combination) with these conditions. If, however, the marginal cost of credit for x_1 is greater than for x_2 , different combinations of x_1 and x_2 will be required since the slope of the budget line will change. The expansion path will steepen (OS_2) and the cost of producing Y will increase from C_0 to C_1 .

FIGURE 3.6
EFFECTS OF FINANCE COST ON
LEAST-COST COMBINATION OF TWO INPUTS



An extreme case of situation (ii) has been suggested by Nisbet (1970) in which F_1 becomes infinitely high due to finance not being available for x_1 . In such cases, if the operator is unable to obtain the input without finance, production is not possible. But, as is usually the case, if some quantity is provided without loan funds (e.g., say, x_1 was labour), the effect is the same as described in situation (ii) above, except that the price of x_1 will increase exponentially. Yet another interesting variation, with similar effects, occurs when bank opinion (or prejudice if you like) sets a limit to the credit for one input and when in fact other sources of credit are either unavailable (infinite cost) or very high cost, e.g., policy that bank will only finance $n\%$ of the cost of a particular item.

The Baker analysis is particularly relevant to small farmer credit programs, where the practice of discriminatory credit policies, especially between capital (i.e., all non-labour inputs) and labour is common. In these situations, broad assumptions are frequently made concerning the availability of 'free' labour from the family unit, and if these assumptions are not valid, that is, if the amount of labour available is not sufficient for optimum allocation, the likelihood of sub-optimization is high.

It is in the light of the theoretical perspectives outlined in the chapter that an attempt will be made to analyse the extent to which development bank funds for smallholder cattle projects may have, in fact, benefited the recipients of the loans. More specifically, using a small number of small cattle farmers as a case study, the net present value method will be applied in order to test its adequacy as a measure of financial improvement. For purposes of comparison,

estimates will also be made of (i) each project's internal rate of return and (ii) each project's annual net income (profit). In essence, this is the subject of Chapter 4.

CHAPTER 4

EMPIRICAL APPLICATION OF THE THEORY

4.1 Selection of the Case Farms

Limitation of time and other resources prevented the use of a statistical sample survey on which to apply the theoretical techniques outlined in the previous chapter. However, to the extent that the study was primarily concerned with formulating and testing a system of individual loan evaluation for use by the Papua New Guinea Development Bank, and as the loan procedures utilized by the Bank are basically the same in all areas and with the various loan categories, it was felt that a small number of case farms could still provide an adequate basis. To this end, 14 small scale cattle projects in the Markham Valley of Papua New Guinea were selected. These projects were reasonably representative of the range of small scale cattle enterprises in the Valley and Table 4.1 gives an indication of their general characteristics.

These farms had also been included in the sample survey performed by the Department of Primary Industry, used in this study (Chapter 2) to provide some background perspectives. The farms were chosen by asking officers of the bank (Lae Branch) for examples of cattle projects that were considered by them to be 'good' and 'bad' investments.

4.2 Derivation of the Cash Flow

In the previous chapter, a discounted cash flow technique, incorporating the net present value criterion, was chosen to measure the extent to which bank-financed farmers actually experienced financial improvement. Some indication of how the cash flows were derived for the

TABLE 4.1
SELECTED CHARACTERISTICS OF THE CASE FARMERS

0	1	2	3	4	5	6	7	8
Farm No.	Area Type	Fenced Area (ha)	Herd Type	Initial Herd Size (head)	Date Stocked	Loan Size (k)	Loan Period (years)	Loan Approval Date
1	G	31(3)	B	26(19)	8/70	4650	6.25	7/69
2	G	29(2)	B	17(17)	12/72	7000	9	7/72
3	R	70(6)	B	39(26)	11/69	7250	7	9/69
4	R	15(5)	B	21(16)	11/72	4775	7	2/71
5	R	13(4)	B	16(16)	5/72	4000	8.5	2/72
6	R	11(5)	B	17(11)	11/72	4300	7	1/71
7	G	87(4)	B	27(13)	12/74	5430	6.3	5/74
8	G	55(5)	B	25(20)	5/73	6950	7	11/72
9	R	23(4)	B	27(21)	5/72	4300	8	2/71
10	R	9(3)	B	21(11)	1/73	4600	9.6	6/72
11	G	83(3)	S	15	6/74	3120	5	4/73
12	G	20(1)	B	15(11)	6/74	4400	8.75	3/72
13	G	119(5)	B	26(16)	9/72	5438	9.5	6/72
14	R	13(4)	B	21(17)	5/72	3220	8	11/69

Note: Column 1 .. G - Grassland; R - Rainforest.

" 2 .. The figures in parentheses indicate the number of paddocks.

" 3 .. B - Breeder; S - Steer fattening.

" 4 .. The figures in parentheses indicate the number of breeders.

" 5 .. Refers to month/year.

" 6 .. More than one loan may have been obtained. The amount shown represents the sum.

" 8 .. Refers to month/year.

case farmers is therefore appropriate. Figure 4.1 illustrates the items included in the derivations.

4.2.1 The Treatment of Non-monetary Factors

In the Markham, as in other parts of Papua New Guinea, establishment and operation of a smallholder cattle project (or indeed almost any farming enterprise run by nationals) involves a relatively large input of labour, the majority of which would be unpaid. Some of the materials used would also be acquired 'free' (i.e., in a non-monetary sense) by the application of unpaid labour, as for example, bush timber for fence and yard construction. In addition, most of the land in Papua New Guinea is held under customary tenure and smallholders usually hold only a usufruct over the land they farm. This situation raises conceptual problems when estimating the capital and operating components of the cash flow analysis.

In two studies of cattle projects mentioned earlier (Evans, 1975 and von Fleckenstein, 1975) different approaches were used in dealing with non-monetary components. Evans completely excludes these inputs on the basis that the 'non-cashable inputs into a cattle project, land and labour, are not very significant from the participant's viewpoint'. He argued that there was no shortage of grazing land in the area of his study and that there was no evidence to suggest that the project participants viewed the labour contribution as a cost to be recouped at a later date.

On the other hand, von Fleckenstein handles the non-monetary components by imputing values based on what he considered to be approximations of their opportunity costs. Thus, he valued the unpaid labour input at \$0.80 per day, indicating that this approximated the mean minimum rural wage during the period of his analysis.

FIGURE 4.1

DERIVATION OF THE CASH FLOW FOR OWN EQUITY ANALYSIS*

Inflows		Outflows				Net Benefits	
Gross Benefits	Less	Capital Expenditure	Less	Operating Expenses	Less	Debt Service	= Cash Flow
(i) Sales		(i) Materials for fence and yard construction		(i) Mineral licks		(i) Interest	Residual available to owners - return to own equity
(ii) Loan Funds				(ii) Veterinary expenses		(ii) Principal	
(iii) Net worth (in final year)		(ii) Tools and equipment		(iii) Own and hired labour			
		(iii) Livestock					
		(iv) Own and hired labour		(iv) Miscellaneous			
		(v) Miscellaneous					

* Adapted from Gittinger (1972).

Similarly, he valued the land at \$5/acre/year on the basis that this was the rent paid by a tobacco company using land purchased from the clan that owned the cattle project he was analysing. In the present context, the essential aim of the study, namely, that of determining whether financial improvement occurred, tends to dictate the most appropriate way of handling the non-cash components.

Evans' assumption that the labour and land is of no value to the participants seems debatable, at least with respect to labour. For while it may be argued that, given the relative abundance of land in the Markham, its opportunity cost to the project participants may be at or near zero,¹ it is questionable that the same argument could be applied to the labour contributions. At minimum, the value of this labour is the value of the leisure that must be foregone.

In Chapter 3, it was suggested that the cash flow measured the return to the capital contributed by the entity for which the analysis was conducted. This means that in cases where all, or a very significant proportion, of the own capital contribution is in the form of non-monetary components² that are excluded from the analysis, but where these components do, in fact, have some value to the contributors, the interpretation of the net present value figure is open to question. In normal interpretation, an investment is considered worthwhile if the NPV is positive for this implies that the entity could have invested an additional amount, represented by the NPV, and still 'break-even'.³

¹ It should be mentioned that in the long term a zero opportunity cost for land may not apply if it reduces the fallow period on subsistence areas by removing land from the subsistence cycle.

² As was the case with the farmers in the study.

³ Alternatively, one can interpret the NPV as representing the present value of the net addition to consumption generated by the investment.

By excluding the non-monetary components, however, a positive NPV represents a necessary but not a sufficient condition for success. The sufficient condition is that the NPV be greater than some minimum level which represents the present value to the owners of the labour and land contributed. Thus, excluding the non-monetary components would tend to invalidate the NPV criterion as an unambiguous measure of improvement.

The approach to this problem utilized in this study represents something of a hybrid of the methods adopted by Evans and von Fleckenstein. Thus, it is assumed that to the project participants¹ the opportunity cost of land devoted to the cattle project could be reasonably approximated by zero, based on the relative abundance of land in the Markham and the fact that the project owners normally hold only a usufruct. On the other hand, the same argument does not appear valid for the labour components. To this extent, the labour is valued by imputation using, as a price, the wage rates paid by expatriate ranches and plantations operating in the Valley at that time. Appendix C gives an indication of the assumptions used to estimate the labour contribution and Appendix D, Table D.2 shows the wage rates that applied in the specific years. Over the period, the wage rate increased from K0.67 per day in 1969 to K1.57 per day in 1976, and it was assumed that the increase was the same per year (i.e., K0.13/year). Using these wage rates does not imply that the imputed values accurately reflect the value to the owners of their own and family labour contribution. Rather, to the extent that the wage rates are those that

¹ There may well be social costs falling on other members of the community who are not participants, and whose long-term welfare is reduced by loss of access to this land.

could be attained if the project participants were able to obtain wage employment, their use enables a more definitive interpretation of the NPV figure. Further, imputation of a wage for own and family labour represents an attempt, in part at least, to take into account the requirement of a minimum level of income, discussed in Chapter 3.

4.2.2 Adjusting for Inflation

One problem that arises in handling time series data is to ensure that changes in value are representative of real movements and not contaminated by price changes resulting from inflationary pressures. In a cash flow analysis, for instance, inflation could cause the cost of the same quantity of inputs to increase over time, and depending on what happens to the price of the output (i.e., what is the relative price effect) the net benefits would be affected.

In project appraisal, the inflationary trends are particularly important if relative prices are not expected to remain constant. Even if constant relative prices are assumed, however, some idea of the overall rate of inflation is still important if accurate budgeting (i.e., for financing of the project) is to be done.

With project evaluation, the fact that we are dealing with historical data means that the effect of inflation is already incorporated into the series, to the extent that the net benefits are arrived at after deducting actual (inflated) cost. But inflation is still a relevant consideration in evaluation for it would influence the degree to which value changes in net benefits reflect real changes in financial position. To this extent, the most logical way for accounting for inflation, in the context of the present analysis,

would be by adjusting the cash flows to reflect the purchasing value of net benefits.¹

In theory, such adjustment is accomplished by a process known as deflating, which simply involves dividing each value (say, each annual cash flow) by an appropriate price index. The real problem is that of finding an 'appropriate' price index. The ideal is to use an index which accurately reflects the price changes occurring on the goods and services (or a representative sample) that the relevant group (i.e., the farmers in the study) are known to purchase, appropriately weighting the items so as to take into account their relative importance. This would be an index similar to the agricultural parity index used in the United States to measure changes in farmers' terms of trade with the rest of the economy. Unfortunately, no such index is available to Papua New Guinea. The only readily available statistic which in any way comes near to reflecting purchasing power is the consumer price index estimated by the Bureau of Statistics, which is designed to measure quarterly movements of retail prices in selected items of expenditure by indigenous urban households.

This index, first published in 1972, covers household expenditure on 146 items in the following commodity groups: (1) food, (2) clothing and drapery, (3) alcohol, tobacco and betel-nut, and (4) household sundries and others. It is calculated separately for five towns - Port Moresby, Lae, Rabaul, Madang and Goroka and also combined into one. The weighting pattern used was based on a small sample of household expenditure carried out during 1970 in Port Moresby, Lae and Rabaul.

¹ This is not to suggest that determining the extent to which changes in net benefits are due to inflation is not an important consideration. Also, in an inflationary situation, funds lent at interest rates which bear no relation to the inflation rate represent, in fact, capital transfers which, in the case of a government lending agency (e.g., the PNG Development Bank), move from the taxpayers to the farmers benefiting from loans. No attempt is made here to reflect these aspects but they are, I believe, deserving of mention.

The Bureau of Statistics makes no claim that the index does more than measure the extent of price movement over time and with respect to certain selected commodities. As such, its use as a measure of the change in the purchasing power would only relate strictly to those items covered and in their specified proportions. However, on the assumption that the items covered are roughly representative of the purchases made by the relevant group, the index as compiled could be used as an indication of purchasing power. As it is hardly feasible to construct a single index that would be applicable to all purposes and in all classes of transactions, the use of the Papua New Guinea consumer price index may be considered for various purposes, subject to one's individual judgment as to its relevance to a particular problem.

In this light, it may be useful to consider its usefulness for converting net benefits to real flows in order to assess financial improvement. It should be noted that the Papua New Guinea index relates to urban households, which is a disadvantage when applying it to rural enterprises. Also, its adequacy as a deflator really only applies to cash expenditures on consumption goods. However, in the absence of any other relevant statistic, the real question is whether the index can be adjusted to meet the conditions pertaining to the farmers in the study more adequately. Further, to the extent that the annual flow being discounted is net of purchases of farm inputs and loan interests, exclusion of these components in a deflator may well be justifiable.

The farmers in the study are all situated in the Markham Valley and the town of Lae is the nearest urban source of purchased goods and services. Even where a trade store is available in a village, the stock carried in the store would be obtained from Lae. To this extent, the index that relates specifically to Lae would appear more relevant.

It has already been indicated that the large majority of farmers in Papua New Guinea still produce most of their food requirements from their own subsistence activities. Thus, an index which includes food as a major component (59.6 per cent of total expenditure) would seem highly inappropriate. Removal of the food component is, therefore, necessary. Fortunately, the way the index is compiled allows this, if it is assumed that total income is spent on the remaining groups in the same relative proportions.

Table 4.2 shows the annual average indices for the years 1972-76. These averages were obtained by finding the arithmetic means of the quarterly indices for each year. Column 6 gives the average annual index for all groups (i.e., including food) and Column 7 gives the index with the food component excluded. This was calculated by weighting the residual group indices (i.e., columns 3, 4 and 5) by the same relative weights used in the original index. Thus, the weight for clothing and drapery which was 8.8 per cent in the original index became 21.78 per cent in the adjusted one. Similarly, the weight for alcohol, tobacco and betel-nut became 34.16 per cent and for household sundries 44.06 per cent. The adjusted index in column 7 will be used to deflate the cash flows derived in the study.

4.2.3 Estimation of the Project Net Worth

In normal farm accounting practice, the net worth is derived by deducting from total farm assets all external liabilities. With the family type farm, frequently included in total assets would be items that could be considered durable consumption items (e.g., the farm house, furniture and appliances). Similarly, external liabilities would include debts incurred that were not used for farm production activities. Such items are normally included in the calculation in an

TABLE 4.2
CONSUMER PRICE INDEX - ANNUAL AVERAGES
(1971 = 100)

1	2	3	4	5	6	7
Year	Food	Clothing and Drapery	Alcohol, Tobacco and Betel-nut	Household Sundries and other goods and services	All Groups	Food Excluded
1972	107.4	103.7	110.1	101.2	106.4	104.8
1973	118.0	114.4	124.0	105.7	116.1	113.2
1974	157.9	132.7	123.1	114.5	143.1	121.4
1975	167.2	155.4	156.8	129.1	157.9	143.3
1976	174.3	169.2	171.2	157.6	170.5	164.8

Source: Papua New Guinea Bureau of Statistics - Statistical Bulletin - Consumer Price Index.

attempt to recognise the artificiality of separating home from farm decision making.

One feature of smallholder farming in Papua New Guinea, however, prevents the use of this approach. Thus, whereas an individual may be identified by the bank as being the recipient of a loan, and the owner of the project, it is not unusual for persons outside of the nuclear family (e.g., members of the extended family or clan) also to have an interest in the project and to expect to benefit from project returns. In such circumstances, it is difficult to determine which non-project assets could be included in the net worth. For this reason, the net worth figure used in the study relates only to project assets.

But a more basic reason for including only project assets concerns the nature of the analysis used. The cash flow residual derived in the analysis represents what is available to the project participants for consumption. To include the value of durable consumption items purchased by participants in the net worth would, therefore, result in a double counting and produce an inflated NPV after discounting.

Appendix D, Table D.1, presents the prices used to value the various classes of livestock over the time period covered in the analysis. In the case of bulls and cows over two years old, these prices were used for valuation when an animal from other stock classes moved into that class. From then on, bulls were depreciated at a rate of 20 per cent per year (straight line) assuming a salvage value of K180 and cows at 10 per cent per year assuming a salvage value of K80. No other stock classes were assumed to depreciate with time.

The valuation of land improvements, stockyards and tools was based on purchase prices of materials less depreciation. The value of unpaid labour was not included in the valuation of these assets since it was felt that the project participants could not realise such values if the assets were sold. A straight line depreciation of 10 per cent per year was assumed on these items.

4.2.4 Data Sources

Documentary data already available in bank and DPI records cover important aspects of the cash flow. The majority of loan funds disbursed by the Papua New Guinea Development Bank for small scale cattle projects are made as direct payments to suppliers. Thus, funds for fencing materials, tools, veterinary supplies and other purchased inputs are paid out using purchase orders (Local Purchase Orders - LPOs) made out to suppliers. Livestock delivered to farms usually are supplied by the Government Livestock Stations, but even when private farmers sell stock to smallholders, the Department of Primary Industry acts as an intermediary ensuring stock quality and providing the necessary permits for transport. Further, all livestock delivered to smallholders are recorded by the DPI on special forms - Receipt of Livestock (ROLs). In the few instances where funds are disbursed in cash, a special form is also utilised and copies of all these documents are available to the relevant branch of the Development Bank and the relevant extension office of the DPI. In addition, for each cattle project a summary record of disbursements is kept on the individual project file.

Information on sales is recorded on individual loan files in a number of ways, but in most instances a weight slip from an abattoir is used. Finally, an account ledger, showing details of all debits

and credits, is available for each loan at the bank's Head Office, and allows checking the consistency of data obtained from other sources. These documents provided the major financial data used in the analysis. They were supplemented by physical and technical information provided in the six-monthly cattle progress reports (see Appendix B, Exhibit B.4) prepared for each project, and by other miscellaneous information available on the individual project files.

These data sources, while providing the majority of the required information, take no account of items purchased with funds other than loan proceeds.¹ Similarly, no account is kept in bank records of sales that did not pass through formal marketing channels. Some attempt was made by the writer to overcome this deficiency, probably with only limited success, when visits were paid to the 14 farmers and questions asked concerning the nature of items purchased out of their own cash resources. An estimate of each farmer's use of operating inputs such as veterinary supplies and mineral lick was also attempted, and the cash flows were adjusted, where necessary.

With respect to informal sales, an indication of the extent to which this occurred was provided by comparing the recorded sales with the changes in stock inventory suggested by the six-monthly review reports. From these comparisons, it appeared that sales activity outside the ambit of formal channels was quite limited, such that exclusion would not have affected the results significantly. It should be noted, however, that this applies only to the situation existing in the Markham Valley, and in other parts of Papua New Guinea explicit account may have to be taken of the 'non-formal' sales (e.g., the 'Sing-Sing' market in the Highland Provinces).

¹ Except where the loan application itself indicated the amount of funds the client was able to contribute himself.

4.3 The Choice of a Discount Rate

In Chapter 3, considerable discussion was devoted to the problems of determining an appropriate discount rate in situations where the assumptions of a perfect capital market are unrealistic. In that discussion it was also suggested that certain features of the semi-subsistence economy pointed to the existence of a relatively high average rate of time preference. In the present context this suggested, as a first approach to tackling the problem, that examination of existing rates of interest from various sources could provide some rough indication of the appropriate discount rate.

Information on the rates of return realised on the types of alternative investment opportunities open to smallholders in Papua New Guinea is not readily available. IDA estimates (in 1972) of rates of return on total capital attainable by other smallholder livestock projects, namely, pig-breeding and fattening, poultry broilers and poultry egg production, were of the order of 52 per cent, 69 per cent and 32 per cent respectively. Commercial Bank interest rates on business loans around the time when the case farm projects were being set up varied between 8 per cent and 10 per cent. Both Evans and von Fleckenstein used an 8 per cent discount rate and Evans rationalized this on the basis that it was the minimum expected annual rate of interest payable to shareholders of the Papua New Guinea Investment Corporation and a minimum investment of K100 was all that was necessary to become a shareholder.

In this study, a 12 per cent rate of discount was chosen simply by increasing the approximate opportunity cost of funds suggested by Evans (i.e., 8 per cent) by 50 per cent. This choice is somewhat arbitrary and is based partly on the assessment that an 8 per cent discount rate was too low for the levels of income attainable by small scale farmers.

4.4 The Discounted Cash Flow Analysis

Table 4.3 presents the result of the discounted cash flow analysis for the 14 case farmers. After adjustment for inflation, the results suggest that five of the farmers (cases 3, 6, 8, 9 and 11) did not experience an improvement in financial position as a result of the Development Bank loan to establish a cattle project. Three of these farmers (cases 3, 6 and 8) were actually in good financial standing with respect to the bank loan (see Table 4.1) and in one case (farmer No. 3), the loan was repaid. This is of significance given the tendency, found with many development banks, to judge success by repayment performance. For while low arrears and default levels are desirable as far as the bank is concerned, it may be a self-defeating policy if it is pushed to the point where it occurs at the expense of the financial improvement of the loan recipients, with consequences on the survival of the very enterprise that the bank is trying to encourage.

Table 4.3 also presents the results of the cash flow analysis before the flows are adjusted for inflation using a modified consumer price index. It shows that only two of the farmers experienced negative net present values before adjustment and illustrates a significant point frequently neglected in discount cash flow analysis. In project appraisal, for instance, even when inflation is taken into account,¹ the adjustment is performed only on the prices of inputs and outputs of the enterprise being analysed in order to ensure that the estimates of net benefits are realistic. To the extent, however,

¹ That is, when constant relative prices is not a reasonable assumption.

TABLE 4.3

ESTIMATED NET PRESENT VALUES AND INTERNAL RATES OF RETURN -
OWN EQUITY ANALYSIS
(in kina)

Farm No.	Adjusted for inflation		Unadjusted for inflation		NPV 12% with labour cost excluded - adjusted for inflation
	NPV 12%	IRR %	NPV 12%	IRR %	
1	819	79	1080	88	1094
2	718	55	1462	76	1146
3	(150)	9	643	23	1775
4	107	19	435	35	578
5	500	32	1107	55	1018
6	(90)	0	(63)	0	257
7	943	82	2117	150	1732
8	(101)	2	138	24	453
9	(15)	11	407	27	772
10	498	52	907	72	868
11	(206)	0	(64)	6	328
12	402	71	892	99	699
13	2506	93	4535	124	3391
14	638	45	1096	57	1040

Note: Figures in parentheses represent negative values.

that these net benefits represent what is available to the project owners for consumption it seems appropriate also to deflate these values so that the net present value is measured in real terms. This aspect is frequently not considered and assuming the deflator used in this analysis is realistic,¹ it suggests that misleading results could arise.

For purposes of comparison, the net present values for the case farms were estimated with the value of family labour excluded (Table 4.3, column 5). The results obtained indicate the inadequacy of these assumptions, for while all the farms showed positive NPVs (and all the IRRs were over 50 per cent) whether this is indicative of success is dependent on the extent to which the NPVs are adequate as a return for the labour contribution. Without some idea of 'an adequate return' to labour, the NPV criterion in this situation is of little value in indicating success or failure.

It was earlier indicated that the cash flow derivation adopted, in this study measured the return to 'own equity'. This suggests that the internal rate of return, being a rate, would be significantly influenced by the proportion of own to borrowed capital in the capital structure of the project. In other words, two projects showing the same level of cash flow, over a similar time period, could exhibit different internal rates of return if the ratio of own to borrowed capital differed significantly. This is illustrated by comparing the IRRs presented in Table 4.4. In this table, the cash flows are

¹ In fact, to the extent that the index used applied to Lae and the farmers live outside the town, the prices they face would be higher by, at least, the additional transport costs.

TABLE 4.4
ESTIMATED NET PRESENT VALUES AND INTERNAL RATES
OF RETURN - TOTAL CAPITAL ANALYSIS
(in kina)

Farm No.	NPV (12%)	IRR (%)
1	746	18
2	1221	21
3	(429)	10
4	259	15
5	910	23
6	(28)	12
7	2140	33
8	(199)	11
9	(8)	12
10	681	21
11	(100)	9
12	1536	37
13	3914	35
14	818	22

Note: Figures in parentheses represent negative values.

estimated by excluding loan funds as inflows and debt service as outflows and thus arrives at a residual which measures the return to total capital¹ (see Figure 4.2). The IRRs calculated on this basis measure the efficiency of total capital use and is not affected by gearing or leverage.² The comparison shows, for example, that whereas farmer No.5 exhibits a lower IRR (55 per cent), in the own equity analysis (unadjusted for inflation) than farmer 1 (88 per cent), farmer 5 was actually more efficient in total capital use, showing an IRR of 23 per cent in the total capital analysis, compared with 18 per cent for farmer 1. Other examples of this are evident from the two tables. Some further discussions on this aspect will be presented in the next chapter.

4.5 The Effect of the Rate of Repayments

It was previously indicated that a high rate of loan repayments could so reduce the cash flow available to a farmer as to create a disincentive situation, leading eventually to a loss of interest in the project and a withdrawal of family labour. Some of the results of the analysis tend to support this contention.

Table 4.5 shows the gross sales and repayments made by the case farmers over the respective periods. Loan repayments represented between 64 per cent and 96 per cent of sales, and, in general, the projects which were operating for a longer period exhibited a comparatively lower percentage. The rate of repayment is high even

¹ The cash flows in this total capital analysis were not adjusted for inflation since the concern was in measuring efficiency of capital use and not with determining the degree, if any, of financial improvement. The rationale of deflating the cash flows, therefore, did not exist in this instance.

² Gearing or leverage are words used in financial jargon to refer to the proportion of own to borrowed capital in the financial structure.

FIGURE 4.2

DERIVATION OF THE CASH FLOW FOR TOTAL CAPITAL ANALYSIS

Inflows		Outflows			Net Benefits	
Gross Benefits	Less	Capital Expenditure	Less	Operating Expenses	=	Cash Flow
(i) Sales		(i) Materials for fence and yard construction		(i) Mineral licks		Return to total capital
(ii) Total asset value (in final year)		(ii) Tools and equipment		(ii) Veterinary expenses		
		(iii) Livestock		(iii) Own and hired labour		
		(iv) Own and hired labour for establishment		(iv) Miscellaneous		
		(v) Miscellaneous				

TABLE 4.5
GROSS SALES AND REPAYMENTS* BY CASE FARMERS

Farm No.	Y E A R S							Total	Repayments as % of sales
	1	2	3	4	5	6	7		
1	Sales	-	704	-	900	1832	3978	861	8275
	Repayments	-	704	-	900	640	3635	318	6197
2	Sales	-	-	518	54	2662			3234
	Repayments	-	-	500	-	2592			3092
3	Sales	-	1220	1100	245	4264	569	1135	8533
	Repayments	-	860	1040	-	3336	434	791	6461
4	Sales	-	23	791	922	305	993		3034
	Repayments	-	-	770	872	219	767		2628
5	Sales	-	-	1446	345	1719			3510
	Repayments	-	-	1346	295	1219			2860
6	Sales	-	576	1067	481	244	2644		5012
	Repayments	-	500	880	431	164	2445		4420
7	Sales	-	181	2411					2592
	Repayments	-	-	7270					2270
8	Sales	-	174	1245	4334				5753
	Repayments	-	-	1039	4254				5293
9	Sales	-	-	874	252	245	-		1371
	Repayments	-	-	780	219	245	-		1244
10	Sales	-	-	1560	1136	500			3196
	Repayments	-	-	1279	551	325			2155
11	Sales	-	-	1566	182				1748
	Repayments	-	-	1173	123				1296
12	Sales	-	132	695	1550	471			2848
	Repayments	-	132	615	1423	391			2561
13	Sales	-	-	1941	719	6295			8955
	Repayments	-	-	1683	594	4380			6657
14	Sales	100	300	367	383	1673	1524	1395	5742
	Repayments	100	300	200	240	1467	996	383	3686

* Repayments include interest and principal.

early in the project's life. Table 4.6, showing the estimated annual cash flows, provides some useful comparisons. Thus, case farmer 3, who had experienced a negative NPV in the DCF analysis, showed relatively high levels of sales from quite early on in the project. The high repayment rate (77 per cent) however, resulted in relatively large negative cash flows for the first four years, such that these were not offset in the discounting procedure by the occurrence of positive flows. It is interesting to note that this farmer complained that he had insufficient funds to obtain hired labour and that his own family labour resources were inadequate. This highlights another effect of the high repayment rate.

A similar comparison is evident with farmer 9, and in fact, with this farmer, negative flows were experienced during all of the six years of the project's operation and a positive flow was recorded in the sixth only by the inclusion of the net worth figure. The important point in this context is not that high rates of repayment would necessarily lead to a loss of interest but that the chances of this occurring are greatly increased if repayment schedules do not take into account a minimum income expectation and/or the need to use hired labour when family labour resources are inadequate.

To illustrate this effect of repayments, three of the five farmers showing negative net present values in the DCF analysis (after inflation adjustment) were analysed by re-estimating the cash flows assuming repayments represented an average of 50 per cent of gross sales. The results from these farmers are presented in Table 4.7. Two of the five farmers (numbers 3 and 9) showed positive net present values under these circumstances.

TABLE 4.6

ESTIMATED ANNUAL CASH FLOWS FOR CASE FARMS - ADJUSTED FOR INFLATION

Farm No.	Y E A R							Net worth component in final year	As % of cash flow
	1	2	3	4	5	6	7		
1	(44)	(77)	(96)	(120)	1012	249	805	371	46
2	(232)	(58)	(78)	(190)	2022	-	-	2089	103
3	(585)	(272)	(550)	(741)	647	(36)	2438	2318	95
4	(136)	(143)	(193)	(16)	(27)	998	-	914	92
5	(433)	(50)	(63)	(41)	1634	-	-	639	39
6	(103)	(75)	27	3	11	67	-	(89)	-
7	(430)	(610)	2547	-	-	-	-	2589	102
8	(304)	(256)	27	559	-	-	-	570	102
9	(220)	(410)	(69)	(58)	(103)	1288	-	1385	107
10	(305)	(39)	199	375	746	-	-	680	91
11	(392)	(119)	88	278	-	-	-	275	99
12	(75)	(104)	34	43	1040	-	-	1036	99
13	(249)	(132)	(127)	(329)	5521	-	-	4496	81
14	(191)	(133)	113	68	112	325	1243	655	53

Note: The figures in parentheses indicate negative values.

TABLE 4.7

ESTIMATED NET PRESENT VALUES AND INTERNAL RATES
OF RETURN - OWN EQUITY ANALYSIS - 3 CASE FARMERS -
REPAYMENTS ADJUSTED TO 50% OF SALES

Farm No.	NPV (12%)	IRR (%)
3	707	30
9	75	17
11	(109)	-

An interesting implication in this context is that reducing the repayment rate of 50 per cent of sales (for farmers 3 and 9) would not have increased the risk to the bank. In the first place, the bank would have substantial control over the sale proceeds and could increase the repayment at any time it felt it necessary. Secondly, with these two farmers, stock values exceeded the loan outstanding from year 2 onwards, indicating that liquidation would have easily recovered the loan.

The two other farmers with negative NPVs (farmers 6 and 8) were not re-analysed as high repayment rates and sales exhibited was due to the fact that both projects were in the process of liquidation. Under such circumstances, high rates of repayment, to ensure loan recovery, are quite understandable. But it may well be that the reason why the animals were allowed to go wild is related to the farmer's disillusionment with the levels of earnings from the enterprise, resulting in a withdrawal of labour.

4.6 A Comparison with Some Accounting Measures

In Chapter 3, it was suggested that the accounting approach is ill-suited to measure financial improvement in the manner defined in the study, since accounting surpluses do not reflect what is actually available to the owners for consumption or re-investment. As such, the discounting technique, in order to compare money flows occurring at different points in time, is not applied in accounting measures. For purposes of comparison, however, certain accounting measures of performance were estimated for the case farmers, in an attempt to see if they would provide results similar to that suggested by the discounted cash flow analysis.

FIGURE 4.3

DERIVATION OF ACCOUNTING NET INCOME

Gross Output		Gross Inputs		Net Income	
	Less		=		
Sales		Veterinary expenses		Return	
Plus closing stock valuation		Mineral licks		to	
		Own and hired labour		Management	
<u>Less</u> Opening stock valuation		Loan interest		and	
Plus stock purchases		Depreciation on fences, yards and tools		Investment	
		Miscellaneous			

The accounting estimate of income used was calculated by the method shown in Figure 4.3. This net income figure could be defined as the management and investment income realised by the project participants and is, therefore, assumed to measure the surplus available to compensate for the management of the project and for 'own investment' tied up in the project assets. The figure is calculated on an annual (or accounting period basis) but, in order to compare it with the net present values, an annual average net income was estimated and is shown in Table 4.8. Comparison with the NPVs in Table 4.3 suggests that this average annual net income figure does not provide the same type of indication. Thus, case farmer 3, who had a negative NPV (after inflation adjustment) exhibited the third highest annual net income. Similarly, farmer 9, though showing a negative NPV, experienced an average annual net income of K202, higher than farmer 4 and at a similar level to farmers 10 and 12, all of whom had positive net present values. As implied, the essential disadvantage of this average income figure is that it does not take the time value of money into account.

Accounting rates of return were also estimated based on the net income estimates and these are shown in Table 4.8. These rates were calculated by taking the annual net income as a percentage of (i) average total assets, i.e., total assets at the end of the previous accounting period plus total assets at the end of the current period, divided by two; and (ii) average net worth, calculated in a similar fashion. As with the 'own equity' discounted cash flow analysis, the net income as a percentage of average net worth is influenced by the degree of gearing, so that farmers with roughly similar average annual net incomes (e.g., farmers 1 and 3, or farmers 10 and 14)

TABLE 4.8
SOME ACCOUNTING MEASURES OF PERFORMANCE

Farm No.	Average Annual Net Income (kina)			As % of Average Total Assets		As % of Average Net Worth	
	Years	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted
1	7	413	439	15	16	63	67
2	5	397	546	8	11	31	42
3	7	430	611	7	10	13	18
4	6	182	234	7	9	27	35
5	5	374	457	13	16	33	40
6	6	73	81	4	4	25	28
7	3	843	1289	16	24	53	81
8	4	99	200	2	4	129	282
9	6	202	261	6	7	25	32
10	5	262	391	11	17	80	119
11	4	100	170	7	12	57	97
12	5	245	353	12	17	52	75
13	5	1176	1798	23	36	67	102
14	7	259	330	15	18	46	59

would exhibit widely varying rates of return (63 per cent and 13 per cent, 80 per cent and 46 per cent respectively).

The rate of return on average total assets also differs from that provided by the total capital analysis shown in Table 4.6 (the relevant comparison in this instance). This is partly a result of the questionable validity of estimating the rate on the basis of average assets and again highlights one of the problems in using accounting identities. With accounting information, serious difficulties arise when one attempts to represent performance by only one or two measures and in accounting practice interfirm comparisons are normally made by using a number of different measures of efficiency.

The above discussion is not intended to deny the usefulness of accounting information on a year to year (or other accounting period) basis, but merely to illustrate that for purposes of arriving at a relatively simple and easily implemented measure of financial improvement, accounting data is not entirely adequate. While a comprehensive accounting analysis, involving estimation of a number of different measures of efficiency and performance could be very useful, the information and skills required for such an exercise, however, suggests that it could not be used as a routine measure of evaluation by a development bank.

CHAPTER 5

DISCUSSION, APPLICATION AND CONCLUSIONS

5.1 Adequacy of the Net Present Value Criterion

One argument against the use of the Net Present Value criterion, as opposed to the Internal Rate of Return, is that being an absolute measure it does not allow ranking of different investment alternatives. Gittinger (1972) indicates, as an example, that a small, highly attractive project (i.e., showing a high IRR) may have a smaller net present value than a large project with only marginal acceptable returns. Such an argument may be valid in the context of project appraisal where the analysis is performed as an aid to decisions concerning alternative investment opportunities.¹ In this study, however, our concern is not with choosing between different investment alternatives, for that decision has already been made, but rather with deciding whether the decision to invest in a particular enterprise resulted in financial benefit to the borrower. In this sense, it is valid to make comparisons between different projects on the basis of the magnitude of the net present values. Thus, a farmer showing a higher net present value than another could rightly be said to have experienced greater financial improvement, to the extent that the investment made a larger contribution to his consumption, as compared to the investment showing a lower net present value.

¹ In actual fact, when comparing alternative investments, suggesting that any one project is preferable, because it shows a high internal rate of return, is really only valid when the investments require similar outlays and there is a constraint on capital available for investment.

In the analysis used to estimate the net present values for the case farmers, a particular method of deriving the cash flow was employed. In that method, the cash flow represented the residual available to the owners of the project and was thus considered the better to reflect financial improvement of these owners. Thus, the net present value so obtained could be referred to as the owners' net present value. With this type of cash flow, however, the internal rate of return, by reflecting the rate of return on own equity, is less suited to making interfirm comparisons of the degree of financial improvement experienced. This is because the rate of return on own equity is affected by the proportion of own to borrowed funds in the capital structure of the project. The conceptual difficulty of reconciling the high IRRs with the relatively modest net present values obtained in the own equity analysis is partly explained by this. (See Evans, 1975.)

The type of cash flow used also raises problems when a significant proportion of the 'own equity' is non-monetary. Where the non-monetary component has some worth to the participants, it is essential to impute a market value if a definitive interpretation of the net present value is to be made. This applies even though such imputation may involve using prices that are unrealistic or artificial because of the non-existence of real markets for the non-market components. Without such valuation or 'shadow prices' of real opportunity costs faced by farmers, the net present values obtained cannot provide an unambiguous indication of improvement since such improvement depends on the extent to which the values provide rewards considered adequate for the contribution of the non-market components.

In the evaluation system employed in this study, historical data was utilized so that inflation of input and output prices were included in the flows before arriving at the net benefits. To the extent however that these net benefits represent the cash available to the project owners for consumption, deflation of the net benefits prior to discounting is considered necessary if the owners' net present value is to reflect 'real' financial improvement. In fact, as was argued earlier, even with project appraisal (i.e., analysis of the desirability of a proposed project) such deflation of the net benefits also seems desirable if the purpose is to determine whether the proposal would result in financial improvement to the project owners. And this applies even though inflationary trends will have been taken into account in the differential effects on product prices and input costs used for calculating the cash flow in each year.

In Chapter 3 it was argued that, particularly under conditions of semi-subsistence, the net present value criterion may still not take fully into account minimum consumption expectations early in a project's life. Inclusion of the value of unpaid family labour at a representative market wage, and the use of a discount rate higher than that which appeared to represent the opportunity cost of funds to the participants, was the method adopted to take into account the minimum cash income expectations. It should be noted, however, that such an approach represents a practical attempt and may still not fully reflect the minimum cash expectation. In the first place, the estimated labour contributed by each farmer was based on certain assumptions about total labour requirements, and it was further assumed that all of this was supplied unpaid.

But in cases where the family unit (or project participants) does not have available all the labour needed, some will have to be hired, so that not all of the labour value would accrue to the family. Secondly, whereas the labour requirement for the establishment phase of a cattle project is relatively high, operating and maintenance labour requirements are of such a level that the family unit may not be fully occupied for a large proportion of time, indicating that a wage value would not fully reflect income potential. Finally, as argued earlier, the time preference rate is not sufficient to reflect the concept of a minimum expected level of cash flow.

These arguments do not completely invalidate the use of the NPV as a measure of improvement, particularly if the wage rates and discount rates used represent real opportunity costs facing the farmers. At the same time, they do suggest that if more accurate estimates of the minimum income expectations are available, the effectiveness of the present value criterion could be significantly improved by their inclusion. It is conceivable, for instance, to collect survey information among relatively homogeneous groups of farmers with a view to determining the minimum expectation levels of cash income based on such variables as family size, distance from urban centres, number of working members of a family unit and number of other cash earning activities engaged in. Such information could then be included as a needed outflow (i.e., a cash cost) in each year of the project. In this way, a positive net present value would undoubtedly indicate improvement, subject to the pre-condition that that needed outflow had been available.

Another aspect which is of particular significance where ownership of a project may involve groups larger than a nuclear family, (as in the case of Papua New Guinea), concerns the comparability of net present value figures between projects that vary in the number of participants expecting to benefit. For instance, one may wish to compare a project with five participants and showing a net present value of K1000, with one with a NPV of K500, but with only two participants. Here too, it is conceivable to take account of this by including the expectations of the participants as a cost (or constraint) and netting this out before discounting. This may not always be practicable, as for instance, when a project is owned by a whole village or clan. Another approach is to group projects for comparison according to number of participants involved. In this way, two projects in the same group could be more readily compared on the basis of the NPVs.

The owner's net present value is also a valid maximizing objective, thus improving the usefulness of the measure as an evaluation criterion. Its validity in a maximizing model is enhanced by its ability to take into account real constraints facing the individual. The minimum income constraint can be readily incorporated and so can such notions as the time and risk-return preferences of the investor (see Linke and Hopkin, 1968).

5.2 Relevance of Financial Measures in the Semi-subsistence

Situation

Given the unique circumstances under which the semi-subsistence production unit operates, it may be argued that dependence on a purely financial measure of improvement could provide misleading indications. In Papua New Guinea, for instance, it has been

suggested that many nationals engage in cash activities like cattle projects because of the prestige associated with such ownership.¹ This implies that net income may not be an important decision variable in the operation of the semi-subsistence farm. It might therefore be argued that the low levels of management exhibited by the Markham Valley cattle farmers may be due not so much to the level of cash income available, as previously suggested, but more to the fact that the farmers do not perceive economic efficiency as an important aim, since efficiency is not a necessary condition for obtaining prestige from cattle ownership. The reluctance of many farmers to sell steers when they become marketable is suggested as one manifestation of this prestige goal.

Information from studies in Papua New Guinea indicate, however, that while prestige is an important determinant, it is not the only relevant variable in the decision structure. Thus, Shand and Straatmans (1974) in their comparative study of four communities in Papua New Guinea, in terms of the responses to new economic opportunities, indicated that 'individuals in all areas acted positively to improvements in their economic environment, particularly where cash returns to labour inputs improved'. These authors also indicated that there was a limit to the response based on the limited utility of money, but this could be expected to increase as transport and other services increased the range of goods available (see also Fisk, 1975, particularly pp. 73 and 78).

¹ Indeed, the idea of 'conspicuous' investment as a manifestation of the desire to accumulate assets for prestige is a well known explanation of development activity in Melanesia (see Evans, 1976).

Evans (1975), while also recognising the importance of prestige considerations in the decision to start a cattle project, suggests that continuing levels of low income would lead to disillusionment and frustration, resulting eventually in withdrawal of interest. Further, in the survey used for background purposes in Chapter 2, 52 per cent of the farmers indicated that their major reason for engaging in cattle production was to increase their incomes.

As a decision criterion, therefore, income (particularly cash income) is still an important decision variable and will significantly influence the quantity of labour that farmers would be willing to devote to the cash enterprise. For financial criteria to be relevant it is not necessary that all members of the population should respond in a distinctly positive way to economic incentives, for there will undoubtedly be a wide range to the intensity of such responses. It is enough that economic motivation be present to a sufficient degree to allow use of the criteria. The evidence suggests that this is so and, in a situation of economic transformation, the importance of economic incentives will certainly increase with time. In this context, it could also be mentioned that even in the fully monetized and developed economies, profit maximization may not be the only objective of firms, yet this does not significantly affect its usefulness as a criterion for analysis of the behaviour of firms.

5.3 The Effect of Discriminating against Labour

Unfortunately, sub-optimization, resulting from bank discrimination against labour in specifying loan purposes (as illustrated in section 3.5 of Chapter 3) could not be empirically tested in the study. Some indication of its possible existence was, however, gleaned from the survey utilized for background purposes in Chapter 2.

Thus, 94 per cent of the survey farmers cultivated an average of four subsistence gardens. Information is not available on the labour requirements of these subsistence activities, but the fact remains that by not considering such activities when appraising a loan, the likelihood of over-estimating labour availability is likely. Further, 57 per cent of the farmers (68 per cent in grassland and 41 per cent in rainforest) were engaged in other cash-earning activities, thus tending to reduce further the labour available for the cattle enterprise. It is also significant that in the survey performed by Tovue (1974)¹ problems of labour availability figured high in the list of grievances. The high rate of repayment is also relevant in this context. For if adequate labour is not available from the family unit, and the repayment demands so reduce the cash flow as to prevent the use of hired labour, sub-optimization leading possibly to project failure could result.

This situation is further exacerbated by the bank requiring prospective loan recipients to cut fence posts and build stockyards prior to receipt of loan funds. While such a practice is undesirable under conditions in Papua New Guinea, it has the effect of increasing the maintenance labour requirements of the cattle projects. This results from the fact that bush materials used in fence and yard construction require much more frequent replacement than if steel pickets and sawn treated timber were used. The implication here is that it may well be advantageous for the bank to consider financing the use of these improved materials where farmers have proved their ability to manage their projects adequately. From a developmental

¹ See Chapter 2, p.49.

viewpoint, too, such a policy would have the effect of increasing the inter-sectoral linkages that could be created by a viable beef industry.

5.4 Application to a Development Bank

In Chapter 1, it was argued that the system of evaluation proposed in this study needed to be based on a realistic assessment of the situation and of the environment concerned. The methods available for doing this are discussed in various parts of the previous chapters, particularly Chapters 3 and 4. The concept of a minimum level of income, the treatment of non-monetary components of income and outlay and the data sources used have been discussed in principle. It may now be useful to indicate, in outline form,¹ the manner in which the system can be applied to a development bank, using as an example the Papua New Guinea Development Bank.

Any evaluation system can be judged, in the final analysis, on the 'cost' of this system in relation to the benefits (i.e., the usefulness of the information) obtained. Too much emphasis purely on information-gathering without clear-cut ideas as to how this information would be utilised could easily render the system so cumbersome as to be of little real benefit to the institution. Frequently, a relatively small random sample may provide just as adequate a picture as complete censuses and investigations.

Application of the evaluation system is thus conceived as a periodic (preferably annual) exercise, using a small random sample (5-10 per cent) of loans in each of the eleven categories of the

¹ Suggestions for the implementation of this system, with the suggested data collection forms, etc., is the subject of a separate report, prepared for the Papua New Guinea Development Bank.

agricultural loans portfolio. Given the Papua New Guinea Development Bank's branch network, such stratified sampling could be performed at a branch level so that a geographical or regional element would be also included in the results obtained.

The majority of agricultural loans given by the Papua New Guinea Development Bank involve enterprises that require some time to pass before returns are realised. Evaluation of such an enterprise, one or even two years after receipt of a loan, will not provide very useful information. For this reason, only those enterprises that have been in operation for a sufficiently long period that 'reasonable' returns are forthcoming should be included in the selection procedure. The actual minimum time period would differ depending on the enterprise type and size, but it should be possible to set standards for use as a general guide. With beef cattle, for instance, a four-year period would seem adequate in most cases.

There may be some loan categories in which the total number of loans is quite small. In such cases, a 5-10 per cent sample will not provide very representative results. A minimum sample size of 5 loans in each category is, therefore, suggested. Where the total numbers of loans in a particular category is less than this minimum, all the loans in that category should be evaluated.

In order to take into account transactions occurring outside the bank's influence (i.e., purchases not using loan funds, and sales outside of formal channels) some attempt to determine the nature and degree of such transactions is required. This could be done by visiting each of the sample farmers and posing relevant questions. Such an exercise may not have to be done at each evaluation unless there are definite indications (say from extension field officers) that the situation has changed markedly from one evaluation period

to the next. If the evaluations are performed annually, a field visit for this purposes every fourth year should prove adequate.

Use of a periodic evaluation does not preclude one-time evaluations of specific loans at particular times. Thus, a particular loan identified in the current system of reporting as showing signs of failure could be evaluated with a view to determining the causes and deciding on remedial action. Similarly, a loan that is being paid off could be evaluated to ascertain the extent to which the client experienced financial improvement.

A major advantage of this periodic evaluation is that eventually the bank would be able to obtain an accurate picture of the effect of its loans on the clients, and it would be able to compare the effects of different enterprises on the financial benefits attained by clients. This is an important factor in guiding policy changes. If, for instance, a particular loan category is found to be of little benefit to the recipients, an examination of the assumptions and lending procedures associated with that category may be in order.

Another level of application of the system concerns the overall evaluation of the performance of the lending institution. An overall evaluation is, of necessity, concerned with some issues much broader than those highlighted in the individual loan evaluation; for example, the extent to which the institution's lending programs resulted in economic benefits to the nation as a whole. But apart from the fact that, as argued in Chapter 1, individual benefit seems a necessary (though not sufficient) condition for overall (i.e., national) success, the information gathered in the individual evaluation is also an essential input in assessing national economic goals. For example, production data obtained for various enterprises in the individual evaluation could be valued at shadow prices in order to reflect the extent of social benefits.

5.5 Incorporation of Subjective Measures of Improvement

It was also indicated in the introductory chapter that financial improvement was a surrogate for economic improvement of the small farmer, and its use was necessary because of the difficulties involved in measuring economic improvement directly. At the same time, it is still possible and desirable at least to identify certain other facets of improvement which could be incorporated in an individual loan evaluation.

In Chapter 2, a number of case studies were cited in which the high degree of 'paternalism' exhibited by the extension services and other development agencies was a common criticism. It was suggested that this led to farmers being unable to manage their farm enterprises effectively, without a high degree of technical support and that this was so even after relatively long experience of the enterprise. Financial improvement, as reflected in a positive NPV, is not an adequate criterion on its own if the farmers are unable to operate their enterprises successfully by themselves. This suggests that one subjective measure of improvement that should be attempted is the degree to which a loan recipient has been able to obtain successful levels of earnings without intensive supervision from development agencies. This is admittedly a difficult issue to deal with, but some indication may be obtained by seeking opinions from experienced field officers, who are acquainted with the particular clients, to the degree to which the farmer would have been able to attain the level of income in the absence of supervision. An indication from the farmers themselves as to their understanding of the reason for doing certain practices in their farming operations would also be relevant in this context.

One of the functions of developmental credit, in a country like Papua New Guinea, is to act as a catalyst in the transformation process from the subsistence to the cash economy, for only by involvement in the monetary sector can an individual (and the economy as a whole) experience significant economic improvement (Fisk, 1966). It follows that if by attaining a loan an individual (or group) becomes a committed member of the monetary sector, both the individual and the nation are potentially in a better position. Mere receipt and repayment of a loan, however, is not sufficient to indicate commitment, for an individual may obtain development bank funds purely for an exploratory excursion into cash earning activities. A subjective assessment of the extent to which a client is committed to cash earning activities, as a result of the loan, is thus another non-quantifiable measure. The extent to which, after establishing the loan-financed enterprise, the individual engaged in other cash earning activities would be one indication of such commitment.

The above are merely two examples of a range of subjective measures that could be identified and incorporated into a system of individual loan evaluation. In this context, Fisk (1975a) suggests a method of incorporation that appears applicable to the periodic evaluation exercise suggested earlier. The important criteria could be listed on a schedule for each loan to be evaluated 'and a subjective assessment made of the level of contribution achieved by the loan towards the fulfilling of each [criterion]'.

5.6 Conclusions

In summary, it appears that the net present value criterion, suitably conceived, is adequate as an unambiguous measure of financial improvement. It incorporates the time value of money, is relatively simple to apply and is able to take into consideration particular constraints (e.g., the minimum income constraint) facing the entity for which the analysis is being performed. It is also capable of incorporating the different time preference rates (and risk return preferences) of different individuals, by reflecting these differences in the discount rate chosen. With the method of cash flow derivation suggested in this study, the NPV criterion can measure improvement at any time in an investment's life, subject to the condition that sufficient time has elapsed for the enterprise to have begun to produce returns (a time period which would vary depending on the nature of the enterprise). Finally, the net present value has the advantage that it can be used as a maximizing objective in the appraisal of an investment proposal.

The minimum income expectation level was postulated as an important concept where semi-subsistence farmers engage in cash earning activities. It is critically important that the lending agency take into consideration this minimum expectation when setting repayment schedules, for failure to do this could result in such low (or negative) cash flows that the participants lose interest in the project. And given the degree of control which the lending agency has over the sale proceeds, relaxation of the rate of repayments would not appreciably increase the risk associated with the loans.

In the appraisal of loans for cattle projects, estimation of the actual amount of labour available, taking into account labour needed for subsistence activities, is too rarely attempted. Coupled with

the fact that the Development Bank does not consider lending for hired labour as an acceptable use of loan funds, this can lead to a sub-optimal input combination, manifested in inadequate levels of fence, yard and pasture maintenance. This situation tends to be exacerbated by the use of materials for fence and yard construction that require a significantly higher maintenance labour requirement than if purchased materials were used.

APPENDIX A

TABLE A.1

PAPUA NEW GUINEA DEVELOPMENT BANK - AVERAGE LOAN SIZE BY LOAN CATEGORY
(values in K'000)

Category	1967/68	1968/69	1969/70	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	Average over 9½ years
Cattle	10.9	8.3	3.4	1.8	2.5	2.8	2.4	2.8	2.8	2.2	2.7
Pigs & poultry	10.0	18.1	1.3	1.2	0.2	0.5	0.9	1.2	4.7	1.6	1.6
Fishing	0.6	0.2	3.4	1.4	0.5	0.3	0.3	0.4	0.4	0.6	0.6
Processing	6.0	1.2	1.9	0.6	0.4	21.3	1.1	0.7	1.1	2.1	2.4
Oil palm	1.9	1.9	1.9	1.6	2.9	50.0	11.1	2.3	1.2	1.8	2.2
Cocoa	1.0	1.5	2.6	1.1	1.4	0.7	0.7	0.5	1.2	1.0	1.5
Rubber	2.7	2.4	2.5	0.5	0.7	0.4	0.4	0.4	0.4	0.6	0.6
Copra	1.1	2.0	0.4	0.7	0.9	0.5	0.5	0.4	0.5	1.2	0.8
Coffee	0.9	2.4	18.8	1.2	3.8	6.3	8.8	4.6	46.9	14.3	9.6
Other crops	2.2	38.6	16.0	2.4	3.6	2.2	1.2	0.5	3.7	3.0	4.3
Other agricultural	3.3	8.6	1.1	23.4	7.2	5.4	12.3	2.9	15.2	16.2	9.5
Agricultural Average Loan Size	2.2	3.6	2.3	1.5	1.9	3.2	1.9	1.6	3.1	2.3	2.2

Source: Papua New Guinea Development Bank - Annual Report and Financial Statements
1975/76 and Summary of Net Approvals 1976/77 (6 months).

APPENDIX A

TABLE A.2

PAPUA NEW GUINEA DEVELOPMENT BANK - TOTAL AGRICULTURAL LOAN APPROVALS BY LOAN CATEGORY
(values in K'000)

Category	1967/68		1968/69		1969/70		1970/71		1971/72		1972/73		1973/74		1974/75		1975/76		1976/77 (6 mths)		Total 9½ years			
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	% of total	Value	% of total
Cattle	14	152.6	75	621.8	179	604.8	349	622.6	552	1391.0	468	1333.1	512	1215.1	431	1205.0	312	875.9	134	290.6	3026	31.6	8312.9	39.3
Pigs & poultry	5	50.1	11	199.4	45	58.3	90	104.4	156	27.6	113	51.9	121	106.1	115	134.6	94	446.0	46	74.9	796	8.3	1253.3	5.9
Fishing	14	7.9	11	2.1	33	110.8	69	93.9	179	88.8	144	47.7	137	43.9	237	93.4	98	35.5	54	31.0	976	10.2	555.0	2.6
Processing	4	23.9	1	1.2	47	87.1	183	106.9	117	50.4	55	1171.8	109	117.9	137	95.9	67	72.0	52	111.1	772	8.1	1838.2	8.7
Oil palm	297	555.3	241	450.7	392	736.5	304	473.3	339	985.3	5	244.9	9	100.2	101	232.4	112	216.4	21	38.4	1821	19.0	4033.4	19.1
Cocoa	20	19.2	28	43.2	87	226.6	80	88.6	26	36.5	20	13.0	14	9.4	16	7.4	14	6.1	15	15.4	320	3.4	475.4	2.3
Rubber	12	32.4	10	23.7	12	29.5	27	14.4	53	35.5	48	19.8	6	2.3	141	53.8	119	47.1	31	17.5	459	4.8	276.0	1.3
Copra	34	37.8	110	221.1	146	64.0	221	17.8	185	158.7	64	32.8	50	26.0	28	10.3	28	14.3	9	10.7	875	9.1	733.5	3.5
Coffee	2	1.7	5	12.0	6	112.6	20	24.3	19	72.9	7	43.9	8	70.0	3	13.7	8	374.8	4	57.2	82	0.9	783.1	3.7
Other crops	5	11.0	7	270.5	15	239.9	43	101.6	53	192.9	46	103.8	18	22.0	28	13.7	30	111.5	7	20.7	252	2.6	1087.6	5.2
Other agricultural	5	16.4	6	51.8	21	23.5	12	281.2	16	11.6	18	97.8	12	147.9	41	119.6	41	621.7	16	259.5	188	2.0	1785.0	8.4
Total agricultural	412	908.3	707	1897.5	983	2293.6	1398	2069.0	1695	3155.2	988	3160.5	996	1861.2	1278	1979.9	923	2831.3	389	927.0	9567	100	21133.4	100

Source: Papua New Guinea Development Bank - Annual Report and Financial Statements 1975/76 and Summary of Net Approvals 1976/77 (6 months).

APPENDIX B. EXHIBIT B.1

BANKS COPY

PAPUA NEW GUINEA DEVELOPMENT BANK

Form A2a

APPLICATION FOR SUPERVISED CREDIT (LOAN) RURAL

Date _____ 19____

[illegible]

SIGNATURES

- 11 We/I the applicant(s) promise to pay back the loan plus interest. We/I also promise to complete my/our project and follow the advices of the Bank and D.A.S.F.

Full Name of Applicant

His/Her mark/signature

Full Name of Applicant

His/Her mark/signature

To be completed if a Marksman

To be completed if a Marksman

I certify that
who is personally known to me, appears to under-
stand the nature of this document and affixed his
mark hereto in my presence.

I certify that
who is personally known to me, appears to under-
stand the nature of this document and affixed his
mark hereto in my presence.

Witness

Designation

Witness

Designation

Witness (Agent to sign)

GUARANTEE

- 12 (By at least two willing guarantors, preferably the direct descendant and/or close relative and/or men of substance, each of whom would be prepared to take over loan obligations and would not be prevented from doing so should such applicant(s) not repay).
In consideration of the Bank's approval of this application for finance I/We
of Village and of
Village promise to pay any debts owing to the Bank should the applicant(s) fail to repay their loan plus interest. We also advise that We/I will assist the applicant(s) with his/their project.

Signature/mark of guarantor

Signature/mark of guarantor

To be completed if a Marksman

To be completed if a Marksman

I certify that
who is personally known to me, appears to under-
stand the nature of this document and affixed his
mark hereto in my presence.

I certify that
who is personally known to me, appears to under-
stand the nature of this document and affixed his
mark hereto in my presence.

Witness

Designation

Witness

Designation

Witness (Agent to sign)

WHERE THERE IS MORE THAN ONE APPLICANT COMPLETE THIS SECTION

- 13 (i) In the event of the death of any one or more of us the balance of loan fund undrawn be progressively payable to and/or made available upon request of the survivors.
- (ii) We authorise and request you to accept the signatories listed below as the only person(s) authorised to sign:-
(a) Release and use of loan funds
(b) Variation of loan purpose
(c) Deferment or rearrangement of loan repayments and/or interest.

Full Name of Applicant

His/Her mark signature

Full Name of Applicant

His/Her mark/signature

Delete one of the following :- (a) Anyone of the above to sign on his own
(b) Both of the above to sign together

APPROVAL BY APPROVING OFFICER

- 14 Loan approved on the basis set out in this application.

Repayments to be K per month, qtr, yrly, commencing / /

DESIGNATION

DISTRICT

SIGNATURE OF APPROVING
OFFICER

APPENDIX B EXHIBIT B.2.

DEPARTMENT OF AGRICULTURE, STOCK AND FISHERIES

SMALLHOLDER CATTLE PROJECT BASIC INFORMATION
TO ACCOMPANY APPLICATIONS FOR DEVELOPMENT BANK LOANS

Form DAS 180

DATE		PROJECT NO	
OWNERS SURNAME		OTHER NAMES	
VILLAGE	SUBDISTRICT	DISTRICT	
WHERE DOES THE OWNER LIVE ☐ ON THE PROJECT ☐ LESS THAN 1 MILE FROM PROJECT ☐ A LONG WAY FROM THE PROJECT		OWNERSHIP OF PROJECT ☐ ONE MAN ☐ A CLAN ☐ A VILLAGE	
LAND TENURE ☐ CLAN LAND AGREEMENT ☐ LEASE ☐ LAND TENURE CONVERSION ☐ OTHERS (NAME)		NO OF PEOPLE INTERESTED IN PROJECT IS THERE LIKELY TO BE ANY DISPUTE OVER LAND OWNERSHIP ☐ YES ☐ NO	
THE LAND (1 HECTARE IS 2½ ACRES)			
THE LAND AVAILABLE FOR CATTLE		AMOUNT IN HECTARES	
NATURAL GRASSLAND (UNIMPROVED)		MAIN SPECIES SPECIES PLANTED {	
CLEARED BUSH (UNIMPROVED)			
SEMI-IMPROVED OR IMPROVED PASTURE			
TOTAL GRAZING AREA AVAILABLE NOW			
BUSH TO BE CLEARED FOR PASTURE			
CYCAD THAEHAZAMIA ZAMIA PALM			
IS IT PRESENT ON THE PROJECT ☐ YES ☐ NO ☐ OTHER POISON PLANTS (NAME)			
PASTURE, FENCING AND STOCKING PROGRAMME -			
ARE IMPROVED PASTURE SPECIES TO BE USED ☐ YES ☐ NO		NAME SPECIES USED	
PROGRAMME		PRESENT	YEAR 1
AREA OF NATURAL PASTURE		ha	ha
AREA OF IMPROVED OR SEMI-IMPROVED PASTURE		ha	ha
TOTAL AREA FENCED			
TOTAL NUMBER OF CATTLE PER STOCK SCHEDULE			
STOCKING RATE = AREA FENCED - TOTAL CATTLE			
WATER SUPPLY -			
IS GOOD WATER AVAILABLE TO CATTLE ALL YEAR EVEN IN DRY SEASON ☐ YES ☐ NO		SUPPLY ☐ CREEK ☐ ROUND WATER ☐ BORE	
		IF TYPE OF SUPPLY IS BORE, IS IT ☐ HAND PUMP ☐ MOTOR PUMP ☐ OTHERS	
SURVEY PLAN AND LOCATION SKETCH -			
COMPLETE A SURVEY PLAN HAVE RURAL DEVELOPMENT OFFICER CHECK AREA AND ATTACH A COPY TO THE APPLICATION COMPLETE A LOCATION SKETCH AND ATTACH TO APPLICATION			
STOCK - COMPLETE STOCK SCHEDULE TO YEAR 4 ATTACH TO THIS REPORT			
NO OF CATTLE ON PROJECT NOW		TEMPERAMENT	
HEAD		☐ QUIET ☐ WILD	
		CONDITION	
		☐ GOOD ☐ POOR	
		NO OF BREEDERS ON PROJECT WHEN FULLY STOCKED	
YARDS -			
CONDITION ☐ GOOD ☐ BAD		DESIGN ☐ GOOD ☐ BAD	
		CONSTRUCTION ☐ BRUSH MATERIAL ☐ SAWN MATERIAL ☐ OTHERS	
EXISTING FENCING -			
CONDITION ☐ GOOD ☐ BAD		POSTS ☐ WOOD ☐ WOOD AND STEEL ☐ OTHERS	
		WIRE ☐ 4 BARB ☐ 3 BARB ☐ OTHERS	
FARMING TRAINING -			
HAS THE PROJECT OWNER BEEN TO A FARMER TRAINING SCHOOL ☐ YES ☐ NO		DOES PROJECT OWNER TAKE ADVICE YOU GIVE HIM ☐ YES ☐ NO	
HAS THE PROJECT STOCKMAN BEEN TO A FARMER TRAINING SCHOOL ☐ YES ☐ NO		HAS HE ACHIEVED THE OBJECTIVES YOU SET HIM ☐ YES ☐ NO	
		WILL HE BE ABLE TO MANAGE PROJECT SATISFACTORILY ☐ YES ☐ NO	
GENERAL REMARKS			
PROJECT SCHEDULE FOR 12 MONTHS			
DISTRICT STOCK OFFICER		DISTRICT STOCK OFFICER	
☐ YES ☐ NO			

(c) If considered necessary what labour is available?

(d) Is amount sought suitable in relation to proposed development?

(e) If necessary state how loan amount should be altered and give reasons.

5. Is there anything to indicate the information supplied by applicant is not correct?

If so, please give particulars, and details of efforts made to verify any doubtful statements.

6. Estimation of value of security offered:—

(Not required in case of new Administration Land Settlement Schemes)

Present value — — — K _____

On completion of development K _____

If more than one security please show details individually on an attached sheet.

7. Any further comments.

8. Recommendation:—

(a) Application be approved as submitted;

(b) Approval be granted subject to variations outlined in 4 above;

(c) Application be declined.

(Delete clause not applicable)

Signed at

Date

RURAL DEVELOPMENT OFFICER

STATION

The recommendation IS
IS NOT supported—

If not supported please give reasons

DISTRICT RURAL DEVELOPMENT OFFICER

(District)

Date

APPENDIX B

EXHIBIT B.4

DEPARTMENT OF AGRICULTURE, STOCK, AND FISHERIES - P.V.O. DEVELOPMENT BANK

DATE OF INSPECTION		SMALLHOLDER CATTLE PROGRESS REPORT		PROJECT NO.	
DATE OF LAST REPORT				LOAN NO.	
OWNER'S NAME		OTHER NAMES		Form DASF 165	
VILLAGE		SUBDISTRICT		DISTRICT	

2. YARDS

CONDITION OF YARDS ☐ GOOD ☐ BAD

WAS WORK RECOMMENDED LAST REPORT CARRIED OUT? ☐ YES ☐ NO (IF NOT, GIVE REASONS)

REASONS

RECOMMENDATIONS

3. FENCES

CONDITION OF FENCES ☐ GOOD ☐ BAD

WAS WORK RECOMMENDED LAST REPORT CARRIED OUT? ☐ YES ☐ NO (IF NOT, GIVE REASONS)

REASONS

RECOMMENDATIONS

4. PASTURES

WAS RECOMMENDATION LAST REPORT CARRIED OUT? ☐ YES ☐ NO

QUANTITY OF FEED ☐ PLENTY OF GRASS ☐ NOT MUCH GRASS ☐ NO GRASS

WEEDS IN PASTURE ☐ NO WEEDS ☐ SOME WEEDS ☐ PASTURE NEARLY ALL WEEDS

MAINTAIN TYPES OF WEEDS PRESENT

IMPROVED PASTURE

ARE IMPROVED PASTURE SPECIES BEING USED ☐ YES ☐ NO (See details below)

SPECIES	YR PLANTED	APPROXIMATE AREA PLANTED (Ha)	CONDITION	RECOMMENDATION
			☐ GOOD ☐ BAD	
			☐ -- ☐ --	
			☐ -- ☐ --	
			☐ -- ☐ --	

5. WATER SUPPLY

IS PLENTY OF WATER ALWAYS AVAILABLE TO CATTLE ☐ YES ☐ NO

6. STOCK

WAS RECOMMENDATION OF PREVIOUS REPORT CARRIED OUT ☐ YES ☐ NO

BULL	COW'S OVER 2 YEARS	HEIFERS 1-2 YEARS	STEERS 1-2 YEARS	STEERS OVER 2 YEARS	CALVES 1 YEARS	TOTAL	NUMBER ON PROJECT	CONDITION	PURCHASES SINCE LAST REPORT	SALES SINCE LAST REPORT	PRICE RECEIVED IF KNOWN	ANIMALS READY FOR SALE	DEATHS SINCE LAST REPORT	CAUSES OF DEATHS (DESCRIBE)	HANDLING OF CATTLE	BRANDING	STOCKING RATE	RECOMMENDATIONS

7. COMMENTS (TICK RELEVANT BOX)

PROGRESS OF ORIGINAL FARM PLAN ☐ BEHIND ☐ MAINTAINING ☐ AHEAD

CLIENT ATTITUDE ☐ POOR ☐ AVERAGE ☐ GOOD

HEALTH ☐ POOR ☐ AVERAGE ☐ GOOD

MANAGERIAL ABILITY ☐ POOR ☐ AVERAGE ☐ GOOD

ACCEPTANCE OF ADVICE ☐ POOR ☐ AVERAGE ☐ GOOD

TOTAL FUND STILL UNDRAWN AS PER PROGRESSIVE CONTROL SHEET (D.B. 25)

LOAN DRAWING SHOULD BE ☐ SUSPENDED ☐ CONTINUED ☐ RESUMED (NOTE IF "SUSPENDED" OR "RESUMED" COMMENT IN GENERAL REMARKS SECTION)

REPAYMENTS DUE TO COMMENCE PRIOR TO NEXT INSPECTION: (i) PLACE OF REPAYMENTS SET ☐ YES ☐ NO (ii) INCREASE REPAYMENTS TO # PER MONTH, QUARTER, OTHER

GENERAL REMARKS

SIGNATURE OF INSPECTING OFFICER	DESIGNATION	SIGNATURE OF CHECKING OFFICER	DESIGNATION
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APPENDIX C

TABLE C.1

ASSUMPTIONS USED IN ESTIMATING LABOUR CONTRIBUTIONS
(Man-days)A. Fencing:

1 hectare = 0.1 kilometres of fencing
(including subdivision)

(i) Cutting posts*	25/kilometres of fence
(ii) Carrying posts*	9/kilometres of fence
(iii) Erection of posts	18/kilometres of fence
(iv) Erection of strainer assemblies	3/kilometres of fence
Total ..	55/kilometres of fence

* It is assumed these activities would not apply to
rainforest areas where the posts are available from
the clearing operations.

(v) If steel pickets used - erection	16/kilometres of fence
---	------------------------

B. Land Clearing:

(would not apply to grassland areas) 25/hectare

C. Yard Construction:

20 man-days

D. Operating and Maintenance Activities:

1.5/head/year

APPENDIX D

TABLE D.1

LIVESTOCK VALUES USED IN NET WORTH AND ACCOUNTING INCOME ESTIMATION
(in kina)

Category	1970	1971	1972	1973	1974	1975	1976
Bulls	316	329	342	356	370	385	400
Cows > 2 years	119	124	129	134	139	144	150
Heifers 1-2 years	103	107	111	115	120	125	130
Weaner heifers	56	58	60	62	64	67	70
Steers 1-2 years	76	79	82	85	88	91	95
Steers > 2 years	131	136	141	147	153	159	165
Weaner steers	56	58	60	62	64	67	70
Calves	33	34	35	36	37	38	40

APPENDIX D

TABLE D.2

WAGE RATES PER MAN-DAY
(in kina)

	1969	1970	1971	1972	1973	1974	1975	1976
Wage rate per man-day	0.67	0.79	0.91	1.09	1.21	1.33	1.45	1.57

APPENDIX E

FARM MANAGEMENT SURVEY OF VILLAGE CATTLE PROJECTS IN
THE MARKHAM VALLEY

M. Thomas, Area Economist, Lae,
Department of Primary Industry

Introduction

Over the last five years, the number of village cattle projects in the Markham Valley has rapidly increased. While recognising that this expansion continues and that new cattle projects are currently being worked up, it is probably fair to say that the industry is moving from its establishment phase to one of consolidation. It is therefore timely to examine the emerging structure of the smallholder cattle industry and to look at the economic and physical performance of the projects compared with estimates used in the original budgets. The survey shall also provide a basis for evaluating the economics of pasture improvement and the possible diversification of farms into feed grains.

Aims

The aims of the survey are:

1. To describe and analyse the development and current structure of the village cattle industry in the Markham Valley. The study is to examine holding and herd size, herd type, resource use and costs, return and profitability, credit, other commercial activities and subsistence cropping.
2. To gather farm management data, including calving and branding percentages, turnoff rates, pasture types and management, stocking rates, husbandry practices.

3. To evaluate the relevance and usefulness of record keeping on village cattle projects.

Data Collection

Much data are available from departmental files. Further information will be obtained directly from the farmer through student assignments, farm records and field visits by myself. (Hopefully, one or two fourth form cadets can be allocated to help me with these field visits.)

Method

Extraction of data from departmental files should provide few problems.

On-farm data collection is more complicated. It is initially planned that this aspect of the study cover one year, although this could be extended if thought desirable. A stratified random sample will be selected; three methods of data collection will be employed:

1. Property Report: Over the Christmas holidays (1975/76) P.A.T.I. students will stay in villages and write up a property report for each member of the sample. The property report is to include not only the cattle enterprise but other commercial and subsistence activities.
2. Farm Records: In order to obtain a continuing source of information on farm performance, it is planned that a farm recording system be introduced to the farmers. Training the farmers in the use of these records will be another responsibility for the students. Not only will this aspect of the survey provide data but will equip the farmers with a useful farm management technique.

3. Field visits by Departmental Officers: During the year, each member of the sample will be paid regular visits by the area economist and/or field assistants (fourth form cadets). The purpose of these contacts is firstly to assist the farmer with any problems arising in connection with his record keeping and secondly to obtain data on the effect of grazing patterns on pasture stands.

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