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Predicting loan repayment performance: a case of Kenyan farm borrowers

Ruth M. A. Otima
Iowa State University

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**Predicting loan repayment performance:
A case of Kenyan farm borrowers**

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by

Ruth M. A. Otiya

A Thesis Submitted to the
Graduate Faculty in Partial Fulfillment of the
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Signatures have been redacted for privacy

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Ames, Iowa

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TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION.....	1
Historical Justification of Farm Credit Programs.....	3
International Agencies Involved in Farm Credit Programs.....	6
Objectives and Operational Experiences of Farm Credit Programs.....	10
Targeting small-scale farmers.....	11
Success stories.....	13
Institutional constraints and limitations.....	15
Problem Statement.....	18
Objectives of the Study.....	20
Thesis Organization.....	21
CHAPTER 2: AN OVERVIEW OF KENYA’S ECONOMY, AGRICULTURE, AND FARM CREDIT SYSTEM.....	22
Location, Geographic Features, and Administrative Provinces.....	22
Kenya’s Economy: Background and Trends.....	23
Sources of adverse economic trends.....	28
Proposals for economic reforms.....	31
The Agricultural Sector.....	33
Performance.....	33
Land potential.....	34
Producer pricing policies.....	42
Reform issues.....	44
Kenya’s Agricultural Credit.....	45
The Agricultural Finance Corporation (AFC).....	52
Policy objectives and organizational structure.....	53
Sources of loanable funds.....	54
Credit terms and procedures.....	54
Loan servicing procedures.....	60
Loan collection procedures.....	61
AFC Performance Between 1980 and 1992.....	62
The financial structure of AFC.....	63
Loan portfolio and number of borrowers.....	66
Loan repayment performance.....	67
Operational costs.....	67
Operational difficulties.....	72
AFC restructuring proposals.....	72
Conclusion.....	74

CHAPTER 3: CONCEPTUAL FRAMEWORK.....	76
Credit as a Market Good.....	76
Information Problems in Credit Markets.....	77
Response to information problems	79
Agency-Principal problem	83
Transaction cost and enforceability of contacts	85
Conclusion	88
Factors that Influence Financial Failure from Bankruptcy Studies.....	89
Defining financial failure	89
Ratio analysis.....	90
Characteristics of Loan Defaulters from Repayment Prediction Studies	93
Definition of a loan defaulter.....	93
Financial characteristics of defaulters.....	95
Managerial characteristics of defaulters.....	98
Demographic characteristics.....	100
Conclusions.....	102
CHAPTER 4: DATA AND MODEL DEVELOPMENT	105
The Data.....	105
Distribution of Loan Funds by Administrative Provinces, AFC Regions, and by	
Loan Type.....	108
Distribution by Kenya's provinces	108
Distribution of loans by AFC operational regions.....	108
Distribution by loan type	112
Descriptive Statistics of the Sample Variables	114
Distribution of Funds by Selected Performance Factors	117
Demographic factors.....	117
Loan factors	119
Defining and Identifying Defaulters.....	122
Demographic, and loan scheme and default incidence	123
Regional differences	123
Loan scheme differences.....	124
Default incidence and the SCCS (maize and wheat)	127
Influential Variables.....	132
Identification of the Procedure and Specification of Variables for Predicting Loan	
Repayment Performance.....	133
Dependent variables.....	133
Independent explanatory variables.....	134
Explanation of the estimation method	138

CHAPTER 5. EMPIRICAL RESULTS AND DISCUSSION	148
Discussion of Results.....	153
Repayment prediction results for small-scale loans.....	153
Repayment prediction results for SCCS loans (maize and wheat)	155
Repayment prediction results for large-scale loans	156
Comparison of the Three Repayment Prediction Models.....	156
Conclusions.....	157
Demographic characteristics	160
Loan characteristics.....	160
Policy implications	161
Research implications	161
 BIBLIOGRAPHY	 163
 ACKNOWLEDGMENTS	 173
 APPENDIX.....	 174

CHAPTER 1: INTRODUCTION

Agricultural credit programs play a central role in the development strategies of most low-income developing countries (LDCs). Policymakers believe that credit is a prerequisite for adopting modern agricultural technologies. The majority of these programs are intended to simultaneously expand both credit demand by farmers and the supply of credit to agriculture. Credit programs have also been advocated on efficiency and equity grounds as a means of mitigating other policy bias against agriculture. Policies based on agricultural credit programs include certain forms of subsidies such as extended repayment periods and below-market interest rates. The largest sources of loanable funds have been government and international agencies.

Although the motivation underlying these agricultural financial strategies still appeals to many policymakers, recent studies (Adam and Von Pischke, 1980; Stiglitz and Weiss, 1981; Adam, Graham, and Von Pischke, 1984; Braverman and Guasch, 1989; Stiglitz et al., 1993) reveal that most credit programs have encountered problems. These problems include the inability of many LDCs to attain anticipated levels of agricultural productivity, increased inequality in credit allocation that magnifies the income gap between small-scale farmers and the large-scale farmers, and the increasingly weaker financial position of specialized credit institutions due to widespread loan default.

The problem of loan default is a serious one for the viability of credit programs. In the last decade, loan default among farm borrowers has attracted the attention of many

researchers. Several factors have been suggested as being responsible for default problems:

- (1) factors within the credit programs (loan conditions and delivery procedures) and factors outside the credit programs (culture, economics, religion, and social aspects of rural communities),
- (2) barriers to change on the part of credit institutions, borrowers, and governments, and
- (3) governments traditionally favoring nonfarm sector development over rural development.

While these factors are important sources of loan default problems, it is how they influence the borrower's loan repayment performance that remains the primary key for improving credit programs.

Given the importance of credit and the frequent failure of credit programs, an increasing number of studies seek to identify specific factors that influence the channeling and managing of farm credit in LDCs. LDC governments, the United Nations (UN), and individual international donor countries are seeking to improve credit access and delivery to small-scale farmers. Without credit, it is believed that growth and development in LDCs will not be forthcoming, and without such development, the standard of living and productivity of a huge number of rural people will be threatened.

Despite extensive research on loan default problems in LDCs, empirical evidence on the relationship between loan repayment performance and borrower-specific characteristics is not abundant. Such evidence is specifically lacking for the small-scale farmers targeted by credit programs since the inception of such programs in the 1960s.

This study seeks to relate loan and borrower characteristics to loan repayment performance for Kenya's specialized credit institution, the Agricultural Finance Corporation (AFC). AFC has experienced default problems similar to those observed in other LDCs. In the past decade, AFC's most serious problems have been the declining quality of its loan portfolio and a chronically weak liquidity position due to loan default and operational losses. The mode of operation and environment under which AFC operates may differ from those in other countries, but the operational assumptions and credit policies are similar.

Historical Justification of Farm Credit Programs

Historically, credit programs in LDCs have been justified from several perspectives. The programs emerged with the increased awareness of the contribution that agriculture could make to economic growth and development following the technological breakthroughs of the 1950s (Rostow, 1960). This new awareness motivated the UN to establish the Organization for Economic Co-operation and Development (OECD) Development Assistance Committee in the early 1960s to assess the rationale for aid in LDCs (Jepma, 1992). As pointed out by Hayami and Ruttan (1985), multiple technological paths that could greatly improve the efficiency of labor and land became available to farmers. For example, constraints imposed by labor shortages could be offset by mechanical technology such as tractors. The productivity of a given unit of land could be enhanced by biological technologies such as hybrid seed varieties and new livestock breeds. Complementary

scientific technologies included fertilizers, herbicides, and irrigation systems, all requiring access to capital.

Most farmers were unable to fund farm projects solely from their own resources, a situation that arrested agricultural growth and development (World Bank, 1975). Of great concern was the majority of relatively poor, small-scale-farmers. The status of these farmers in terms of initial resource endowment, access to regular financial markets, technical and managerial know-how, and the services necessary for adopting these technologies was perceived to be relatively weak. Agriculture provided these farmers with between 3 percent and 92 percent employment opportunities, through which they contributed between 4 percent and 62 percent to gross domestic product (GDP) (Martinu and Pes'kova, 1990). The view taken by many was that rural development required widespread access to resources so that benefits would be spread broadly among the target populations (Lele, 1987).

The farm sector in many LDCs suffered biases in credit allocation by private lenders due to the high risk and administrative costs that characterized lending to the agricultural sector. On average, the agricultural sector received a very small share of credit (e.g., 10 percent in Bangladesh; 15 percent in Thailand, the Philippines, and Mexico; and 27 percent in India) (Lipton, 1981), of which small-scale farmers received the smallest allocation. According to many observers, the poorest strata of these farmers had historically relied mainly on private moneylenders who were believed to be exploitative and needed to be disqualified and suppressed (Adam and Von Pischke, 1980). Without government

intervention in credit allocation, it was believed that the gap in income distribution between the rural poor and rich would worsen over time.

Another justification for farm credit programs was the need to link land reforms with technological dissemination as a development strategy (Von Pischke, 1981). This link was important because most LDCs were in the process of attaining their independence. In East and Central Africa, for example, colonial administrations left behind immense inequalities in land distribution. It was believed that bestowing land ownership rights to individual farmers was an appropriate land reform strategy; it improved the farmers' ability to extract the highest returns from land while improving their creditworthiness (Feder et al., 1988). However, such land reform required capital.

Other justifications were based on anticipated biases in of food product prices, distorted exchange rates, and inefficient marketing systems during the development process. It was argued that low interest rates on farm loans provided by specialized credit programs could compensate farmers for any adverse effects resulting from price or income policies.

In certain instances, governments and international lending agencies found it easier to initiate credit programs and extend credit than to initiate other reforms such as land tenure and marketing policies. This practice appealed to policymakers and encouraged them to use credit as a reform and development tool (Adam and Von Pischke, 1980; Braverman and Guasch, 1989).

International Agencies Involved in Farm Credit Programs

The major international development agencies that have supported specialized agricultural credit programs in LDCs include the World Bank and its affiliates, the International Development Agency (IDA), the International Bank of Reconstruction and Development (IBRD); the United States Agency for International Development (USAID), and private banks (Adam and Von Pischke, 1992). The World Bank has supported credit programs in nearly all LDCs. The United States initially promoted credit programs throughout Latin America and parts of Africa. Several European countries have supported cooperative movements in Africa as a potential source of grassroots participation in credit programs, inputs, and commodity markets.

Credit terms have not been uniform across these agents; for example, intermediate production credit advanced by IBRD has generally had a grace period of five years with repayment over a period of three to fifteen years (World Bank, Various issues). Interest rates charged by IBRD reflect its cost of funds. On the other hand, IDA lends to poorer developing countries with per capita gross national product (GNP) of US \$650 or less (in 1988 dollars). Forty countries qualify for IDA credit, of which twenty-seven are African nations. Credits from IDA are made to governments and normally provide a ten year grace period with maturities ranging from thirty to forty years.

Table 1.1 shows World Bank lending to agricultural credit programs in LDCs through IBRD and IDA, by region, from fiscal year (FY) 1980/81 through 1990/91. These agencies have played important direct and indirect roles in designing, establishing, funding, and

staffing specialized agricultural credit institutions in LDCs (Von Pischke, 1981). In many countries, these institutions are the single largest sources of agricultural credit and often operate side by side with a nationwide network of rural credit cooperatives. However, their relative importance as a source of total credit to the agricultural sector varies from country to country (Table 1.2). In some Asian countries where informal financial markets provide an average of 60 percent to 70 percent of rural credit, the relative importance of these institutions is lower compared to their importance in countries where such markets are less developed. The latter is the situation in much of Africa.

Table 1.1 World Bank direct lending to agricultural credit programs in LDCs, FY 1980/81 90/91 (million US\$)

Year	Africa		Asia		Europe, Middle East, and North Africa		Latin America and the Caribbean	
	IBRD	IDA	IBRD	IDA	IBRD	IDA	IBRD	IDA
1980/81	8.5	71.0	1,31.5	1,178.8	983.5	96.2	345.4	23.0
1981/82	33.5	92.5	256.6	1,358.8	997.5	96.2	706.4	23.5
1982/83	33.5	126.5	446.5	1,518.0	1,092.5	96.2	706.4	23.5
1983/84	33.5	232.2	526.5	1,566.6	1,242.9	104.2	921.4	23.5
1984/85	283.5	231.9	526.5	1,836.6	1,358.3	104.2	1,251.9	23.5
1985/86	283.5	275.6	651.5	1,836.6	1,612.3	104.2	1,307.9	23.5
1986/87	283.5	283.1	1,293.3	1,984.1	1,732.3	104.2	1,487.9	23.5
1987/88	293.5	293.1	1,293.3	1,884.1	1,793.3	104.2	1,935.9	23.5
1988/89	283.5	311.4	1,268.5	2,154.3	1,002.3	304.0	2,357.4	23.5
1989/90	319.8	333.4	1,287.9	1,984.1	2,610.3	138.0	2,445.4	15.0
1990/91	319.8	369.1	1,287.9	2,154.3	2,798.8	305.5	2,627.4	23.5

Source: *World Bank Annual Report*, Various issues.

The rate of increase of Africa's debt has declined substantially since the mid-1980s compared to earlier periods (Figure 1.1). Compared to Latin America, Africa's debt burden has been more crippling and represents a higher proportion of GNP; over 90 percent in 1987 compared to 60 percent for Latin America and 15 percent for China (O'Connor, 1991).

Africa's debt service ratio, which relates annual scheduled payments to interest and principal annual export earnings, worsened due to falling export earnings, in the 1980s. For most individual African countries, this ratio is now between 40 percent and 50 percent. Debt burden has thus limited further borrowing capacity for many African countries.

Table 1.2. Relative importance of specialized government-sponsored Agricultural financial institutions in selected countries

Country	Year	Percentage Share of Total Agricultural Credit	Source
India	1992	33.0	Ghate, 1992
Nigeria	1989	18.0	Mbatia, 1991
Bangladesh	1987	13.5	Kashem, 1987
Zambia	1987	15.7	Allen, 1987
China	1989	6.4	Feder et al., 1989
Rwanda	1991	4.0	Adholla et al., 1991
Ghana	1991	23.0	Adholla et al., 1991
Kenya	1992	20.0	Agricultural Finance Corporation of Kenya, 1992
Japan	1983	18.0	Asian Productivity Organization, 1985
United States	1987	17.0	Belongia and Gilbert, 1987

Note: Japan and the United States are included in this table for comparison purposes. In these two countries, the percentage share of credit provided is within the average of that in LDCs.

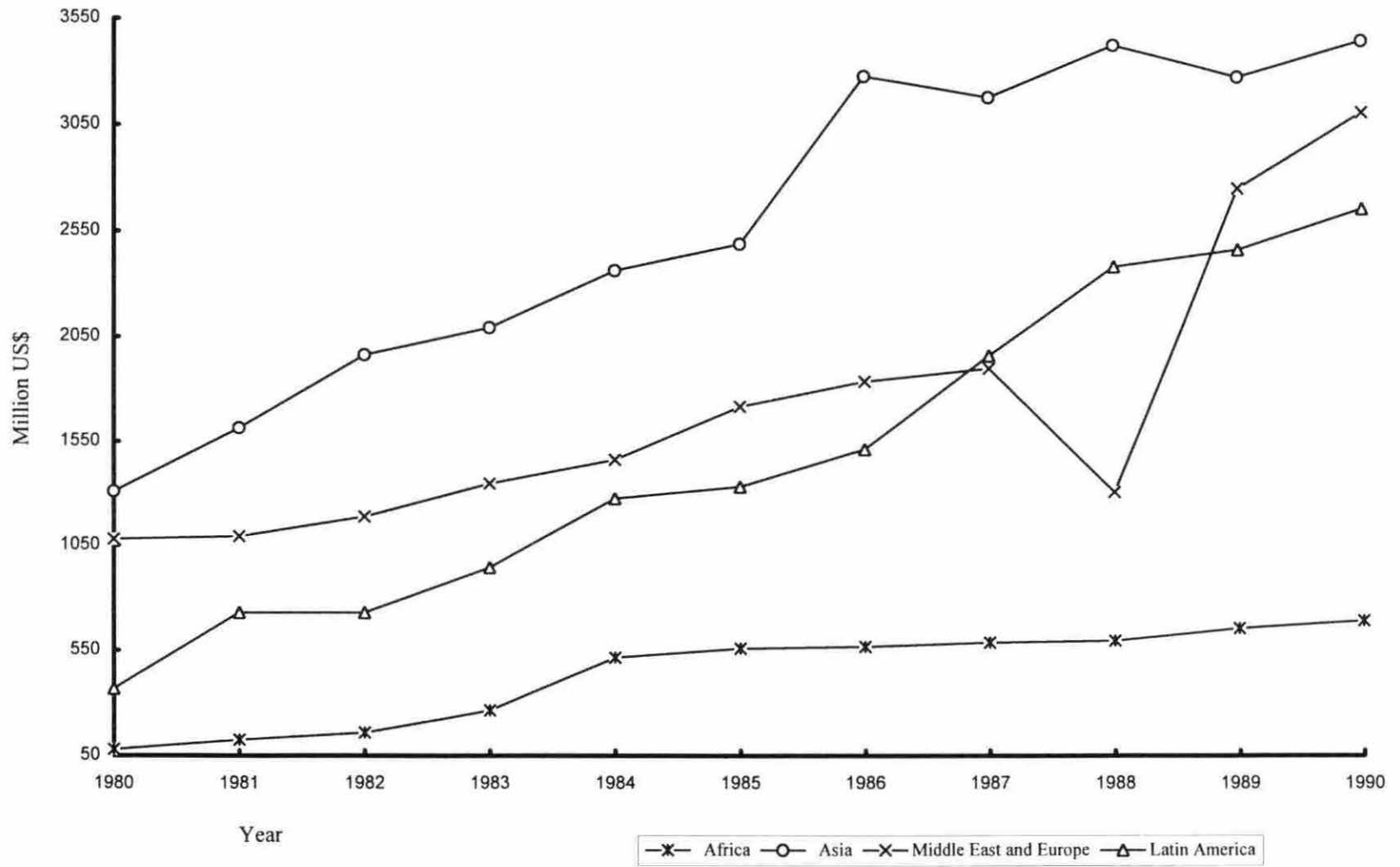


Figure 1.1 World Bank new lending to LDCs, 1980-90

Objectives and Operational Experiences of Farm Credit Programs

Farm credit programs in LDCs were designed to pursue specific development objectives (Hayami and Ruttan, 1985; Meier, 1989). The programs were part of a system for resource allocation that transferred financial resources over time to individuals engaged in agricultural production. Financial intermediation in agriculture was thus expected to facilitate agricultural productivity, particularly within the small-scale-farm sector. As a result, accelerated growth in productivity meant an increase in jobs and income, equitable distribution of wealth, and upgraded living standards of the target group.

At the national level, a wide range of strategies was available to achieve these objectives. First, investment could be directed toward labor-intensive industries to create new jobs. Second, trade linkages could be created between farm sector input-output markets and other sectors. Third, credit could be directed toward farm technologies that transfer labor to other sectors or help meet labor shortages. This transfer could free up farmers' time and allow them to expand or intensify production. Last, loans could be granted directly to individuals and incorporated groups, or indirectly through cooperative societies. Credit systems could allow for credit interlinkage within the agricultural marketing system. On an individual basis, credit recipients could adopt new agricultural technologies and increase productivity.

The effectiveness of credit programs has been debated. The first major performance evaluation of farm credit programs was the 1973 IDA Spring Review of Small Farm Credit by the World Bank (World Bank, 1973). This study raised several issues regarding the initial

experiences of credit programs, including credit allocation, credit impact, and institutional development of credit institutions.

Targeting small-scale farmers

Targeting credit and creating incentives for its use have been among the most important and difficult challenges in rural credit delivery in LDCs. The choice of regulatory procedures and the combination of incentives have significantly determined the success of the credit objectives. For a variety of reasons, performance of these programs in LDCs has generally been considered a failure (Gonzales-Vega, 1983; Adam, Graham, and Von Pischke, 1983; Llanto, 1988; Germidis, 1990; Adam and Von Pischke, 1992; Yaron, 1992; Hoff and Stiglitz, 1993). Credit programs have failed to efficiently improve income distribution or to alleviate poverty among small-scale farmers. The common features of these failed attempts have been loans benefiting wealthy large-scale farmers instead of small-scale farmers, skyrocketing arrears, loan diversion to nonagricultural investments, and financially weak and inefficient credit institutions.

Braverman and Guasch (1989) estimated that only 5 percent of farms in Africa and about 15 percent of farms in Asia and Latin America have had access to formal credit. Shirota, Araujo, and Meyer (1990) observed that a significant number of small-scale farmers in Brazil had not been reached by large and extensive agricultural credit programs over a fifteen-year period, during which huge amounts credit were channeled to the agricultural sector. They found that credit distribution is often concentrated in more commercialized regions, thereby excluding potential participants in less commercialized regions.

The effects of credit programs on agricultural productivity have not been easy to establish. Several studies have attempted to compare productivity between small and large farms (Rao and Chotigeat, 1981; Feder, 1985). These studies found an inverse relationship between farm size and output per acre, and that small farms have a relatively high labor-to-land ratio. Although these findings are not conclusive, the relatively higher levels of loans received by large farm holders were not justified on efficiency grounds.

Interest subsidies within farm credit systems are seen as favoring only those obtaining credit and not the entire agricultural sector, thereby distorting the cost of agricultural investments. For example, Shirota, Araujo, and Meyer (1990) showed that the ratios of interest subsidies to agricultural GDP and to overall country GDP in Brazil, were between 7 percent and 11 percent and 2.1 percent, respectively, between 1979 and 1980 (periods of high inflation). As a result, agricultural credit institutions became targets for financial arbitrage. It has therefore been argued that interest subsidies have had a degenerative effect on production efficiency. The programs also have had limited portfolio diversification, and the absence of farm production insurance as part of farm credit programs increased the vulnerability of producers to climatic production risks.

If a high loan recovery rate is considered the measure of success for a lending institution, these specialized credit institutions have failed dismally. Studies confirm a general inability of credit institutions to enforce legal loan contracts--evidenced by the growth of loans in arrears. Reports indicate that poor loan recovery has been a major deterrent to the sustainability of credit institutions (Adam and Vogel, 1986; Yaron, 1992).

Continuous inflow of external and government funds to these institutions has contributed to laxity in loan collection, despite ever-rising loan default problems. For example, an estimated 30 percent to 95 percent of agricultural credit portfolios in the Middle East, Africa, and Latin America are in arrears (Braverman and Guasch, 1989). Moreover, borrowers have developed poor attitudes toward these government-sponsored institutions, perceiving them as charitable organizations (Veget, 1984). Also, these institutions have appealed to politicians as an easy ground for patronage, thereby encouraging abuse and misuse. Deliberate and negative misconceptions by politicians about the essential nature of credit have been recognized as a source of negative borrower attitudes and poor credit discipline.

Success stories

It is encouraging to note that, despite problems, some programs have met with success. In general, LDCs in East, Southeast, and South Asia are considered more successful in using credit programs than are LDCs in Latin America and Africa (Ruttan, 1987). Identifying the unique features of successful programs is important for the reform efforts currently underway. The common features of successful programs are enumerated by Braverman and Gausch (1989). These features include tough stands on default, strict auditing, accountability, and financial control of the lender. Braverman and Gausch noted that some joint responsibility of grouped borrowers instilled credit discipline. For group borrowing, default of at least one of the group members means denial of credit to the whole group.

Yaron (1992) notes success stories in terms of institutional financial viability in the republics of Korea and Taiwan. In these republics, loan collection rates have exceeded 90 percent. Interestingly, cooperatives are involved in most of these success stories. It is believed that China's strong cooperative system aids lenders in capturing useful information regarding the financial behavior of borrowers and assessing their creditworthiness. Borrowers are likely to repay more promptly because they know that lenders have full knowledge of their incomes. The cooperatives provide farm inputs, farm product marketing, savings and credit, some kinds of insurance, and technical education. Perhaps the most important distinguishing feature of cooperatives is their holistic approach. Transaction costs are considerably reduced in terms of time saved running between several agents to secure credit and inputs and to sell output. On the lender's side, a strong relationship is established with the farmers, thereby reducing adverse selection and moral hazard problems. Lenders also enjoy reduced transaction costs.

Other researchers contend that, to some extent, small-scale farmers in LDCs have generally benefited from credit programs, but it has been difficult to precisely separate the impact of credit from the impact of other economic policies. Recent credit models have shown that small-scale farmers indirectly benefit from agricultural credit programs through the trickle-down effects of supply-led credit (Hoff and Stiglitz, 1993). These models hold that when large amounts of loanable funds are supplied to one agent, the demand for credit from other agents is reduced, which in turn drives down interest rates. According to Hoff and

Stiglitz, these indirect benefits to small-scale farmers may explain why informal credit markets have become popular in some regions.

Institutional constraints and limitations

The traditional rationale on which credit programs were based presumed financial constraint of small-scale farmers, sometimes from discriminatory lending practices by formal lenders. This situation has not been found to be the case in all regions. In China, Thailand, and Zambia, for example, small-scale farmers preferred the more flexible and cheaper services of informal lenders over commercial or governmental institutions; only a small percentage were financially constrained (Allen, 1987; Feder et al., 1989). In Brazil, 90 percent of small-scale farmers did not request any form of credit between 1978 and 1989 (Shirota, Aurojo, and Meyer, 1990). Other traditional justifications--that credit shortages retard adoption of new technologies, for example--are refuted by Graham and Firestone (1984) and Yaron (1992). They argue that technologies are divisible and can be adopted progressively. Unless the new technologies require a huge up-front investment with returns spread over time, credit is not the correct mechanism for motivating a farmer to adopt the technologies. Besides, new techniques cannot be adopted in an adverse product-pricing environment, with or without a loan (which is a frequent problem in many LDCs).

Farmers' ingenuity in improving their incomes has created inefficiencies in credit programs. Farmers facing bureaucratic systems have used credit institutions as sources of funds for nonagricultural ventures that may offer better income opportunities. The credit programs have thus often failed to become instruments for upgrading farm technology,

increasing agricultural productivity, or improving the long-run income status of small-scale farmers.

According to Borlaug (1990), these problems have been closely related to infrastructural constraints and price incentives. For example, a majority of African countries did not link agricultural research and production activities to promoting, exploiting, and disseminating more and better technologies. Such activities remain an important challenge for reversing Africa's economic woes. Poor economic performance was characterized by the failure of policymakers to develop complementary technologies such as adequate storage facilities, redistribution, and marketing systems to absorb higher yields. African countries caught in this predicament often manipulated prices, which resulted in variability of yields. During bumper harvests, prices went down and farmers kept their harvest for consumption and looked for nonfarm income opportunities. This outcome may partly explain why farmers in countries such as Malawi have insisted on growing the local flint maize, which they contend tastes and stores better than the "improved" dent (Lele, 1989).

According to Krause et al. (1990), other major impediments are the inability of small-scale farmers to bear the combined business and financial risks posed by adopting new technologies and the lack of development within credit institutions to reduce these risks. Other expressed problems relate to the fungibility of money (Yaron, 1992; Feder et al., 1989; Adam and Von Pischke, 1983). Fungibility problems have made it increasingly costly for lenders to separate household expenditures and easily account for expenses directly connected to credit. Credit may therefore only generate a negligible increase in agricultural

productivity unless a very strict supervision system is followed, which may in turn be cost-ineffective.

Lenders have to be consistently committed to monitoring borrowers in the use of funds and taking appropriate action to force violators to correct their ways. The lender's action must provide visible examples to encourage other borrowers to maintain desired behavior. Attempts by lenders to monitor and enforce contracts have often resulted in over-staffing, which further boosts lending costs (Adam and Von Pischke, 1992). The very lack of monitoring means that evidence of noncompliance is manifested in loan default and diversion.

Reduction of undesired behavior through effective monitoring and enforcement of contracts takes two paths, both of which require high investment in information collection. The first path concentrates on monitoring the effort level of borrowers and making it less likely for default problems to arise. The second involves enforcing credit contracts, improving credit discipline, and eliminating inefficient borrowers.

Little research has focused on identifying and attaching some objective value to factors that influence loan default in LDCs. It is believed that each factor has a relative influence on the borrower-lender relationship and subsequent loan repayment performance. From a practical perspective, knowledge of the relative level and potential influence of each factor can help improve the success of credit programs

Problem Statement

Rural credit is an important government intervention in developing of the agricultural sector in LDCs. Credit programs represent government attempts to create credit markets for small-scale farmers. The choice of institutional arrangements to facilitate coordination of credit allocation and use significantly determines the achievement of developmental goals. Financial institutions establish expectations and rules about the rightful use of credit and the partitioning of income streams resulting from its use. To perform these functions, institutions must be stable over time and ready to change with developmental advancements. Past institutional policy arrangements introduced in most LDCs to facilitate the development process have had a number of problems. One of the most serious problems is financial instability resulting from loan default. Kenya is no exception to this dilemma (Kenya, *Economic Review* 1989).

Virtually every default case has many potential causes, both internal and external. Identifying the causes of default, assessing the characteristics of defaulters, and quantifying the relative potentiality of factors that influence default provide a reasonable approach to evaluating the problem. Researchers have used a broad range of factors to estimate the proportion of default attributable to specific factors in many regions.

The environments under which particular credit programs operate may differ significantly, however. The environment is therefore a relative unknown, as are the socio-economic characteristics of farm borrowers, which are important in distinguishing their relative repayment abilities. It is important to develop an environment-specific model to

assess the characteristics affecting repayment ability. Several researchers have observed that there is no definitive set of explanatory variables for these models (Miller and LaDue, 1989; Ellinger, Splett, and Barry, 1992). They contend that each lender reacts differently to a given situation, depending on the circumstances.

In Kenya, default rates for the specialized credit institution AFC have been growing rapidly (Agricultural Finance Corporation of Kenya, 1993). In 1980, the average default rate was 43 percent; by 1992, it had grown to an average of 57 percent. This default rate is typical of many credit programs in LDCs, as Braverman and Guasch (1989) point out. Usually, a project program has two phases in repayment rate: very high in the early stages and progressively deteriorating toward the end of the project period. Toward the end of these projects, loan screening quality declines, and loan collection and supervision are often lax. Borrowers have a strong incentive to default because the prospects for future loans under that project diminish. For AFC, however, default rates have remained consistently high with all programs.

Assuming that both lenders and borrowers are operating under rigid and bureaucratic policies, it is not practical for either group to take full advantage of repayment risk strategies. Borrowers are able to resort to political patronage and fall back on a wide range of reasons when default problems begin to appear. Many believe that this tendency is the result of poor credit discipline among some borrowers. On the other hand, some farmers are willing to repay their debts regardless of default opportunities. It would therefore follow that performing borrowers have the incentive to repay, perhaps through a determined, skillful, or

shrewd plan to maintain a healthy relationship with the lender. As a result, studies aimed at identifying factors that influence loan repayment performance should consider both defaulters and nondefaulters. Several questions present themselves. What motivates those who repay their loans fully or partially and what demotivates those who do not? Are there specific characteristics that significantly distinguish those who pay from those who do not? If so, can lenders take advantage of these characteristics in making loan decision, and predict an applicant's expected performance? These questions underlie this research effort.

Objectives of the Study

From the preceding discussion, it can be concluded that the factors that influence loan default are interrelated in a complex manner. This study attempts to measure the relative contribution of the factors identified as being important in the loan repayment behavior of Kenya's AFC borrowers. The specific objectives are to:

- (1) consider insights of previous studies examining firm failure and loan default characteristics,
- (2) analyze Kenya's AFC operational practices and constraints and evaluate its financial performance for the FY 1980/81-1992/93,
- (3) analyze default trends within loan and borrower characteristics and identify factors that influence loan repayment performance among AFC borrowers,
- (4) formulate hypotheses and empirically test selected repayment performance characteristics, and

- (5) draw conclusions about the relationships between repayment performance and loan and borrower characteristics for lending decisions.

Thesis Organization

The contents of the study are organized as follows. Chapter 2 introduces Kenya as a case study. First, the chapter presents Kenya's location, geographic features, and administrative provinces. Then; Chapter 2 reviews Kenya's economy, agriculture, and agricultural credit and presents an analysis of the current status of AFC, Kenya's main government-sponsored credit institution. The analysis of AFC provides a factual background from which the loan default analysis will subsequently be explored. Chapter 3, the conceptual framework for the loan default analysis and the literature review are provided. Chapter 4 describes the analytical procedures used for this study. Chapter 5 provides the results of the analysis, a discussion, and the summary and conclusions for the study.

CHAPTER 2: AN OVERVIEW OF KENYA'S ECONOMY, AGRICULTURE, AND FARM CREDIT SYSTEM

This chapter introduces Kenya as a case study. First the Chapter presents Kenya's location, geographic features, and administrative provinces. Then the chapter reviews Kenya's economy, agriculture, and agricultural credit, presents an analysis of the current status of AFC, Kenya's main government-sponsored credit institution for the agricultural sector. In particular, this section emphasizes the role of the AFC as a specialized agricultural credit institution. The objectives, operation, procedures, and current financial status of AFC are discussed. Finally, an analysis of AFC operations for the FY 1980/81 to 1991/92 is presented.

Location, Geographic Features, and Administrative Provinces

Kenya lies astride the equator on the eastern border of the African continent, bounded by the Indian Ocean and five countries. Counterclockwise from the Indian Ocean, Somalia is to the north, followed by Ethiopia, Sudan, Uganda, and Tanzania directly to the south. Kenya covers an area of 580,367 square kilometers. Included are 11,230 square kilometers of water, mainly Lake Turkana and a portion of Lake Victoria. Kenya is ranked number twenty-second in size among sub-Saharan African countries.

One-third of Kenya is semi-arid: barren, brown, and sun-burnt land. One-third is highland: mountains, forest, lakes, and farmland, much of it fertile. The remaining one third is Savannah grassland. Less than 15 percent of the country, mainly the coastal and

southwestern highland regions, receives reliable annual rainfall of 760 millimeters or more. Most of the country experiences two wet seasons (February-May and September-October) and two dry seasons (November-December and June-August). The overall pattern of rainfall is highly erratic, particularly in areas of low precipitation. Intermittent drought affects the entire country. In the highlands, the climate is temperate, while the coastal areas are humid and hot.

For administrative purposes, Kenya is divided into seven provinces (with the capital city, Nairobi, granted the special status of province), and 41 districts (Figure 2.1). The Rift Valley province is the largest, stretching from the desert around Lake Turkana in the Turkana district (36) bordering Sudan, to the Kajiado district (28) along the border of Tanzania. The Rift Valley province contains land with the highest agricultural potential.

Kenya's Economy: Background and Trends

At the time of independence in 1963, Kenya's economy was based on a well-established modern agriculture operated mainly by colonial settlers. Post-independence economic strategies focused on agriculture for economic growth and development. The government emphasized the economic philosophy of private investment in the agricultural sector. Land redistribution and privatization were agricultural incentives used to encourage private investment and to ensure widespread participation of indigenous Kenyans in development.

Kenya's economy displays the same characteristics of the economies of other

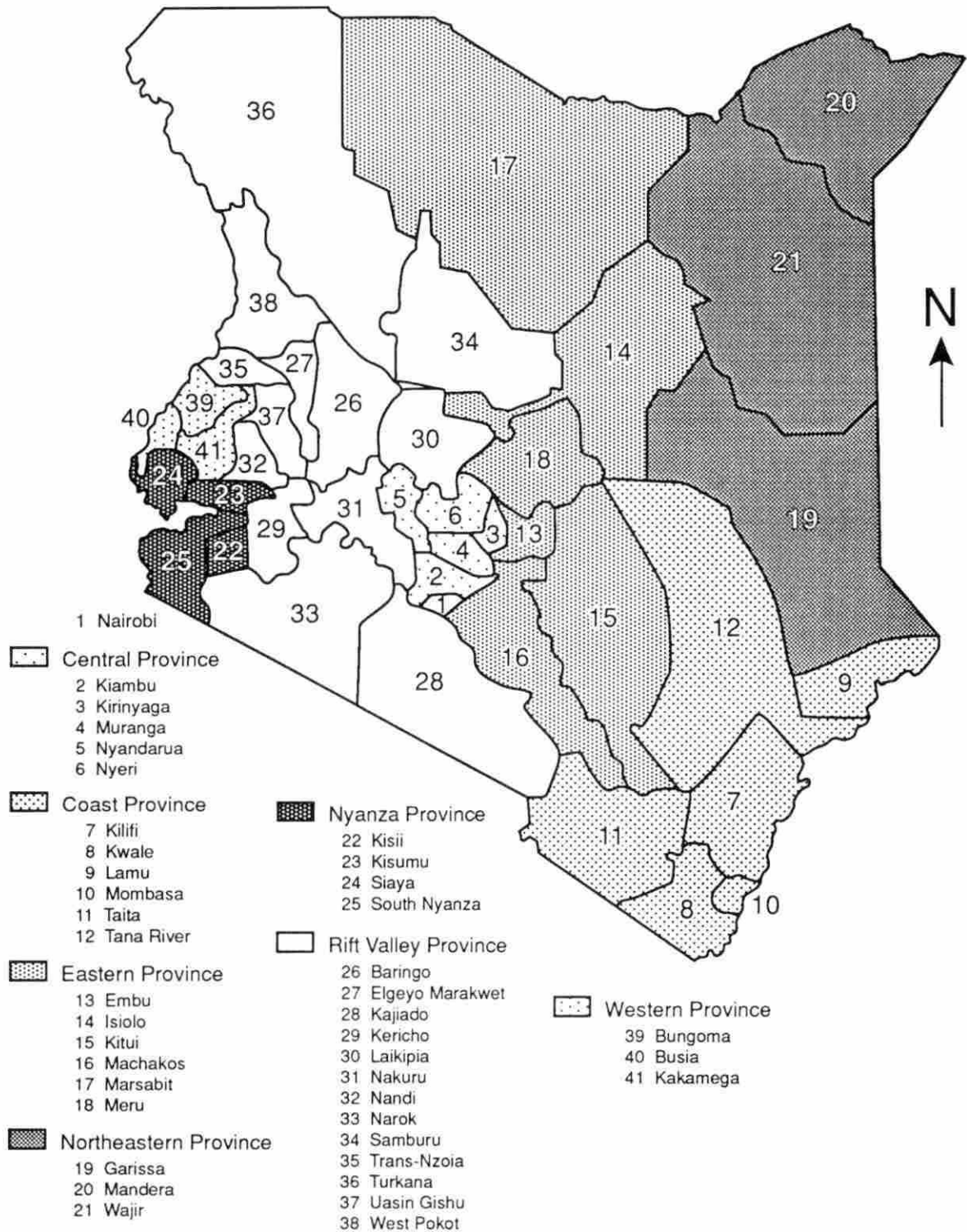


Figure 2.1 Provincial Map of Kenya

Source: National Research Council, 1992.

developing countries. Agriculture dominates, contributing about 30 percent of GDP (Table 2.1). The manufacturing (domestic small industries) and industrial (large production units such as tourism) sectors contribute an average of 12 percent and 20 percent, respectively, to GDP. Agriculture is the leading foreign exchange earner and the single largest employer.

Kenya has achieved reasonable growth in GDP since achieving independence. The relative contribution of the three sectors--agriculture, industry, and manufacturing--to GDP has remained unchanged. As Ricardo (1960) points out, growth and productivity in agriculture limit growth in nonagricultural sectors. In a healthy economy, the contribution of the agricultural sector to GDP would typically decline as the other sectors progressively expanded through market and factor contributions from the agricultural sector (Kuznets, 1965). As agriculture grows, it makes a market contribution by purchasing production items from the other sectors at home and abroad and a factor contribution by transferring resources such as labor to the other economic sectors. The cumulative growth rate of GNP between 1981 and 1990 is evidence that Kenya's economic progress has been declining in real terms (Table 2.2).

Kenya's economy is dependent on export earnings from the agricultural sector. This situation determines Kenya's financial condition. The export sector also determines the import level of essential agricultural inputs, and the ability of the country to meet external debt repayments. Export earnings growth in nominal terms between 1966 and 1980 averaged 12.8 percent annually, reflecting a steep rise in commodity prices (Rosen and Shapouri, 1989).

Table 2.1. Contribution of Kenya's agriculture, industry, and manufacturing sectors to GDP

Year	GDP			
	(million current US\$)	Agriculture (%)	Industry (%)	Manufacturing (%)
1960	330	35	18	11
1965	358	31	20	12
1970	573	33	20	12
1981	3,039	27	22	12
1982	3,515	28	21	11
1983	3,888	31	20	12
1984	4,448	31	19	11
1985	5,037	30	20	12
1986	5,874	31	20	13
1987	6,523	31	21	12
1988	7,470	33	20	12
1989	7,929	38	18	9
1990	8,404	33	22	13
1991	8,787	32	21	13

Source: *World Development Report*, Various issues.

Table 2.2. Kenya's GNP per capita and population

Year	GNP per Capita (US \$)	Population (million)	Period (years)	Growth of GNP per Capita
1981	420	17.4	1960-81	2.9
1982	390	18.1	1960-82	2.8
1983	340	18.9	1960-83	2.3
1984	310	19.6	1960-84	2.1
1985	290	20.4	1960-85	1.9
1986	300	21.2	1960-86	1.9
1987	330	22.1	1960-87	1.9
1988	340	22.9	1960-88	2.0
1989	360	23.5	1960-89	2.0
1990	370	24.2	1960-90	1.9

Source: *FAO Production and Trade Yearbook*, Various issues

Between 1980 and 1986 this growth had declined to -2.6 percent. Real growth for the periods 1966-80 and 1980-86 were 0.3 percent and -0.9 percent, respectively. Although the volume of exports expanded, low commodity prices had adverse effects on growth. Table 2.3 shows Kenya's index of export volume and the index for unit value (in US dollars) between 1966 and 1989. For the period 1966-80, the percentage annual growth of export volume was 3.44 percent. Growth then dropped to 0.26 percent between 1980 and 1986. The index for the unit value dropped drastically from an average of 10.11 percent for the period 1966-80 to -5.15 percent for the period 1980-89, a drop of about 150 percent.

Import growth for the period 1966-80 averaged 15.6 percent annually. Due to shortfalls in exports, this growth was reduced to -10.6 percent annually between 1980-86. Export share of GDP, which was 31 percent in 1965, declined to 27 percent in 1986. In 1990, Kenya tried to initiate export incentive schemes which provided access to inputs at international prices through manufacturing under the bond scheme and the exemption scheme (Kenya, *Weekly Review*, 1992). The traditional quantitative restrictions were removed and replaced by tariff protection in the import sector. The tariff system was expected to obtain efficiency in revenue collection and to reduce the level of effective protection by reducing the tariff bands from 25 to 10.

Sources of adverse economic trends

From 1965 through the 1970s, policies were outlined and strategies adopted that increased government investment in agriculture. The 1980s were a period of adjustment and

re-adjustment of strategies based on the outcomes of the strategies adopted earlier. This second period has been a difficult one.

Kenya experienced accelerated economic growth from 1963 until 1972. Agricultural productivity increased as new land was put into production. International prices for Kenya's chief export crops--coffee and tea--were favorable. The annual average growth rate in GDP of 6.7 percent, and GNP growth averaged 5 percent. Taking into account population growth of 3.6 percent during the same period still meant 3.1 percent per capita GNP growth. Three main factors contributing to this growth are related to agriculture: expansion of land area for cash crops, increased participation of small holders in production, and the introduction of high-yielding maize and wheat varieties. Emphasis on farm credit availability facilitated increased agricultural output.

Kenya's major economic growth problems began in 1973 when external and internal forces confronted the country, and growth has fluctuated considerably since. The first external force was the high price of oil in 1973. Kenya was listed by the World Bank Annual Report (1985) as one of thirty LDCs that was heavily affected by the rise in oil prices. Increased coffee productivity in Brazil and the collapse of world coffee prices necessitated repeated devaluation of the Kenya shilling (Ksh.) from Ksh. 7.33/US dollar in 1979 to Ksh. 13.79/US dollar by the end of 1983. This was followed by worldwide inflation and recession that greatly increased interest rates for external borrowing. Coffee and tea fetched low prices in world markets. The collapse of the East African Community--a regional trade agreement

Table 2.3. Index of export volume and unit value of Kenya's exports, 1966-86 (1980 = 100)

Year	Export Volume (%)	Unit Value (%)
1966	66	25.4
1967	63	25.4
1968	67	25.7
1969	80	26.0
1970	84	28.5
1971	64	27.4
1972	96	28.5
1973	112	33.5
1974	102	43.4
1975	97	48.6
1976	103	57.6
1977	107	82.7
1978	99	74.8
1979	97	82.5
1980	100	100.0
1981	102	89.9
1982	109	81.9
1983	118	80.6
1984	116	89.3
1985	93	77.3
1986	100	78.5
1987	102	77.1
1988	104	80.9
1989	103	83.4

Source: Rosen and Shapouri, 1989.

among Kenya, Uganda, and Tanzania--due to trade and political disagreements among the three countries eliminated the market for Kenya's manufactured goods.

Internal problems that persistently affected Kenya's economy were erratic weather, which resulted in fluctuations in agricultural output, and the decline in exports. Pricing and marketing of most cash crops were controlled by the government, and prices were often low,

thereby creating disincentives to producers. Marketing procedures were cumbersome and costly to the government and to farmers. Kenya's inflation rates were between 0 percent and 3 percent per year from 1966 through 1972 (Mwega and Killick, 1990). Between 1973 and 1986, however, inflation averaged 12 percent per year. After falling to 6 percent, the rate of inflation has risen to an average 27 percent in 1993.

Kenya's monetary policies had the strongest direct impact on domestic inflation and GNP growth. Mwega and Killick (1990) noted that the budget deficit always dominated monetary changes. It has been difficult for the authorities to manipulate domestic credit in the public sector, especially from nonbank financial institutions that substitute for bank credit. Policies aimed at reducing total lending by commercial banks are matched almost shilling-for-shilling by an increase in nonbank institutions.

Since 1963, Kenya's population has more than tripled. This increase has created pressure both on land resources and services. Population growth, which has been steadily over 3 percent per year has offset all or most of the gross productivity gains that have been made.

As these problems persisted, the government fell short of meeting economic commitments and the social demands of a fast-growing population. As a result, Kenya's dependence on foreign funds progressively grew. Although Kenya managed to reduce its deficit by a level equivalent to 3.7 percent of the GDP in 1991, the foreign debt stock stood at US \$7,014 million with arrears of US \$108 million (World Bank Development Report, 1992). The ratio of present value to nominal value of debt in 1991 was 77.3 percent.

Throughout 1992, Kenya's economy was in a deep slump. GDP growth declined to an unprecedented 0.4 percent, agricultural productivity was -4.8 percent, and inflation escalated to 27 percent.

Proposals for economic reforms

Since achieving independence, Kenya has clearly been on a downhill trend economically. Common features of such a trend include uneven, sometimes negative real per capital income growth, chronic deficits on external and internal fiscal accounts, and high inflation. Around 1989, Kenya lost good relationships with its bilateral donors, resulting in the freezing of disbursements of US \$350 million worth of economic aid. The strained relations were due to Kenya's failure to pursue structural and political adjustments (Kenya, Weekly Review, 1993). Enforcement of laws, respect for human rights, and firm action against corruption were lacking. Fiscal discipline and civil service reforms, improvements in efficiency and financial performance, accountability of public enterprises, and the establishment of an environment for growth of private sector were required adjustments.

Intense economic turmoil in 1991-93 forced Kenya to reform. Economic reforms focused on fiscal management and monetary control for reducing internal and external debt and the budget deficit. The government expected reduced expenditures, improved revenue collection, and improved fiscal discipline to stabilize the money supply. The tightened monetary policy showed positive results by pushing down the Treasury Bill tender rate from

73 percent in June 1993 to 49 percent by November 1993. The exchange rate dropped from Ksh. 82/US dollar in June 1993 to below Ksh. 73/US dollar by October 1993.

Of its the 205 public enterprises, Kenya was arranging to privatize 45 and liquidate 20. Key public enterprises continue to restructure. These adjustments are an attempt to improve efficiency in financial resource use. The main agricultural credit enterprises are expected to be more competitive. Liberalization toward a more free market approach and decreased government involvement in the economy are options that Kenya recognizes as important.

Economic events in Kenya have had direct impacts on the agricultural sector. The most immediate impacts have been the growing debt to finance agricultural producers who are not able to repay their debts and the inability of the government to maintain a consistent supply of farm inputs and services. The rising cost of imported agricultural inputs such as fertilizers and herbicides has made it increasingly difficult for small-scale farmers to adopt such inputs. Supplies of fertilizer and insecticides are restricted or interrupted. In addition, agricultural extension services have been cut because of budget constraints.

Other impacts on the agricultural sector include instability in production due to tremendous government involvement in agricultural activities through public enterprises. Public enterprises have often been favored on efficiency grounds; however, studies have shown that their mode of operation has been a hindrance to efficiency in the agricultural sector. The frequent financial deficits of public enterprises have been a great burden to the government and even more so to farmers. The non-export crop sector, which is the main

source of livelihood for a large rural population, has been neglected since independence was achieved in 1963. To some extent, the government has failed to understand the management and institutional innovations that are necessary for development in this sector.

The following section provides an overview of the agricultural sector and its contribution to economic development in Kenya.

The Agricultural Sector

Performance

In 1963, the agricultural sector contributed about 38 percent to GDP, 88 percent to employment, and 57 percent to export earnings. Three decades later, this sector contributed about 32 percent to GDP, 76.5 percent to employment, and 62 percent to export earnings (Table 2.4). Overall, agriculture's contribution to employment has declined, but at a slow pace. Its contributions to export earnings have been small and stagnant. The rate of growth in GDP and in agricultural productivity fluctuated widely over the period. The broad pattern of productivity of land and labor resources is seen in average per capita output presented in Figure 2.2. Average per capita output is commonly expressed as a ratio of per capita income from agriculture to total labor or land engaged in agricultural production. Figure 2.2 shows the per capita growth rate of land and labor, and the decline in the ratio of agricultural population to land. The decline in the land/labor ratio is not surprising considering population growth averaging 3.8 percent per year since 1963. Of greater concern is the rate

of growth of land per capita, which should be far higher than population growth if Kenya is to achieve notable improvements in economic growth.

Land potential

Land base and utilization

Kenya has a relatively small land base (Figure 2.3). Only 12 percent of its land is classified as having high agricultural potential. Over 70 percent of the land has low agricultural potential and about 9 percent is unusable for agricultural purposes.

Figure 2.3 and Table 2.5 show the classification of land area by agricultural potential. 5.048 million hectares are suitable for producing major export crops. Tsetse fly infestation limits livestock production, claiming about 7.56 million hectares (*FAO Production and Trade Yearbook*, Various issues).

Land redistribution and appropriation reflect the political and economic history of Kenya. Early agricultural legislation emphasized land reforms within the settlement areas evacuated by departing colonial settlers. These areas form the bulk of the high-potential lands where export crops thrive. By 1984, an estimated 60 percent of rural people cultivated the high-potential lands, 30 percent cultivated the medium- to low-potential areas, and 10 percent cultivated the dry rangeland (*FAO Production and Trade Yearbook*, Various issues).

The high-potential areas contain the majority of commercial farms, with lower population density than that found in the traditional areas in the Central province or in western Kenya. Because of increasing population pressure in the high-potential areas, land

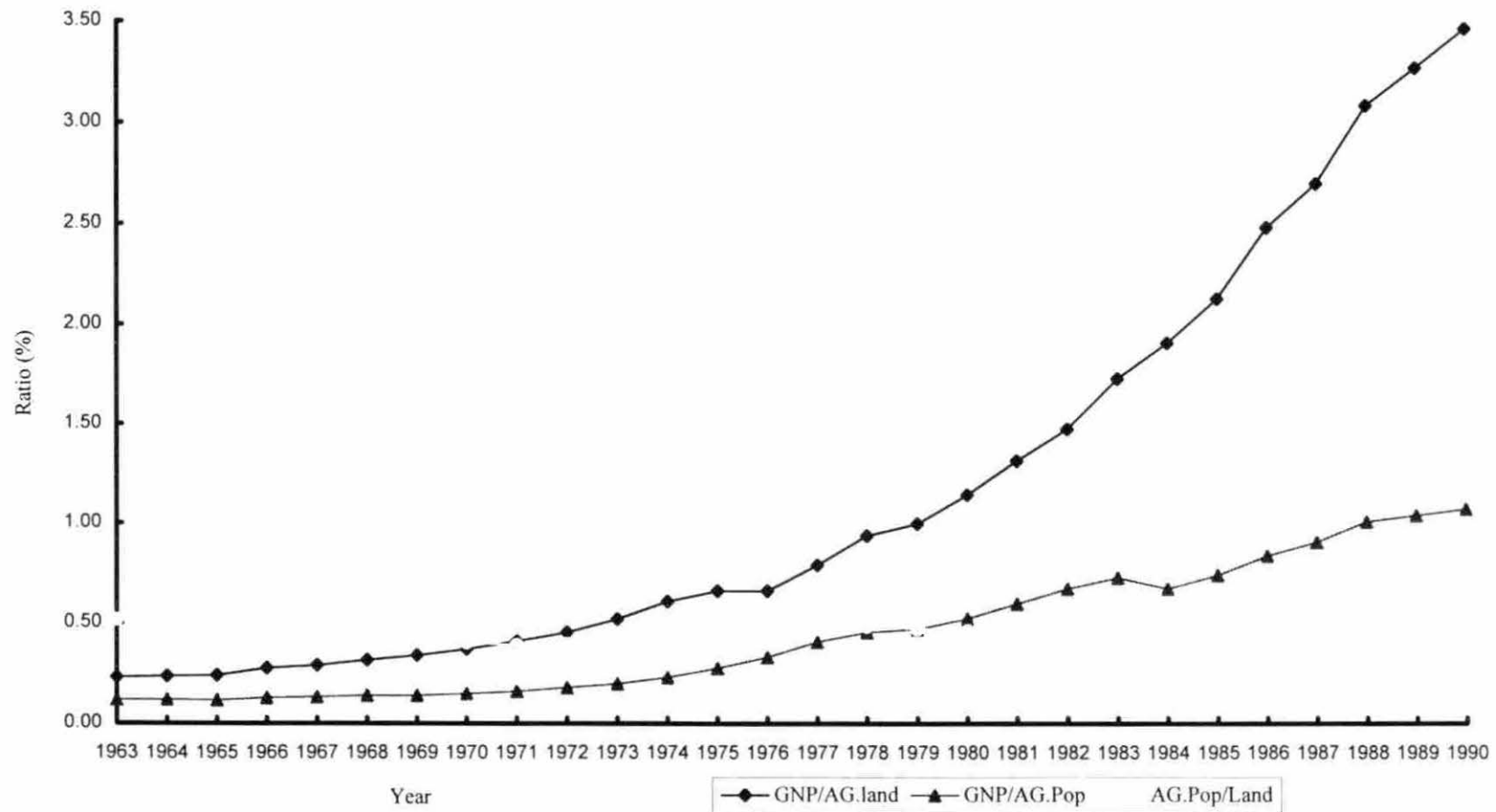


Figure 2.2. Kenya's per capita land and labor and agricultural population/land ratio, 1963-923

Table 2.4. Growth of Kenya's GNP and agricultural productivity, and the contribution of agriculture to employment and export earnings

Year	Growth Rate of GDP (%)	Growth Rate of Agricultural Production (%)	Contribution of Agriculture to Employment (%)	Exports from Agriculture (%)
1965-71	7.5	6.9	88.0	57
1972	16.1	7.7	84.8	61
1973	5.9	4.4	84.4	63
1974	2.1	-0.2	82.9	55
1975	0.8	4.6	82.9	52
1976	3.9	3.7	79.9	71
1977	9.4	9.5	79.5	69
1978	7.3	8.9	78.5	66
1979	3.9	-0.3	81.0	63
1980	4.8	0.9	77.6	49
1981	3.9	6.1	77.1	51
1982	1.7	11.2	76.5	57
1983	1.5	1.6	76.0	64
1984	3.9	-3.9	75.5	69
1985	7.1	3.7	79.1	69
1986	5.9	4.7	78.7	74
1987	6.0	3.8	78.2	70
1988	4.6	4.4	77.8	69
1989	4.6	3.9	77.4	67
1990	4.3	3.4	77.0	68
1991	3.9	2.2	76.5	62
1992	3.2	-4.8	76.1	61

Source: *FAO Production and Trade Yearbook*, Various issues.

fragmentation has reached an alarming level throughout the country. The situation is worse in the traditional areas, where lineal laws encourage land inheritances. Lineal law guarantees every adult male child a proportional share of the family land. Table 2.6 shows trends in farm distribution in selected years. The number of farms with less than 0.5 hectares

increased fourfold between 1970 and 1978. Similarly, the number of farms with less than one hectare increased threefold.

At least twenty-five economically important species of crops, which can be divided into sixty-four crop types, and six livestock types are produced in Kenya (Kassam et al., 1991). The main cash crops include cereal crops (maize and wheat), export crops (tea, coffee, sisal, and pyrethrum), industrial crops (cotton, sugar, and tobacco), and horticultural crops (vegetables and flowers).

Livestock types include dairy and beef cattle, pigs, poultry, small ruminants, and bees. Maize and horticultural crops are widely grown as staple food crops. Export and industrial crops are grown in suitable ecological regions, as shown in Figure 2.3.

Commercial livestock production, especially dairy and highbred beef, is prevalent within the high rainfall areas. Local traditional beef, dairy, and small ruminant production is widespread in the low lands and the Savannah grassland.

Land tenure patterns

Agricultural production is divided into large-scale farms and small-scale farms. Large-scale farms are officially defined as land holdings of more than 50 hectares, while small-scale farms are defined as 50 hectares or less. This classification varies, depending on the potential of the land (above 20 hectares, or equal to and below, respectively with majority of small-scale commercial farms in high potential areas). In 1973, there were 3,500 holdings that averaged over 800 hectares and more than 600,000 holdings that averaged less than two hectares (*World Bank Annual Report*, 1973).

Table 2.5. Classification of Kenya's land area by agricultural potential

Classification	Land Area (1,000 hectares)	Percentage of Total
High Potential	6,785	11.9
Medium Potential	3,157	5.5
Low Potential	42,105	74.0
Unusable	4,867	8.6
Total	56,914	100

Source: *International Labor Organization*, 1985.

Table 2.6. Distribution of rural household farms by size, in Kenya

1970 ^a		1978 ^a		1993 ^b	
(hectares)	(%)	(hectares)	(%)	(hectares)	(%)
Below 0.5	11.7	Below 0.5	46.8	Below 1.0	27
0.5-0.99	15.5	0.5-0.9	20.1	1.0-2.5	29
1.0-1.9	24.6	1.0-1.9	15.8	2.6-3.5	9
2.0-2.9	16.4	2.0-2.9	7.3	3.6-5.0	8
3.0-4.9	13.3	3.0-3.9	3.2	5.1-10.0	11
5.0-9.9	11.3	4.0-4.9	1.6	10.1-20.0	7
Above 10.0	7.0	5.0-7.9	2.8	20.1-35.0	2
		Over 8.0	2.4	Over 35.0	7

^a Lele and Agarwa, 1989.

^b Calculated from a sample of 1993 AFC borrowers. This column represents only the distribution of holdings for those borrowing from the institution.

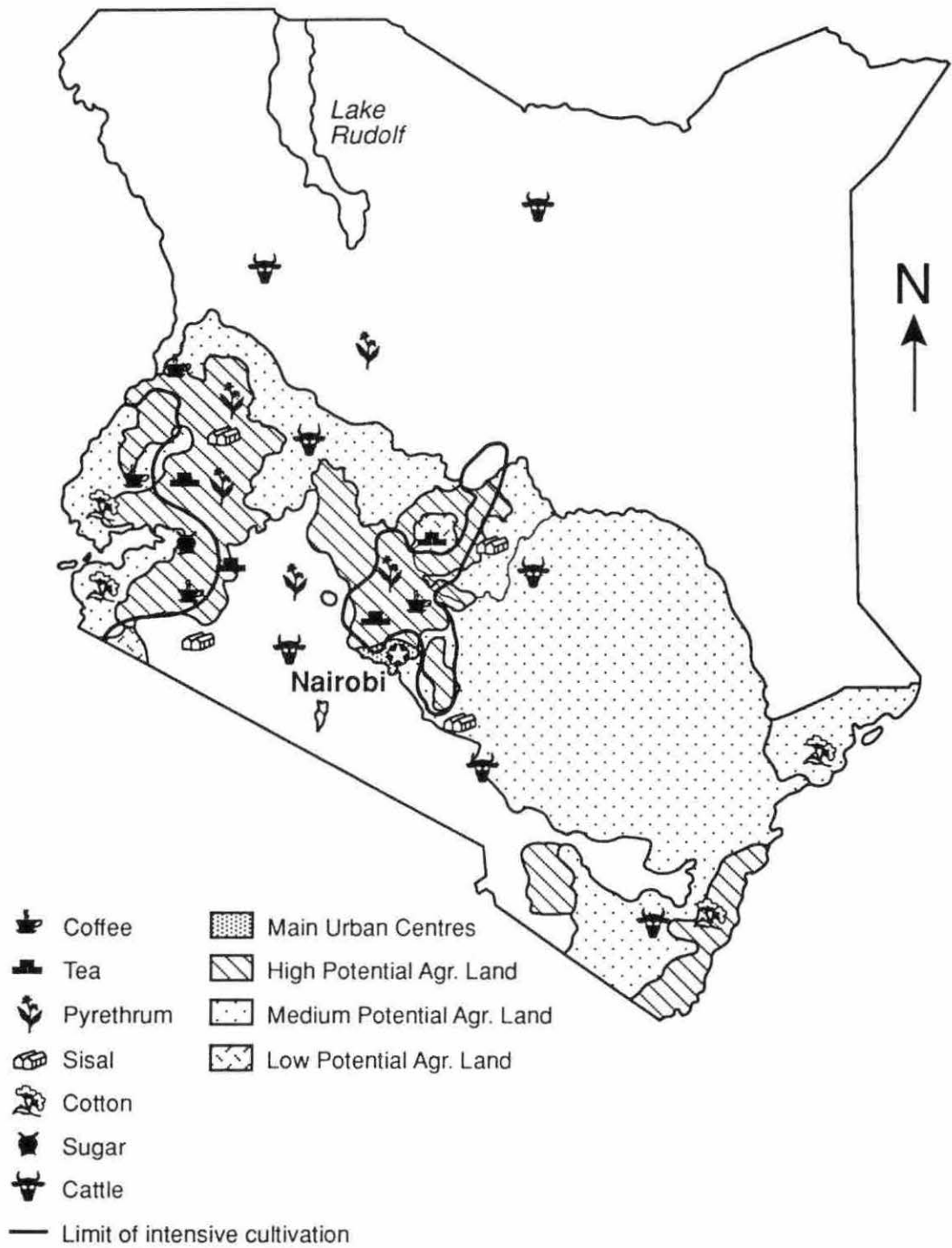


Figure 2.2 Potentiality and Cash Crop Regions of Kenya

The farm sector can be grouped into four main categories: large-scale commercial farms, small-scale commercial farms, traditional farms, and pastoral farms. Traditional and pastoral farms are considered subsistence farms, and agricultural practices are closely related to ethnic economic traits (e.g., Bantu cultivators, Hermitic pastorals, Cultic nomads, Dorobo hunters, and Bujun fishermen).

Large-scale commercial farms are capital-intensive and rely heavily on mechanized operations and modern inputs. They can be mixed or specialized. Dairy, beef, and sheep farming are common livestock enterprises. The major crops include wheat, barley, oats, maize, tea, coffee, sunflower, fruits, and sugarcane.

Small-scale commercial farms are numerous, and can be highly or moderately capital-intensive. They are labor-intensive and generally depend on oxen; only a few use mechanization. Farm labor consists of both family and hired workers, but hired labor is common during peak labor periods, such as weeding and harvesting. Very small farms produce labor-intensive products such as vegetables, poultry, and pyrethrum.

Traditional farms are matrilineal and are subject to subdivision with each subsequent generation. They are often small in size and located in the high-potential areas, which have high population densities. Farm size becomes progressively larger toward the pastoral and arid lands. Oxen and donkey are the main forms of traction. Occasionally tractor service or labor is hired. These farm enterprises are diversified, but traditional staple foods are emphasized and any surplus is marketed in the local open markets or directly from the farm.

Crops include English potatoes, sweet potatoes, cassava, groundnut, rice, sorghum, millet, maize, pulses, and fruits.

Traditional farm families have little incentive to change their subsistence and ethnic-oriented lifestyles and occupations. Normally, they have a high propensity to invest in nonagricultural ventures (e.g., retail shops) as a way of diversifying income sources. There is a distinct division of labor based on gender. Men till the land and herd livestock. Women are more involved in producing traditional food crops. They plant, weed, harvest, milk, and herd young stock.

Pastoral farms are mainly communal, and shifting livestock grazing is practiced extensively. In most cases, these farms are matrilineal and characterized by individual stock ownership and communal land use. Diversified herd type and separation of herds into several locations is a survival strategy to guard against weather hazards. Upgrading of livestock by cross-breeding the local herd with exotic breeds is practiced. Pastoral livestock include camels, cattle, goats, and sheep. Increasing pressure on grazing land as a result of the commercialization of ranches, encroachment of crop cultivators, and allocation of pastoral land to tourist game parks has precipitated pasture degradation.

Land control

Farmland is traditionally a highly valued asset. The farmers tend to have strong ethnic laws that govern its use. The decision to obtain credit for family farms may require the farmer to seek authority from other family members. In high-potential settlement areas, the pressure to consult family is less pronounced.

Some pastoral areas have yet to be demarcated and are group-owned for the most part. A single clan may occupy different, separated pieces of group farms. Credit provision on group-owned farms is discouraged. If credit is provided to the group, the group farm is usually offered as collateral, but the loan funds are split among individuals. Each group member contributes a specific level of funds toward group facilities such as cattle dips and watering troughs. The balance of credit is used by the individual borrower for restocking and veterinary services. Default rates within the pastoral communities are high and the realization of collateral is impractical. The impact of credit in group-owned farms is often difficult to measure because group facilities are difficult to manage and maintain beyond the life of the loan.

High-potential settlement areas are owned by individuals across all ethnic groups. The majority of these farms are held by elite, rich farmers. Credit decisions are made unilaterally by the individual household. These farmers hold the highest share of the farm credit and dominate in the production of marketed produce such as coffee, tea, maize, and sugarcane.

Producer pricing policies

Kenya has maintained an efficient marketing system for export crops, but an inefficient one for food crops and livestock products (Bevan, Collier and Gunnie, 1993). For example, the coffee board of Kenya acts as an auctioneer for coffee producers. It sells coffee at world prices and charges a commission for doing so. Thus, the producer's price follows

world prices. Coffee producers have received as high as 90 percent of the price received by the marketing board. Surprisingly, the government has not been keen on taxing export producers. Evidently, this has been a source of motivation for export producers.

Production of food crops, especially of maize and wheat, have faced a totally different situation. As Bevan, Collier and Gunning (1993) observed, the maize and produce marketing board has monopolized interdistrict marketing of these two important food crops. The government announces the price at which the board buys from farmers and sells to consumers. Intradistrict marketing, on the other hand, is somewhat free. This situation is similar for milk and other minor produce. Whenever the government marketing system is not able to handle the produce (e.g., a bumper season), the announced prices do not act as a floor or a ceiling for the produce in intradistrict trade. These small-scale producers experience large price differentials between regions.

The critical problem with government marketing controls is the uncertainty they create among efficient producers. The government system often has no efficient way of handling produce or promptly paying producers. Farmers in surplus areas are not sure of when or if the board will buy their produce, and when it will pay if it does. Farmers therefore engage in a wide range of enterprises including off-farm businesses to protect themselves against marketing and price uncertainties.

Reform issues

The performance of Kenya's agricultural sector could be better. In the last two decades, both internal and external factors have caused the sector's unsatisfactory performance. The most damaging and de-motivating factors to producers are the pricing system of agricultural inputs and products and heavy government involvement in marketing, especially for cash and food crops. These problems are addressed in current structural reforms. Beef prices were decontrolled in 1987, and the price of beef has more than tripled. Three key parastatals, the South Nyanza Sugar Company and the National Cereals and Produce Board were reorganized, and maize marketing was partially deregulated. The government also adopted measures that improved marketing and pricing efficiency of fertilizers by increasing the number of licensed importers from 15 to 20 in 1989. By 1990, the government had fully decontrolled fertilizer prices on the domestic market.

Lele (1989) argues that increased efficiency will not lead to equitable growth if production factors are not distributed equitably or if farmers have unequal ability to undertake and manage risk. Risk and loss evaluation require the ability of the farmer to attach monetary value to all factors of production. The farmer's time and labor are as important as cash, and livestock herd's must be viewed in terms of quality and calf turnover. Resources have shrunk, and production risks and efficiencies in production factor use are becoming increasingly important.

No single initiative or policy will be sufficient to deal with Kenya's economic problems. A more comprehensive policy that mutually supports all aspects of development

is necessary. Accompanying institutional changes that can revitalize Kenya's agricultural sector are important aspects in the development process. The description of Kenya's farm credit institutions in the following section emphasizes this point.

Kenya's Agricultural Credit

Agricultural credit has played an important role in the development of Kenya's agricultural sector since independence in 1963. The oldest farm credit sources are commercial banks, merchant suppliers, and quasi-government agencies. Today, Kenya has an array of well-established credit institutions serving agriculture either through government directives or as government-sponsored agencies, member-owned cooperative organizations, and private independent lenders.

Commercial banks account for 48 percent of total credit. AFC, the single largest government-sponsored specialized credit institution, accounts for 20 percent. Combined AFC and government for funding of the seasonal crops credit scheme (SCCS) accounted for 14 percent of total credit to the agricultural sector until 1984 (after 1984, AFC took over financing of SCCS instead of operating it on commission). Other credit institutions such as cooperatives and nonbank sources account for 18 percent of total credit to agriculture (Agricultural Finance Corporation of Kenya, 1992).

At the time of independence, farmers' credit requirements were for long-term loans for land purchase and capital-intensive investments such as bush clearing, removal of tree

stumps, fencing, and water facilities. The government had organized settlement loans that were relatively long term, mainly for land purchase within the settlement areas. AFC provided supplementary long-, medium-, and short-term loans for various agricultural uses.

AFC later inherited the defunct Guaranteed Minimum Return (GMR) of 1942-78, a government-sponsored credit for large- and medium-scale maize and wheat farmers. As the name suggests, GMR had an insurance system that compensated natural losses. Various credit schemes have since been introduced by the government. In the 1970s, two loan schemes were introduced: the Smallholder Production Services and Credit Project (SPSCP) and the Integrated Agricultural Development Project (IADP). The SPSCP was a precursor of the IADP, financed by USAID and administered by AFC. The New Seasonal Crop Credit (NSCS), now referred to as SCCS, replaced the GMR, and had similar objectives of food sufficiency. Unlike GMR, SCCS has no insurance coverage. The Cooperative Production Credit (CPC), which was started in 1972, caters mainly to producers of cash crops such as coffee and tea. The Smallholder Coffee Improvement Project (SCIP), started in 1979, helps small-scale coffee farmers rehabilitate coffee plantations where quality has deteriorated. AFC administers a more general production credit, which supplements all credit sources.

Besides the formal credit channels, traditional informal credit systems for rural communities exist. These systems include cash exchange between members of the family and/or clan and friends involving credit in cash or kind. In-kind credit may include family members, friends, and church groups who assist with the field operations of weeding and

harvesting. Local merchants, shopkeepers, and community leaders also provide local credit in various forms. No records exist as to the total level of the informal credit used in Kenya.

In recent years, AFC has dominated the long- and medium-term loan markets, and other institutions have tended to supply shorter-term loans. The type of credit is determined by the purpose of the loan. Land purchase loans, although now being phased out, carry the longest duration. Medium- and short-term loans are used for working capital and seasonal crop production. Table 2.7 and Figure 2.4 show that large-scale farm enterprises are leading in borrowing. Agricultural board borrowing peaked around 1983 and dropped to the same levels as small-scale and cooperative enterprises by 1990. Figure 2.5 also shows AFC lending to small-scale, large-scale, and SCCS projects between 1980 and 1992. The largest amount of money lent by AFC for long- and medium-term loans is to large-scale borrowers. Most AFC short-term loans are used by SCCS.

Credit allocation among the small-scale and large-scale sectors is shown in Table 2.8. Of the credit allocated in 1972, 41 percent was for small farms and 59 percent was for large farms (World Bank, 1973). The emphasis on the small farm sector put the two sectors in tight competition for virtually all resources and services. The distribution of loans between small and large farms changed dramatically by 1989; 91 percent of farms receiving credit were small, while 9 percent were large. Short-term loans claimed 50 percent of all funds advanced to small-scale farmers. More than 70 percent of loans to large farms were long term. Although small-scale farmers received the bulk of the credit, large farms benefited more from the credit because they held much larger average loan sizes. The AFC average

Table 2.7. Distribution of outstanding commercial bank agricultural loans in Kenya, by type of borrower

Year	Value of Loans (million Ksh.)				Total
	Small-scale ^a	Large Scale ^b	Cooperatives	Agricultural-Boards ^c	
1974	103.80	235.30	62.80	54.70	456.60
1975	167.00	363.30	94.20	88.70	713.20
1976	243.50	432.20	85.30	152.10	913.10
1977	307.50	517.40	197.90	330.10	1,352.90
1978	302.50	732.50	353.90	174.30	1,563.20
1979	317.50	986.00	399.00	161.70	1,864.20
1980	380.30	1,053.70	432.30	211.90	2,078.20
1981	499.70	1,008.90	462.40	335.40	2,306.40
1982	559.20	1,151.10	436.10	674.90	2,821.30
1983	594.30	1,210.00	592.80	1,414.80	3,811.90
1984	700.60	1,268.30	654.50	1,013.10	3,636.50
1985	805.00	1,676.60	603.90	1,253.20	4,338.70
1986	922.90	1,787.70	595.20	1,270.40	4,576.20
1987	940.00	1,881.70	1,204.90	949.80	4,976.40
1988	1,080.90	2,677.10	1,321.90	1,098.70	6,178.60
1989	1,072.00	3,237.90	1,384.20	1,075.50	6,769.60
1990	1,178.80	3,041.50	1,246.70	1,368.00	6,835.00

Source: Central Bank of Kenya, 1990.

^a Small-scale farm enterprises include individual farms, groups (not cooperative societies), and companies

with farms of less than 50 hectares.

^b Large-scale farm enterprises include individuals farmers, groups of farmers (not cooperative societies), and companies with farms of more than 50 hectares.

^c Agricultural Boards include such statutory institutions as the Agricultural Development Corporation (ADC), Pyrethrum Marketing Board, Kenya Tea Development Authority (KTDA), Cotton Lint and Marketing Board, National Irrigation Board, and Lands Limited.

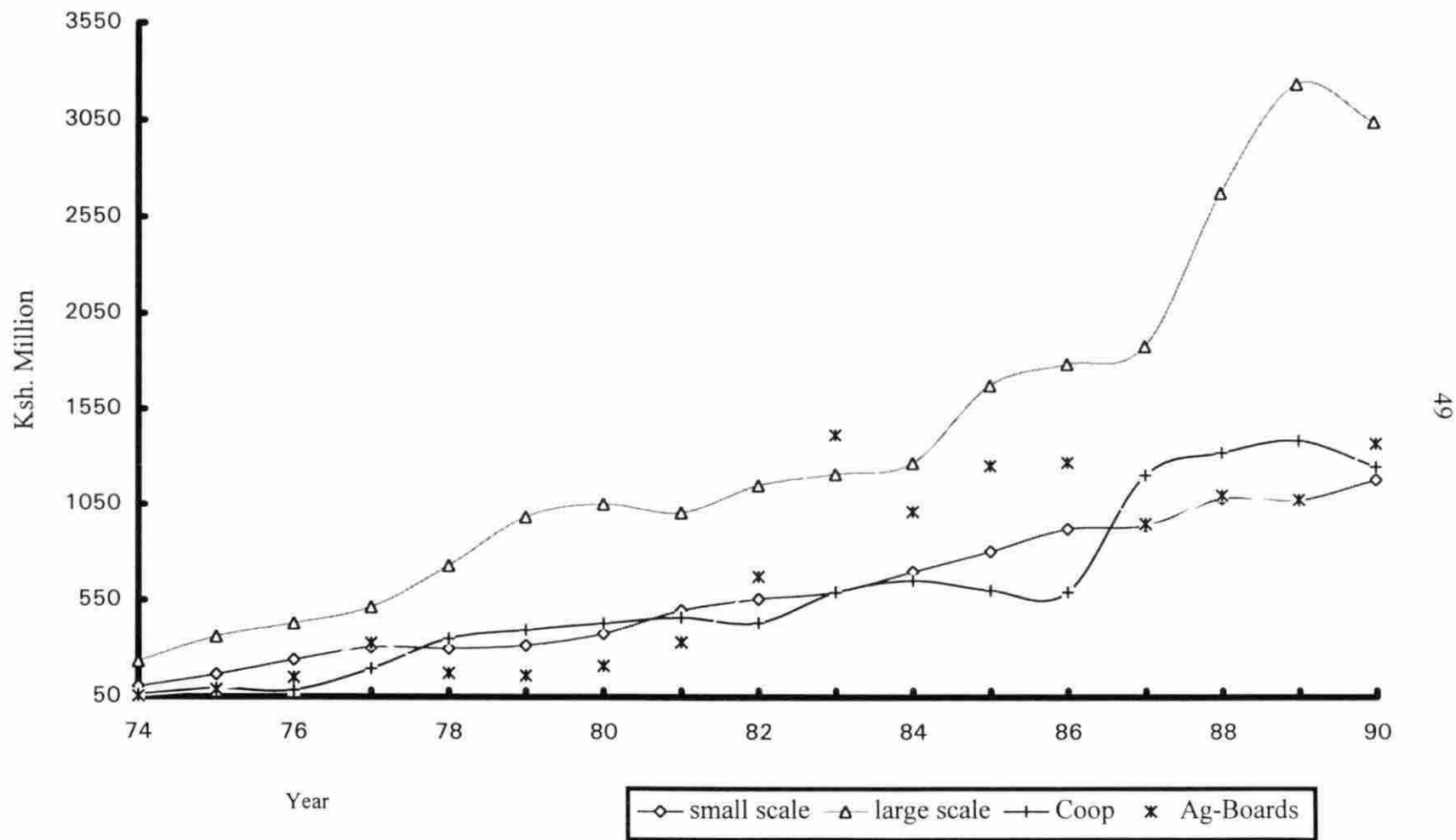


Figure 2.4. Trends in commercial bank loans to agriculture in Kenya by loan type

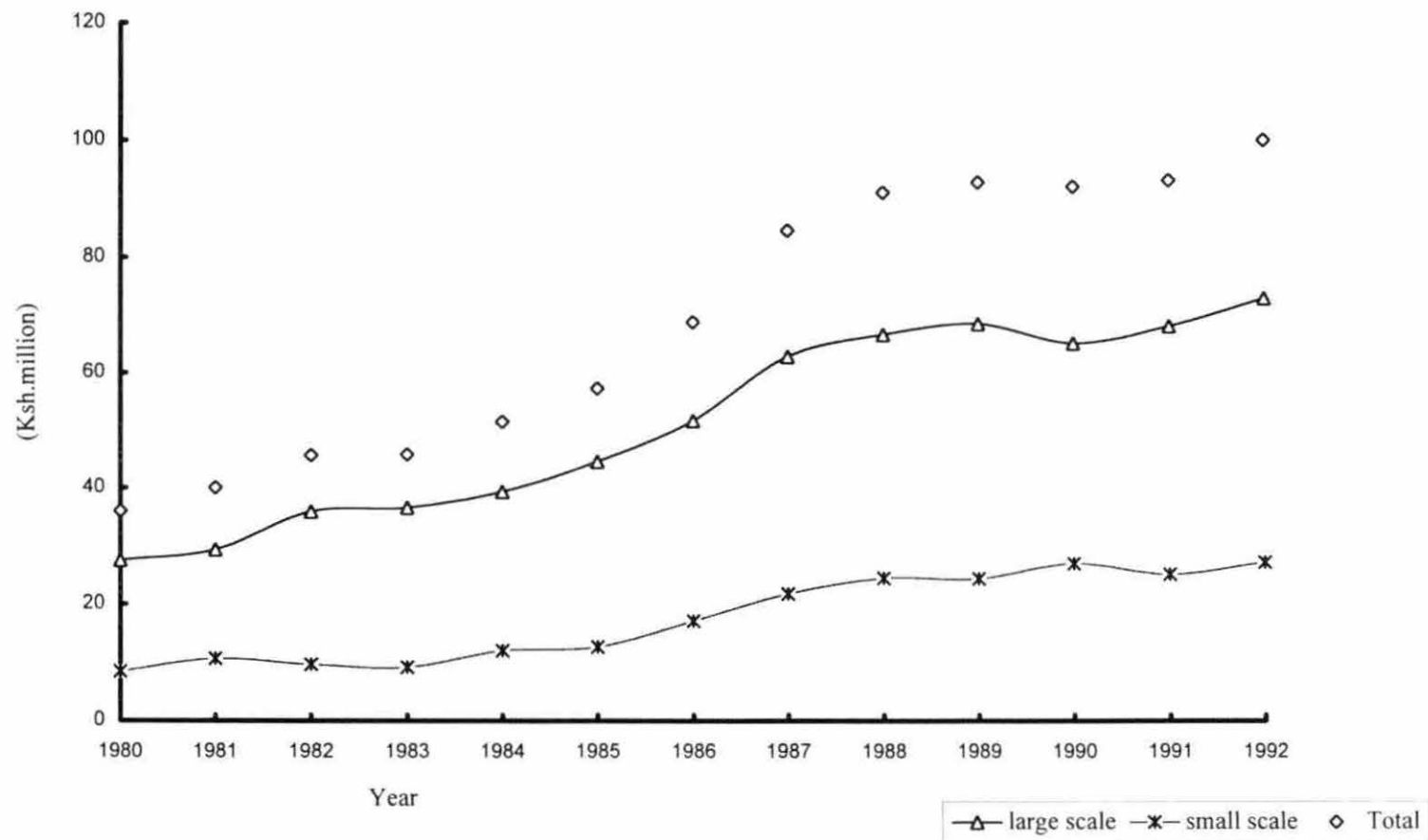


Figure 2.5. Trends in AFC lending by loan type, 1980-90

Table 2.8. Estimated agricultural credit provided to the small-scale and large-scale farm subsectors

Fiscal Year	Total Credit to Small Farms (%)	Total Credit to Large Farms (%)
1972/73	41	59
1980/81	36	64
1981/82	62	38
1982/83	45	55
1983/84	63	37
1984/85	72	28
1985/86	91	9

Calculated by author from World Bank, 1973, and Kenya Bureau of Statistics, 1990.

loan size for large-scale farmers was eight times that for small farms in 1980 and three times that for small farms by 1992.

Realizing the increasingly competing credit needs of Kenya's small and large farm sectors, the government instituted several measures aimed at expanding credit to small-scale farmers. Currently, commercial banks are required to lend at least 17 percent of their net deposits to agricultural enterprises, and nonbank financial institutions are required to lend at least 10 percent. Although the requirement does not specify the allocation of the credit between small and large farms, it forces institutions to meet a certain percentage credit requirement.

In 1991, interest rates for commercial banks and nonbank institutions were decontrolled for virtually all loans to encourage these institutions to lend at competitive rates determined by the market. The government also made amendments regarding SCCS by

making AFC the principal lender beginning in 1985. For AFC, no interest rate decontrols were effected. The implication of these changes was an influx of borrowers demanding AFC's relatively inexpensive credit. Strengthening financial support of existing marketing boards to improve short-term credit to producers has also been part of the government's credit strategies.

The Agricultural Finance Corporation (AFC)

AFC is the credit agency for agricultural development within Kenya's Ministry of Agriculture. AFC was established under Kenya's Agricultural Credit Act of 1963. Under the AFC Act of 1969, AFC was reconstituted and empowered to become the primary agricultural credit institution in Kenya. AFC took over the Land and Agricultural Bank and the GMR loan scheme, which had been established to serve the colonial. AFC it is thus a specialized, nondepository institution, and is exempted from the Companies Act and the Banking Act.

The data for 1980 through 1992 and information used for the analysis of AFC operations and performance was obtained from AFC management on (1) the loan procedures manual, (2) the number and value of direct loans, by type, to farmers and staff, (3) statement of sources and uses of funds, (4) balance sheet statements, (5) profit and loss account statements, (6) operating costs, (7) reports on interest rates AFC is charged by donors and the government, and the interest rates AFC charges borrowers, and (8) reports on loan arrears and loan repayment, by loan type. The analysis of AFC operations, objectives, and

performance is intended to provide a historical background on how AFC has evolved to be Kenya's main agricultural lender. Areas of difficulties in AFC operations are analyzed in order to trace root sources of loan losses. AFC is aware of its increasing exposure to default risk; however, measures introduced in the past to mitigate loan losses have achieved little success.

Policy objectives and organizational structure

Historically, AFC was established to assist in implementing agricultural development policies by providing credit and farm services. Under the AFC Act of 1969, the objective of AFC is defined as assisting in the development of agriculture and agricultural industries by making loans to farmers, cooperative societies, incorporated group representatives, private companies and public bodies, local authorities, and other persons engaged in agriculture or agricultural industries.

AFC headquarters are in Nairobi, Kenya's capital city. AFC has two regional offices, in western Kenya and eastern Kenya, 49 branches, five sub-branches, and 1,770 staff members (Agricultural Finance Corporation of Kenya, 1992). The administration consists of nine board members, a managing director, and the managing director's staff. The board is appointed by the Head of State, to act as the AFC representative within the framework of laws established by the state. The board is therefore the policymaking body of AFC.

The region, area, and branch office locations follow district administrative boundaries. The branch office is the lowest administrative unit of AFC. At this level, AFC

staff carry out loan activities within a specified area and have direct contact with borrowers. Each branch office is directed by an area manager, who is in turn directed by a regional manager.

Sources of loanable funds

The bulk of AFC funding comes from external loans and grants and government loans. Part of the funds are obtained from AFC's own accumulated general reserves and revolving funds. Tables 2.9 and 2.10 show AFC capital inflow and outstanding moneys owed to government and other donors. Usually, the funds are soft loans or grants extended to the Kenyan government from international agencies. Grants normally provide development assistance to rural communities. In 1989, AFC owed the government Ksh. 245.2 million, which represented 88 percent of AFC capital.

Credit terms and procedures

AFC's primary economic function is to supply reliable low-cost credit to small-scale farmers. The liberal branching of AFC into rural areas is a deliberate attempt to provide rural communities with access to AFC loans. Farmers in certain parts of the country have not perceived their farms as business entities. AFC officials are thus expected to make such farmers aware of the services AFC offers and how the farmers could use the services for commercial farming.

AFC loans are broadly classified as the AFC Principal Scheme (AFCPS) for general development and farm production loans and SCCS loans for maize and wheat production.

Table 2.9. Funds to AFC from external sources, 1980-92 (million Ksh.)

Year	Seasonal	Grants	Irredeemable Loans	Redeemable Loans
	Crop Credit Scheme			
1980	0.0	41.20	0.15	108.51
1981	0.0	1.21	0.21	63.63
1982	0.0	0.64	3.21	58.69
1983	0.0	0.83	0.0	8.00
1984	0.0	8.83	0.0	84.66
1985	60.0	13.10	0.0	250.41
1986	0.0	14.87	0.0	235.14
1987	0.0	1.26	0.0	52.66
1988	0.0	0.0	0.0	43.10
1989	0.0	0.0	0.0	56.00
1990	0.0	0.0	0.0	0.0
1991	0.0	0.0	0.0	0.0
1992	0.0	0.0	0.0	0.0

Source: AFC audited annual reports, various years.

Note: 0.0 means that AFC did not obtain any external funds during the year. The major funds under redeemable loans are for the Rural Service Design Project (Credit VI), started in 1987.

Table 2.10. AFC debt to the Kenyan government as of June 1993

Source of Funds	Million Ksh.
Irredeemable Interest Loans (Government of Kenya)	8.0
Redeemable Loans (Government of Kenya)	32.4
GMR/SCCS Loans (CSFC)	108.6
Irredeemable Loans (External Donors)	20.4
Redeemable Loans (External Donors)	75.8
Total	245.2

Source: AFC special report on restructuring, 1993.

FCPS is further classified into two major categories by loan size: large-scale loans between Ksh. 50,001 and Ksh. 2 million, and small-scale loans that are typically below Ksh. 50,000. The loans are also sub-categorized by loan duration: short term (less than three years), medium term (three years to less than seven years), and long term (seven years to thirty years).

AFC interest rates are set periodically by the government. Although AFC interest rates vary by loan scheme, they are always below market rates. These lower rates make AFC the least-cost formal agricultural lender, which makes AFC loan demand remain far above what it can supply. For AFCPS, interest rates are adjusted about once a decade. SCCS interest rates are adjusted as frequently as every two to three years. Table 2.11 shows AFC interest rates for the period 1980-92. Because most AFC loans are long term, increasing inflation rates translate into negative real interest rates, which also encourage use of credit.

The AFC system of assessing loan eligibility is based on internal appraisal reports on a proposed project. The farmer's financial and operating information is analyzed by an AFC loan officer to ascertain the applicant's repayment ability. The traditional five credit factors are usually applied: character, financial condition, equity contribution, repayment capacity, and collateral position. The AFC loan assessment philosophy is stated in the 1987 operational manual: "A loan is collected at the time of making it." This philosophy implies that it is more important to accurately predict the borrower's repayment ability at the time of loan making than to correct mistakes later. The ability of a loan officer to make an accurate loan decision depends on well he or she knows the ability and the willingness of the borrower

to repay debts. AFC stresses equitable treatment of borrowers in loan assessment to maintain borrower loyalty and confidence in the corporation.

Generally, AFC loans have two to sixteen special condition provision in the loan agreement, depending on the loan purpose. For example, small ruminant loans have two

Table 2.11. AFC interest rates for borrowing and lending, by loan type, and inflation rates, 1980-92

Year	Average ^a Interest Rates at which AFC Borrows	Interest Rates ^b at which AFC Lends to Farmers	Inflation Rates	Interest Rates AFC Charges for Development Loans	Interest Rates AFC Charges for Working Capital	Interest Rates AFC Charges for SCCS ^c
1980	3.4	10.3	11.3	10.0	10	11.0
1981	3.2	12.3	24.8	12.0	13	12.0
1982	3.4	13.0	18.3	12.0	13	14.0
1983	3.7	13.0	10.1	12.0	13	14.0
1984	4.0	13.0	11.1	12.0	13	14.0
1985	3.9	13.0	11.4	12.0	13	14.0
1986	6.0	13.0	5.6	12.0	13	14.0
1987	8.2	13.0	7.6	12.0	13	14.0
1988	7.6	13.0	10.7	12.0	13	14.0
1989	7.6	13.0	15.6	12.0	13	14.0
1990	7.7	13.0	19.8	12.0	13	14.0
1991	7.8	14.0	27.0	12.0	13	14.0
1992	8.1	14.0	24.0	12.0	13	17.0

Source: Agricultural Finance Corporation of Kenya, 1993.

^a Interest rates at which AFC obtains credit from the government.

^b Average interest rates at which AFC lends to farmers. The interest rates for lending then vary within the schemes. Working capital loans are revolving loan funds repayable within one to three years.

^c Seasonal crop credit scheme.

stated conditions, dairy loans have six, bore-hole loans (drilling of water wells) have five, permanent crops have eight, farmhouses have thirteen, and lifting of bank mortgages (refinancing of bank loans) have sixteen. Fulfillment of these conditions may be required as early as loan approval time or as disbursements are in progress.

In 1986, AFC decentralized certain procedures to improve the accountability and efficiency of its officers. Among the changes was the loan approval authorization level. AFC now has four levels of loan approval depending on the type of loan scheme. Table 2.12 shows these authorization levels.

Table 2.12. AFC loan authorization level

Authorizing Officer	AFC Principal Schemes (Ksh.)	Seasonal Crop Credit scheme (Ksh.)
Branch Manager	Under 50,000	Under 250,000
Regional Manager	Over 50,000 up to 100,000	Over 250,000 up to 500,000
Managing Director	Over 100,000 up to 200,000	Over 500,000
AFC Board		To ratify in the next board meeting all loans over 500,000

Source: *AFC Operational Manual*, 1987.

Loan disbursement authority is shared among the branch manager, regional manager, and managing director. As shown in Table 2.12, the branch manager authorizes loan payments below Ksh. 50,000 for any principal loan scheme, and the managing director authorizes amounts above Ksh. 100,000. AFC loans are, in most cases, disbursed in kind. Once the loan is approved, the borrower obtains a letter of authority to incur expenditure (AIE). The AIE is presented to the supplier of loan items, who issues an invoice to AFC against the borrower's account. Theoretically, the borrower should obtain the items as soon as the invoice is drawn, but in practice, the supplier may wait until the invoice is paid by AFC before releasing the items to the farmer. Most suppliers hold the view that the AFC payment process is slow. They are not willing to supply as expected due to inventory and financial implications.

To solve this problem, in 1987 the World Bank initiated the Rural Service Design Project (RSDP) (namely, Credit IV under the Smallholder Lending Program), to strengthen the AFC credit delivery system. In 1990 and 1991, two sets of evaluations assessed the performance of participating branches. Determining efficiency of lending through speedy loan processing was one objective of the evaluations. It was reported that it took AFC 102 days and 105 days in 1990 and 1991, respectively, to process loans from the date the application is purchased by the farmer to the date the first loan disbursement draft is released. Reasons for the delays included the time taken by the borrower to (1) register collateral, (2) fulfill special loan conditions (the more special conditions a borrower has to fulfill, the longer it takes to complete a credit transaction), and (3) present invoices for processing.

The second set of performance evaluations, started in 1988, showed marked improvements in credit management practices, particularly loan documentation and disbursement. According to the evaluation report, misapplication of loan funds was still a major concern and was not limited to Credit IV loans. Under the Credit IV scheme, however, a number of branches promptly recalled misapplied funds. By 1990, Credit IV total arrears was 8.4 percent of a total portfolio of Ksh. 109.7 million, financing 3,418 borrowers. The collection rate on Credit IV loans was 69.5 percent (Agricultural Finance Corporation of Kenya, 1990).

Loan servicing procedures

AFC's primary objective in servicing loans is to ensure proper loan utilization and to reduce the risk of default. Servicing activities include assisting borrowers in the initial planning of the loan project and disseminating technical knowledge pertaining to the project throughout the life of the loan. Farmer/AFC contact mainly occurs through farm/office visits and letters and occasionally by telephone. Servicing is critical during loan disbursements when compliance with certain conditions is closely monitored and to ensure that loan funds are not diverted to other uses. When loan funds are diverted to other uses and the diversion is minor, the borrower is warned, or given a chance to rectify the problem using his/her funds. For more serious cases, the unspent loan balance is frozen and the loan is immediately recalled through foreclosure action.

Post-disbursement loan servicing is a systematic follow-up to keep AFC abreast of the borrower's farm activities and to help identify problems. During this period, the borrower normally makes installment payments, which form part of the post-disbursement loan service activity.

Loan disbursement and servicing procedures have not effectively reduced the problem of unauthorized use of credit funds. For the most part, delaying the release of loan funds creates a number of problems that facilitate unintended use. First, farmers may change their planned activities to guard against losses that would result from delayed projects. These changes may not be relevant to agriculture. Second, the farmer may not want to turn down funds, especially after incurring the costs of obtaining the funds. Third, the credit institution weakens its own ability to be thorough in loan servicing and to prevent unauthorized use of funds when loan funds are delayed.

Loan collection procedures

AFC loans normally have a grace period of one year. Farmers may make installment payments as they wish during the grace period and earn 5 percent interest on their credit balances. Installment payments can be made directly to any AFC office or by signing a banker's order (periodic remittances from the bank account), salary order, or produce marketing agency order. The borrower's relatives may make similar remittance on behalf of the borrower.

Special farm visits are carried out for loan collections, especially for defaulting and delinquent borrowers. Because one loan officer may supervise more than 300 borrowers, farm visits are mainly to defaulting borrowers. Reasons for default are often difficult to verify, even at the farm level, because of the lack of farm records. When a genuine reason is identified (for example, a widespread drought), AFC may seek government authority to reschedule the loans of affected borrowers. Occasionally the government will direct AFC to write off bad debts. On an individual level, AFC may reschedule and/or provide additional loans. The most drastic action for defaults on unforgivable loans is foreclosure. AFC has accumulated many farm properties from foreclosure.

AFC Performance Between 1980 and 1992

Three measures of performance are used to determine whether AFC channels funds to small-scale farmers at reasonable cost within the constraints of quality loans. These measures are efficiency, equity and financial viability. Although AFC is not a profit maximizing entity, it is expected to progress towards self-reliance and reduce dependency on public funds. AFC is also expected to maximize the absolute number of small-scale farmers it lends to as well as loan the amount outstanding. Otherwise, it would be construed that AFC is diverting benefits of low-cost credit away from farmers and thus limiting government intentions for subsidized credit. A healthy performance in terms of efficiency in costs, equity and financial viability is a demonstration of success in meeting the credit needs of the target group.

The financial structure of AFC

The financial structure of AFC is shown in Table 2.13. In 1980, AFC had an equity base of Ksh. 119.63 million, which expanded to Ksh. 502.61 million by 1986, and then declined to Ksh. 340 by 1992. On the other hand, net total assets rose almost three fold from Ksh. 35 million to Ksh. 83 million, between 1980 to 1992. Equity to net asset ratio fluctuated between a low of 9 percent and a high of 19 percent.

Table 2.13. AFC financial structure, 1980-92

Year	Equity (million K£.) ^a	Net Total Assets (million K£.) ^a	Equity to Net Asset Ratio (%)
1980	5.04	34.75	14
1981	5.48	37.34	15
1982	5.66	41.08	14
1983	6.04	41.49	15
1984	7.22	40.56	18
1985	8.81	47.72	18
1986	10.96	57.91	19
1987	12.31	79.91	16
1988	13.68	80.78	17
1989	7.95	92.36	9
1990	9.05	83.49	11
1991	9.41	80.55	12
1992	10.42	82.93	13

Source: Calculated by author from AFC annual reports, various years.

^a 1 K£= Ksh. 20.

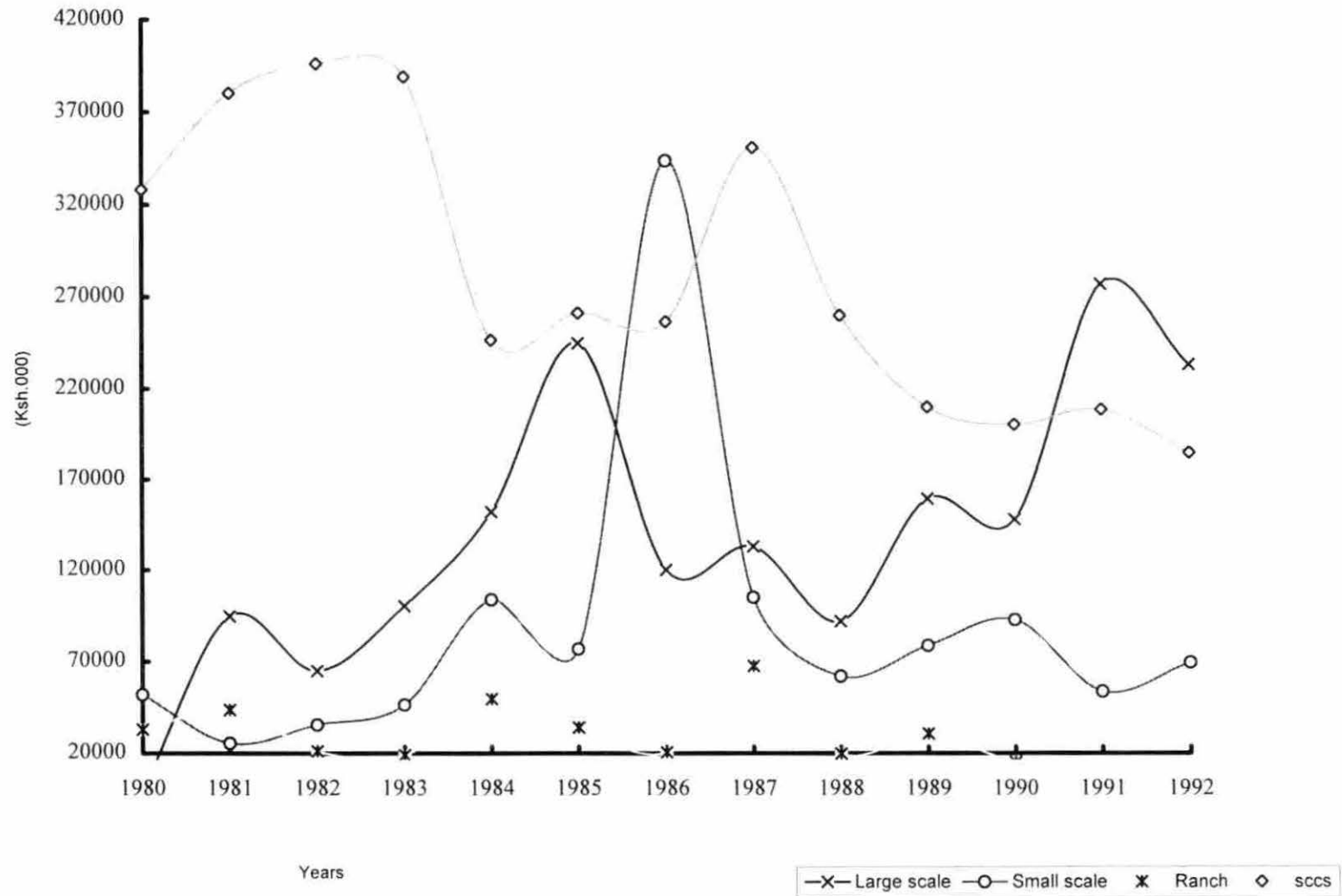


Figure 2.6. AFC loan portfolio by loan type, 1980-93

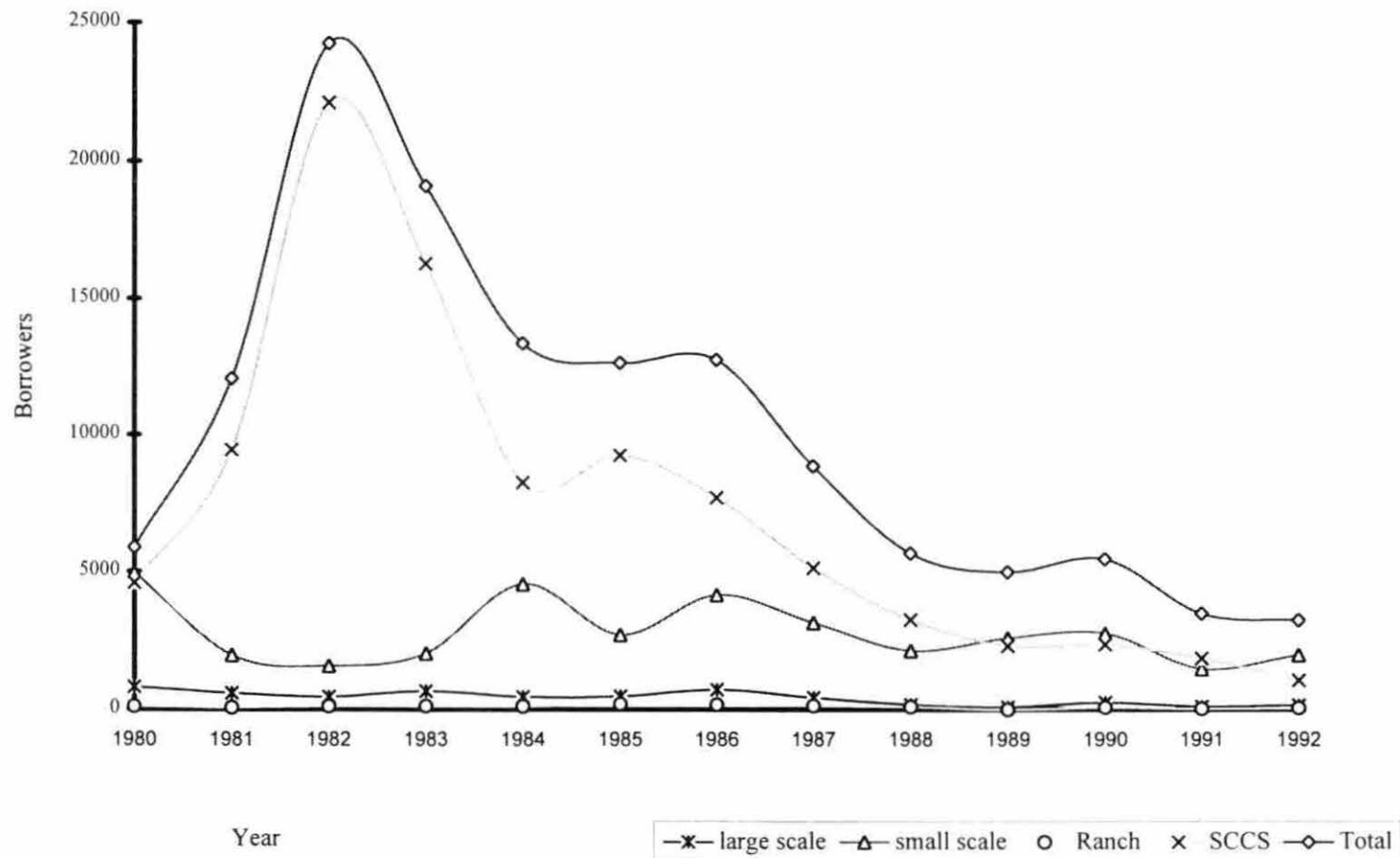


Figure 2.7. New AFC borrowers by loan type, 1980-90

Loan portfolio and number of borrowers

AFC loan portfolio was about Ksh. 36 million in 1980, and by 1992, it was about Ksh. 100 million (Figure 2.6 obtained from data in appendix 3.2). Over the thirteen-year span, AFC total loan volume of AFC-approved loans nearly tripled, from about Ksh. 156 million to Ksh. 499 million financing about 132 thousand borrowers (Figure 2.7). Large-scale farm loans accounted for 4 percent, small-scale loans were 27 percent, ranch were less than 1 percent, and SCCS, which began in 1981, was 68 percent. In 1982 and 1983 SCCS held the highest loans on a per year basis for the entire period. By 1992, SCCS had reduced by 21 fold from its peak in 1982. Combined AFC loans had the smallest share of 38 percent. The amount of money involved was Ksh.6.76 million. Large scale loans were 28 percent, small-scale loans were 17 percent, ranch were 6 percent and SCCS 49 percent. Large scale loans were allocated twice as much money as were the small-scale loans.

The AFC loan portfolio has been declining for development loans because foreign donors drastically reduced loans and grants contribution. Credit IV, which was initiated in 1987 was the last reasonable loanable funds amount obtained from the World Bank. Nor has the government provided new capital to AFC on a consistent manner. AFC's internally generated funds form the main source for financing operations. Without injection of external funds, AFC lending capacity to provide term loans has reduced drastically. AFC has been heavily engaged in SCCS for the past eight years, creating competition between term loans and seasonal loans. Loans to staff members also claimed part of the loanable funds.

The average loan amount per loan scheme grew rapidly over the entire period, about 6 fold. Average loans for ranching were more inconsistent than large and small-scale loans. The most consistent were the small-scale loans. Average large scale loans increased 17 fold while average small-scale loans increased about 3 fold.

Loan repayment performance

Loan repayment for the period 1980-1992 is shown in Table 2.14. Total collection was Ksh. 6.4 million of which large scale loans were 31 percent, small-scale loans were 15 percent, ranch were 9 percent, and SCCS was 49 percent. AFC collected just about what it disbursed. The highest collection as a percentage of disbursement was from large scale loans while ranch and SCCS performed poorest.

During the period under review AFC provided an amount equal to Ksh 77.4 million in bad and doubtful debts. Large scale and ranch loans combined held 80 percent, small-scale loans had 14 percent, and SCCS 6 percent. From the relative levels of allocation of bad and doubtful debts, AFC obviously expects highest default from the large scale loans, as shown in the provisions for bad debt in Table 2.14. This situation is evident from the arrears growth rate for the period as shown in Figure 2.9.

Operational costs

Loan administration costs have been increasing. The costs grew by 1.5 percent from 4.7 percent in 1984 to 6.2 percent in 1990 (AFC, 1993). Growth in costs follow the overall

Table 2.14 Provision for bad and doubtful debts by loan type (Ksh): 1980-92

Year	Large scale	Small-scale	SCCS
1980	1,877,540	478,515	NA
1981	1,949,956	603,375	NA
1982	2,983,884	548,202	NA
1983	3,452,164	529,763	NA
1984	3,609,054	668,272	NA
1985	3,915,039	711,435	NA
1986	4,303,660	990,629	451,829
1987	5,625,441	400,636	16,854
1988	6,188,730	720,761	255,048
1989	11,518,520	1,198,168	339,921
1990	5,003,850	1,315,924	982,699
1991	5,547,218	1,395,020	1,023,925
1992	5,748,397	1,583,424	1,502,079

NA = Not available

Note: Although no data was available to the author under SCCS between 1980-1985, the scheme was existing.

Source: AFC annual reports, various years

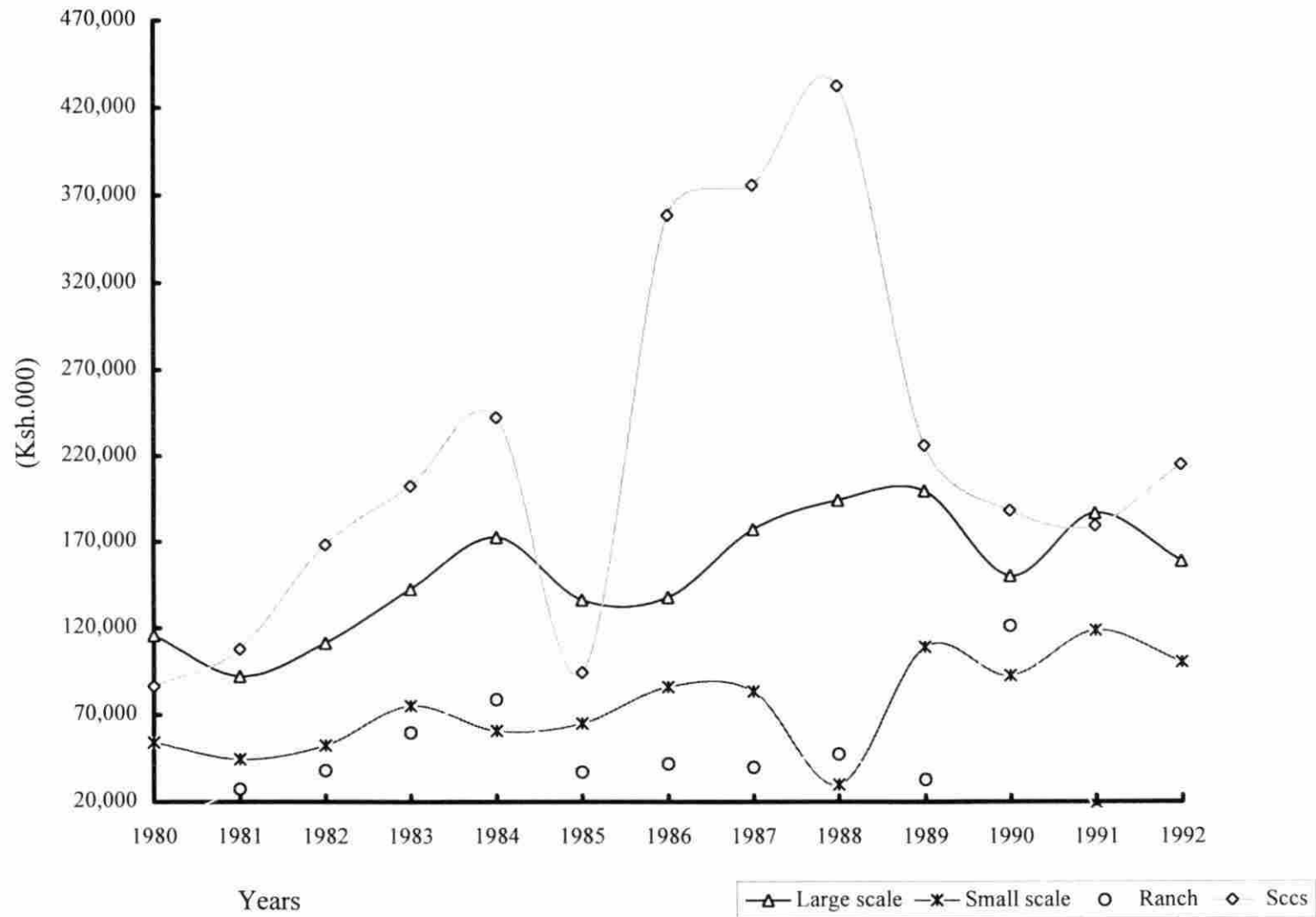


Figure 2.8. AFC loan repayment by loan type, 1980-92

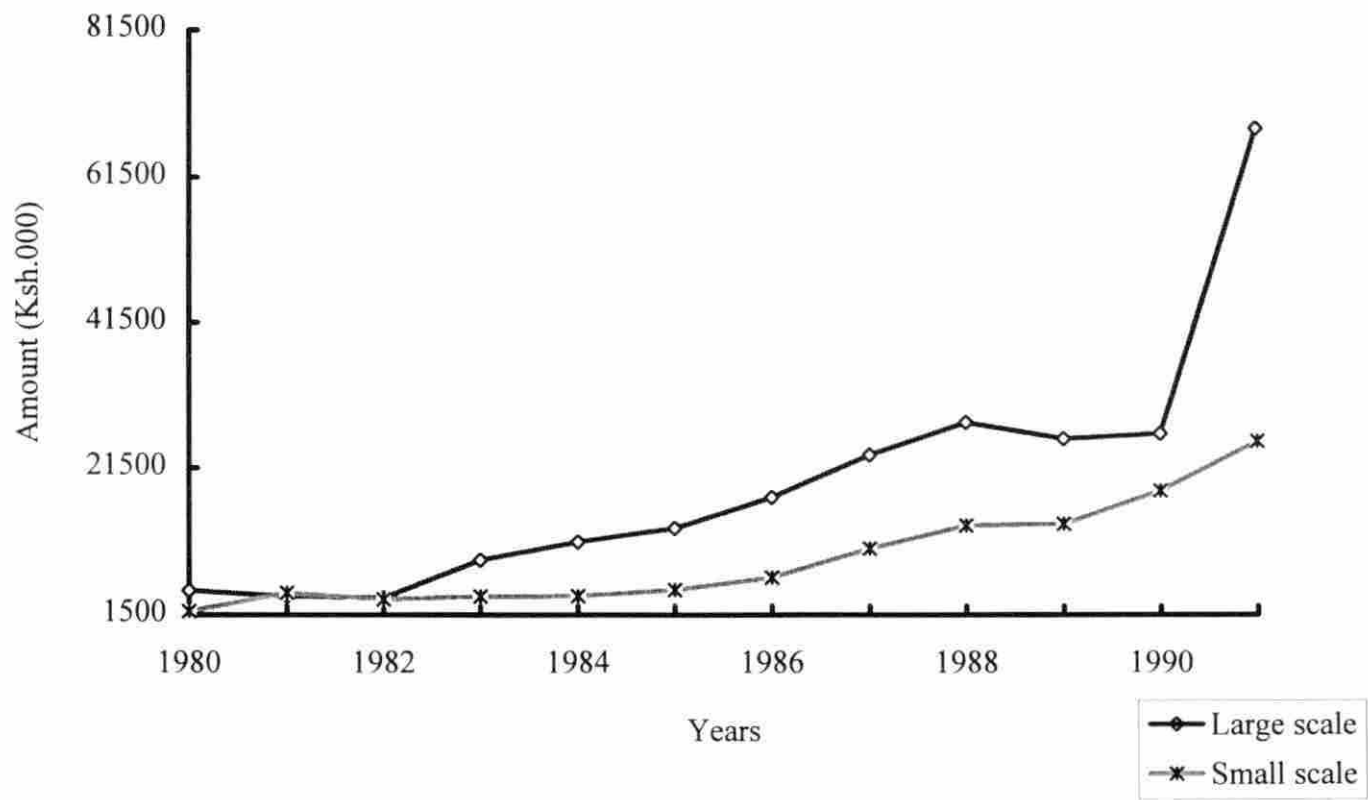


Figure 2.9. AFC arrears growth by loan type, 1980-92

economic trends. Increases in inflation resulted in higher expenses for fuel, repairs, and equipment. Cost of loan administration vary with branches.

Trends in AFC staff and administrative costs are shown in Figure 2.10. The staff costs rose rapidly from 1986 onwards, with increase in salaries accounting for a big portion. This was in line with a series of salary review recommendations in the government sector. The general administrative costs have remained relatively modest over the entire period. Another reason for the rise in staff costs was due to the hiring of branch accountants. AFC did not, however, improve much in terms of loan collection as more staff were required in handling seasonal crop credit loans that continued to be popular among borrowers. The ratio of staff cost to administrative cost also increased as shown in the first portion of figure 2.4.

The weighted cost of funds for AFC is estimated at 7.14 percent while the weighted lending rates was about 11.84 percent. This provides AFC with a spread of 4.6 percent. The cost of funds for the major schemes, Credit IV at 8 percent, R.S.D.P at 7.6 percent, SCCS at 14 percent, and Livestock II at 3 percent. Credit IV and R.S.D.P. combined provide a spread of 4 % while SCCS does not provide any.

The average cost of AFC operations between 1984 and 1990 was 13.34 percent (7.14 percent cost of funds plus 6.2 percent cost of loan administration). Ignoring the cost of direct losses from default and considering only interest charges, AFC operates at a loss of 1.5 percent.

Operational difficulties

AFC faces considerable difficulties in its ability to supervise borrowers. The seasonal demand for SCCS loan administration has drastically reduced time devoted for supervision of term loans. The critical factor is the cost implication for SCCS, especially when it does not provide any interest spread. Inadequate supervision thus results in default and loan diversion. The AFC system of penalty on default does not include default on interest charges. This system gives borrowers incentive to default because interest arrears are essentially interest free loans.

Figure 2.10 AFC operational costs

Viability issues related to default are central to AFC. Default sources include drought, inadequate loan supervision and collection system, and political interference in collection enforcement. Nyanza and Western Kenya, disposal of collateral is difficult due to the structural set up of the farm communities and culture related problems.

AFC restructuring proposals

In 1986, AFC was granted approval by the government to undertake financial restructuring that would transform it into an agricultural bank. The restructuring objectives were to remove uncollectable loans from the accounting system and to expand the eroded capital base. Maintaining uncollectable accounts on computer memory was costly yet no returns were expected. The plan approved a loan write-off totaling Ksh.817.3 million (59 percent seasonal crop credit in old GMR, 15 percent seasonal crop credit under the new

SCCS, 15 percent in ranch loans, and 11 percent in miscellaneous loans). Another write-off of Ksh.77.4 million was composed of 80 percent large scale and ranch loans, 14 percent small-scale and 0.6 percent SCCS. The eroded capital base was 12 percent of total net assets financed by AFC own capital funds and 88 percent financed by loan capital. AFC's total debt then was Ksh. 2,452 million (61 percent domestic debt and 39 percent external). The proposal was to bring equity to debt ratio to 1.25 (Ksh. 777 million long term debts and Ksh. 884 million in equity).

AFC complained of the serious cost problems it faces by not charging a penalty on interest overdue. AFC penalty is based on principal overdue. Restructuring policies would allow AFC to charge penalty on total outstanding arrears to discourage defaulters who deliberately avoid repaying interest due simply because it is an interest free loan. It was felt that the relatively low interest rates charged by AFC were creating a huge demand for loans. The demand always outweighed supply. The plan recommended a market harmonized interest rate policy.

The income tax liability on AFC books, worth Ksh. 6.6 million as of 1986, was believed to be erroneous since it was based on non-performing loans and an under estimation of bad and doubtful debts. AFC desired that this amount to be waived so fresh calculation could begin based on better accounting records.

Funding for the restructured AFC was estimated at Ksh. 534.9 million. The disbursement of the funds was proposed to be over a period of four years, based on five years after AFC restructured. These disbursements proposals excluded the proposed new capital

structure. The new capital structure was concerned with the outstanding reserve deficit on SCCS prior to 1985 of Ksh. 4.8 million and AFC surplus reserves of 1.4 million. The combined deficits and the surplus was a net deficit of 46.6 million. AFC requested that these funds be charged against the capital funds and be treated separately from the estimated new capital requests.

Also of importance were measures that would boost credit to agriculture. AFC suggested three main redistribution mechanisms of capital to the sector. These were: (1) rediscounting a certain percentage of agricultural lender's portfolio to encourage more institutions to participate in agricultural lending (2) administering the 17 percent net deposit requirement of the Central Bank of Kenya to agricultural lending by commercial banks that could be delegated to AFC on an agency basis and (3) establishing an agricultural credit coordinating council to formulate resource mobilizing strategies in the agricultural credit markets and prioritizing and coordinating supply of agricultural credit.

Conclusion

Evidently AFC is conscious of its operational difficulties in credit intermediation. As Braverman and Guasch (1993) pointed out, government-sponsored credit institutions face annual peak-load demand for speedy credit decisions and disbursement, always have to work with inflexible repayment schedule policies, for example, loan repayments are matched with harvest season which is in itself another peak-load speedy loan collection and so on. The key issue that AFC need to address is how the borrowers use such weaknesses, especially in

relation to credit policies and operational inefficiencies. AFC can improve its loan decisions by improving loan assessment techniques. This is an area that can improve credit delivery and stabilize AFC's position in coordinating credit activities and use, and repayment performance. In the next chapter, a closer look at literature on conceptual framework of credit markets is presented. The chapter also reviews literature on factors that influence loan repayment.

CHAPTER 3: CONCEPTUAL FRAMEWORK

This chapter develops a conceptual framework for loan default analysis. In the first section, literature review on asymmetric information problems intrinsic in credit markets is presented. The last part of the section discusses the concept of incentives and institutional credit. The second section of the chapter is a review of literature from bankruptcy and loan repayment prediction studies focusing on factors that determine institutional viability and loan repayment.

Credit as a Market Good

Credit and debt creation is perhaps the oldest and most complex system of reciprocity and cooperation in society. The lender is willing to give up consumption in the present in exchange for consumption in the future with a compensation and vice versa for the borrower. The process for creating debt contract raises a basic question with every transaction. The mechanisms which ensure that the debtor will meet future repayment obligations are at the core of the relationship. In principle, a borrower has a strong incentive to avoid repaying after receiving credit. The analysis of debt relationships is relatively simple under two conditions. First, if the debtor is viewed purely on the basis of the capacity of borrower's business to generate adequate revenues and the expected revenues are known with certainty. Secondly, if the lender is guaranteed complete enforceability to penalize and restrict dishonest borrowers. However, a problem arises when lenders and borrowers are uncertain about the future. Normally, a lender will accept a small level of default probability in

exchange for higher compensation. The lender's concern in credit analysis is the authenticity of the implicit and explicit promises of the borrower associated with future debt repayment. The intangible nature of "trust" is often an inherent problem.

Information Problems in Credit Markets

Information related problems in credit markets have attracted the attention of many researchers. Institutional arrangements such as specialized credit markets are traditionally seen as devices to remedy inefficiency in credit allocation and equity problems associated with informational problems. Institutional economists, such as Holdgman (1960), Stiglitz and Weiss (1981), and Stiglitz (1985), argue that specialized credit institutions may easily create new market information problems. They may lower the cost of illiquidity and increase debt repayment problems. Private investors are then encouraged to take on higher risks.

The results of these studies have made important advances in understanding the conceptual framework of specialized rural credit markets. These credit markets represent the government's response to market failure. Markets created by government directed at situations where a market has failed to emerge due to information problems may produce undesirable new outcomes. The outcomes are different from those where a market sprung up naturally with complete information and operates competitively. Allocation of resources in competitive markets are believed to be efficient because the market outcomes are price determined thus providing a natural starting point for gathering information. Competitive prices are essential in determining how market participants evaluate risk as they allocate

resources. In contrast, government created markets offer inadequate information and resource allocation which is not price determined, thus creating sub-optimal allocation of resources.

Studies focusing on failures in government sponsored credit markets in LDCs emphasize problems related to information. Other major failure problems include transaction cost, enforceability of credit contracts and the design of credit institutions (Akerlof, 1970; Rothschild and Stiglitz, 1976; Adam and Von Pischke, 1980; Adam and Von Pischke, 1984; Braverman and Guasch, 1989; Innes, 1990; Hoff et al., 1993; and Hoff and Stiglitz, 1993). Government specialized credit institutions provide credit at below market interest rates. This leads to higher demand for credit than its supply. When interest rates do not equilibrate credit supply and demand in one market, the various credit markets in the rural sector may be segmented geographically. The supply in all markets will also differ with interest rates, default risk, an event (for example a natural disaster), credit supplier, and demand and supply of credit in the locality. Limited information encourages formal lenders to lend in areas where farmers have collateral.

Small farm borrowers' lack of access to formal credit markets is attributed to asymmetric information (Adam and Von Pischke, 1993; Hoff and Stiglitz, 1993; and Hoff et al., 1993). These studies have contended that lenders have imperfect information about the hidden characteristics and actions of borrowers. They argue that the economic incentives of rural credit markets depart from the perfect information and complete market assumptions of the traditional competitive neoclassical models. Credit markets lack information about actual

economies of other markets involved, especially risk factors. Cost of information regarding default risk are prohibitive. Thus their transactions are often based on more than price.

Rural credit markets also face high transaction and enforcement costs which are fundamental to profitability and viability. Together, these costs may eliminate some markets or make them incomplete and inefficient.

Loan default risk is linked to hidden characteristics and actions which differ among borrowers. Default risk can be reduced by screening borrowers according to default signals of their characteristics and actions. Borrowers on the other hand may not be willing to provide lenders with such information, especially those who believe that a disclosure of such information may lower their chances of obtaining a loan.

Response to information problems

It can be argued that high risk borrowers should be charged higher interest rates to compensate lenders for default risk. Accordingly, low risk borrowers should enjoy lower interest rates. But starting from the idea that asymmetric information lump heterogeneous prospective borrowers together, lenders encounter a problem in separating high and low risk customers. Again, applying high interest rates to all customers discourages low risk customers and encourages high risk ones. Lenders therefore respond to information problems either directly or indirectly in a way that attempts to balance all risk types. Credit rationing is a direct approach whereby lenders use risk signals to screen applicants.

Credit rationing

Credit rationing is a condition of credit market in which the supply and demand of loan funds are not in equilibrium at the existing contract terms (Stiglitz and Weiss, 1981). Holdgman (1960), the first to focus on loan default as a reason for credit rationing, ruled out the argument that default alone can be a sufficient condition for credit rationing. He reasoned that lenders and borrowers share information and therefore have the same information about the future. Default risk alone cannot therefore eliminate a lender's incentive to raise prices whenever credit supply is less than demand.

Non-price rationing, a common feature in credit markets, results in allocation of credit in equilibrium with non-clearing market interest rates (Braverman and Guasch, 1991). Credit rationing can be viewed from two perspectives: borrowers' self-imposed limits to credit use (internal rationing) and lender imposed credit limits on borrowers (external rationing) (Penson and Lin, 1980). Borrowers' credit decisions are based on the ability of a project to service the debt; they estimate the expected gross returns. A high variation of incomes from the project may suggest inability of the project to repay the debt. In this case a borrower reduces or terminates use of credit. Risk-neutral borrowers will propose projects with positive net returns, taking into account risk provision (Hoff and Stiglitz, 1993). From a lender's perspective, when interest rates persistently stay below the market rates, resulting in a situation in which credit supply is below demand, non-price credit rationing is an appropriate allocation strategy. Lenders often use a combination of profitability

measurements to gauge the ability of a project to repay. Interest rates are used to indirectly screen proposed projects for their risk level.

Lenders use interest rates as a screening mechanism. For every project with the same mean gross return but differing risk, the interest rate will determine a marginal project. Projects that barely provide a positive expected net return are classified as marginal and those which provide higher expected net return are classified as high default risk. As the interest rate increases, the mix of projects will also increase in risk. In an earlier study, Stiglitz and Weiss (1981) argued that interest rates have a dual function. If their increase does not affect the risk composition of the lenders' portfolio, then lenders enjoy increased income. However, if they do increase the risk, lenders will ration credit. In a U.S based study conducted by Weerawardane (1993), internal credit rationing exceeded external credit rationing during unstable economic conditions for U.S farm operators.

Information problems often oblige lenders to rely on collateral and other special loan conditions to ration credit. This is a way of reducing the cost of gathering information regarding default risk. Small farmers who do not possess collateral and fail to fulfill certain special conditions are excluded from the credit market.

Signaling and screening

Lack of direct and inexpensive ways to obtain information necessary for assessing borrowers ability and willingness to repay debt encourages lenders to develop indirect methods to screen credit-worthy borrowers. Often borrowers exhibit certain indicators or signals which distinguish their hidden characteristics and actions. For example, lenders may

infer the honesty of a borrower from leadership responsibilities and the number of dependents may be used to approximate family expenses.

The problem that arises is the identification of the “best” signal to approximate a particular information. Suppose that the lender is interested in finding out whether the borrower is likely to default by assessing hidden characteristics and actions. The borrower may transmit to the lender several signals that influence default risk. A borrower's own effort in terms of farm development can suggest work ethics and effort level. However, a small, poor borrower may possess equally acceptable work ethic but lacks the financial ability to initiate a sizable investment. Lenders may develop a selection criterion that often tend to ration out small farmers. The key is to identify the best proxy signal. Three examples commonly practiced in the screening process by lenders in Pakistan are discussed by Aleen (1993). First, lenders avoid new entrants without any previous loan dealings. Second, the lender investigates the applicants' indebtedness by talking to the village neighbors or relatives. Third, the lender may decide to start off the new borrower with a small probational loan amount which does not satisfy the borrower's legitimate credit needs. The lender's screening process balances all sources of default risk as perceived in the signals and approximately matches the degree of default risk with the signals in setting the long run default risk management strategies (Arrow, 1963; Stiglitz, 1975).

Adverse selection and moral hazard

The problems of adverse selection and moral hazard are considered as a more general feature of asymmetric information. Adverse selection refers to the inability of lenders to

infer the risk characteristics of borrowers, while moral hazard refers to lack of knowledge about the actions of agents (borrowers, managers of institutions, and others involved in the credit relationship). Adverse selection results in a situation where borrowers can distinguish themselves but lenders treat them as if identical (Katze and Rosen, 1991). Borrowers who feel that they deserve better treatment may decide to withdraw if they get the impression that the lender cannot distinguish them from more risky borrowers (potential defaulters). If a significant number of viable borrowers (good borrowers) withdraw, the signals sent to lenders would be largely from potential defaulters. In such a case, it may be difficult to develop important and useful distinguishing signals (for example, the in-kind rural credit system in developing countries is perceived by good borrowers as a mistrust of borrowers' ability to use loan funds for purposes approved). If the lender is incapable of accurate assessment of borrowers so that those identified to be good over time are provided with their rightful incentives and remuneration, lenders will tend to hold low quality loans. This a situation of a moral hazard when attempting to allocate resources.

Agency-Principal problem

Literature views specialized credit dispensing as a "layered web" of relationships among several parties (Barnea et, al., 1985; Stiglitz, 1987 and Braverman and Guasch, 1989). The government's target is the small farmer. To serve the farmer, the government (principal) appoints a credit institution (agent). The (principal) establishes a contract with the agent. In turn, the credit institution establishes a sub-contract with the borrower. The credit

institution becomes an intermediary principal between the government and the borrower. To accomplish the common economic development objective, the government establishes two incentive and reward plans. The first one is directed to the lender (sub agent), and the second to the borrower (full agent). Each incentive and reward will be contingent on the nature of the contract structure and information flow among the parties, which in turn will determine the level of effort the agents exert. Financial managers stand between the credit market and the operations of the lending institution. Managers are expected to maximize government interests, however, economics teaches that human beings tend to act on their own self-interest. Thus risk perception and valuation rules may differ when an agent makes decisions on behalf of the principal. The conflicting interests between the two has adverse effects in the capital structure and the allocation of resources within the institution (Barnea et al., 1985) and results in moral hazard problem. An example of moral hazard within the insurance markets is explained by Arrow (1963). He observed that the insured may participate in careless actions that may facilitate occurrence of an accident at the expense of the insurer. Within the labor markets, moral hazard arises between employees and employer. When an employee is left unsupervised, the employer may not be sure whether the employee earned a rightful wage or took a nap and got paid for it. Hoff et al. (1993) points out key strategies for reducing moral hazard. External and internal monitoring, incentives, and organizational and contract design that most efficiently accomplish a given objective usually reduce moral hazard problems. Katze and Rosen (1991) also note that incentives improve the effort level of the agent but may not completely eliminate problems.

Appropriate incentives and contracts motivate managers to take actions that minimize inefficiency at all levels. Managers can maximize loan portfolio to targeted groups, carry out consistent and accurate credit evaluation, and ensure that appropriate projects are financed. They can design ways to reduce patronage and ensure institutional financial viability by minimizing loan default risk. Equally essential is proper incentive package for borrowers. Motivation to select the right agricultural projects, eliminate desire to divert loan funds to non-agricultural projects, and comply with loan repayment agreement could occur.

Transaction cost and enforceability of contracts

Information has an impact on costs. Every credit transaction and acquisition of long-term loan assets usually increases the complexity of credit contact. Gardner and Mills (1991) observed that formalizing or legalizing costs, costs for monitoring borrowers, and contract adjustments costs can be substantial. Credit also leads to the need to maintain a formal memory for operations, an additional cost (Penson and Lins 1980).

Cost of operation focuses on effectiveness and efficiency of the system. In a competitive market, costs can be controlled or offset by market price (interest rates) adjustments. Below market rates do not provide adjustment opportunities in cost management or in default risk strategies. Services are thus exchanged on a non-price mechanism, that is, on the basis of expected transaction cost and perceived default risk. Lenders favor large farmers because the large loans provide scale or size economies.

The ability of a lender to enforce a contract is critical. Stiglitz and Weiss (1981) pointed out that lenders often assumed that the debt-financed project is obvious public

information. This suggests that lenders believe that borrowers willingness to repay their debts is influenced by debt publicity. Therefore, as long as the expected returns from the project exceeded debt installment, the lender would be repaid. Possession of collateral provide a lender with extra cushion, but the ability to dispose of it when need arises requires complete price information on the asset. In this respect, the rural debts in LDCs are like sovereign debt, where the borrower is a sovereign country and is not subject to penalty by national law. Rural debtors are often embedded in cultural and socio-economic ties. Lack of information of transferability of land assets results in incomplete asset markets. Okorie and Inheanacho (1992) reemphasize this observation by showing that the strategy adopted in a contract enforcement will either accelerate or decelerate default risk depending on whether the lender has the correct perception of social and economic aspects of the rural area in question.

Effectiveness of a contract can be measured in terms of its cost. Information regarding the selection of an enforcement strategy and the legal costs are impediments in contract enforcement in credit markets. Wrong strategies can also trigger a social uproar and political interference in loan collection.

Lack of enforceability has serious adverse effects within a community information network. Information about consequences of undesired actions is quickly past on among families, friends, church groups and informal gatherings. Weaknesses within a program are extremely dangerous. For example, consider a farmer who is interested in financing a non-agricultural project and has no means of obtaining the level of credit he requires. He knows

that his neighbor and brother obtained credit from the local agricultural credit institution and managed to divert part, or all of the funds. He will consult with the two and apply similar tricks. They become “birds of the same feather” and begin to protect each other. Depending on their ingenuity and skill and contract enforcement problems, they maintain the process while others follow suit. Defaulting borrowers resort to similar strategies. To a new default entrant, what is important is the size of the default group; the larger the better. If everyone has to face adverse consequences at one point in time, he believes he is unlikely to be the first one nor the only one to be dealt with.

The foregoing discussion conceptualizes the difficulties in establishing healthy lender-borrower credit relationship. The borrower is encouraged to default because if the default amount is reinvested, the returns obtained from the investment are improvement in utility over and above the present level. In essence, utility is derived as an expected marginal benefit from default. If the borrower defaults without any partial repayment, then the borrower’s utility is at its maximum and is equal to the present value of the absolute default amount.

Default may thus vary with borrower characteristics such that severity of the default is determined by factors that influence behavior such as the demographic characteristics (age, profession, and education of the borrower) (Dunn and Frey, 1976; Hardy and Weed, 1980; Stover and Gardner, 1985; Turvey and Brown, 1990; Miller and LaDue, 1989; Turvey and Weersink, 1993).

Conclusion

The literature presented in this section does not fully cover the complexity of default risk problem. For example, it has not covered the role of external forces such as natural calamities (drought, earthquake, death and illness) that alter behavior in some instances. It however touches on the key issues that need to be put on perspective in default analysis. The primary concern is that the lender (government-sponsored credit institution) has conflicting objectives (Barnea et al., 1985). One is to promote efficiency by maximizing lending capacity. The other is equity, by not allowing external events to determine the distribution of credit to target farm borrowers. The conflict arise because imperfect measures are used to design loan contracts ; (Stiglitz, 1987). A critical problem in a poorly designed contract is non-commitment to agreements and promises specified in the contract. Loan default is common and the serious problem is that the risk of default by borrowers has an underlying significant effect on credit decisions and thus leads to sub-optimal credit allocation.

Loan default consequences are not limited to lenders only, borrowers and the society also suffer the effects. Widespread and excessive loan default can set off a wave of detrimental outcomes. In the short run, lenders suffer illiquidity, borrowers lose equity and it shrinks the fund “pie” for the society. In the long run, it leads to bankruptcy and eliminates the credit market. Elimination of firms resulting from firm financial failure is a reoccurring phenomenon of business which may occur when a firm is unable to meet its financial contractual obligations. Lev (1974) pointed out that failure is a costly event. Many groups who have vested interest in the firm as well as some sectors of the economy incur direct or indirect losses. Suppliers may

lose the market share of their products provided by the failing firm, customers may lose supply of firm specific products and employees may lose their jobs.

Up to this point, the literature emphasizes the important role that information plays in credit granting decisions. Lenders, borrowers and the society stand to suffer when poor credit decisions are made. Lenders are able to guard against bankruptcy by accurate assessment of borrowers' credit-worthiness. For loans already made, lenders can assess their quality from time to time and make corrections if necessary.

The next section reviews literature in two areas. The first is literature on factors that influence firm failure. The second part is literature on factors that influence loan default. Together, the two parts are intended to provide further insight in default analysis. In each part of the sections, these factors are considered as firm and borrower characteristics respectively. The literature reviewed in the first part is mainly from firm failure studies, while the second part is from loan repayment prediction studies. The review is to help identify factors that have been found important in earlier studies.

Factors that Influence Financial Failure from Bankruptcy Studies

Defining financial failure

Literature definition of firm failure is largely based on the objective and the scope of the research study. Giroux (1984) defined firm failure as any event(s) that signal the firm may be experiencing financial difficulties or stress. The events range in their level of severity which may suggest the degree of failure. Firm financial failure may range from mild

to total failure or bankruptcy. Tevlin et al. (1978) describes firm financial failure by using three financial terminology which represent the degree of failure. Economic failure arises when a firm is not able to generate adequate revenue to cover expenses. This condition is considered as a mild failure because it is a common but is a temporary position in many business firms. Technical insolvency arises when a firm has positive net worth but experiencing a shortage in meeting current liabilities. Bankruptcy is a situation whereby a firm has negative net worth as well as insufficient liquidity. At this point, a firm is either going through reorganization or being dissolved. A bankrupt firm will go into a legal process whereby it is put under the protection of the bankruptcy court, allowing it to keep on operating while arrangements are made to pay off its creditors in an equitable way (Shapiro, 1990).

Firm failure studies identify two empirical approaches to understanding factors that failures. The financial and accounting ratio approach attempts to identify ratios that explain firm failure process. A second approach focuses on a firm's pre-failure financial condition and any events that signal the failure process. Financial and accounting ratio approach method uses models that classify firms as bankrupt or non-bankrupt.

Ratio analysis

Numerous financial ratios can be constructed from balance sheets and income statements of a business. Beaver (1966), who is considered to have pioneered this approach, examined thirty financial and accounting ratios. Using single ratio models, he identified

three ratios which proved to have superior predictive power for firm failure. These ratios were: (a) cash flow to total assets, (b) net income to total debt, and (c) cash flow to debt. These ratios are negatively related to the financial strength of a firm. Later studies (Altman, 1968; Blum, 1974; Haldeman and Narayan, 1977; Norton and Smith, 1979) applied the same approach modified by relying on multivariate models to predict failure. They viewed firm failure as a complex phenomenon that involves several explanatory variables.

Altman (1968), considered to be the original initiator of multivariate models developed and derived coefficients of four financial ratios that were important in identifying a firm that is experiencing financial difficulties of various degrees. The ratios were: (a) Altman's model, which is known today as Altman's Z-score, measures the level of the financial condition of a firm. To obtain the Z-score, the computed values of the four financial ratios from the firm's financial statements are multiplied by Altman coefficients and then summed. The Z-score would show whether the firm has failed, has not failed or is in neutral position. Edmister (1972) modified Altman's (1968) model by dividing the values of the Z-score by the averages of the financial ratios in the small business industry. Edmister's (1972) model provided an empirical tool for predicting failure within the small business industry.

Within the agricultural sector, similar ratios have been applied to analyze the financial condition of borrowers in loan assessment studies. Turvey and Brown (1990) and Miller and LaDue (1989) developed failure prediction models that were based on ratio analysis. Most studies use financial ratios that measure liquidity, profitability, efficiency, leverage, debt

repayment capacity, and incorporate borrower demographic characteristics as explanatory variables. Turvey and Brown (1990) extended their analysis to capture covariance that incorporate differences in regions and farm sizes for Canadian farm borrowers.

Dunn et al. (1976) determined which characteristics distinguish loans that become problematic and those that maintain quality several years after being granted. They used data obtained from loans made to Production Credit Association (PAC) cash grains in Illinois. These loans were advanced between 1964-1968 but were still active in 1971. The PCA classified their loans ranging from those of highest quality to loans that exhibited significant repayment weakness. Dunn et al. excluded loans that were classified as "loss" cases and concentrated on successful loans using information contained in the application form as of origination date. The ratios were total liability to total asset ratio, the amount of credit line of the applicant, and the amount of PCA loan as a proportion of cash income. Of these three ratios, total liability to total assets held was by far highest in explanatory power. The model correctly classified 75 percent of the loans in the sample compared to 50 percent correctly classified by lenders who did not use Dunn et al. model.

Alcott's (1985) discussion on the importance of establishing a loan quality rating system by agricultural lenders suggested that lenders should classify borrowers' accounts into groups according to specific financial ratios. She suggested the following: liquidity (debt structure ratio, debt to dollar sales ratio, debt to milk sales ratio, and debt to income ratio), and profitability (return on investment, return on equity), and efficiency (pounds of milk sold per cow, replacement stock ratio, feed cost per milk income, machinery and real estate per

cow, total investment per cow, total investment per man, and capital turnover). These ratio categories were then weighted according to perceived priority. The perceived priority, as suggested in this study, depended on the experience of the bank official. Several loan officers may be asked to independently attach a weight to each of the ratios. If a weight of “4” is the highest weight then it would be attached to the ratio perceived to be the most important and “1” to the ratio perceived to be least important. The actual ratio times the assigned weight form the weighted score. After the scores are summed, the borrower is then placed in one of relevant risk categories. The higher the score, the stronger the repayment ability of the borrower. According to Alcott, financial ratios are the most important perceived factor that influence credit quality. She concluded that the elimination of credit assessment decisions which are based on instinct would force lenders to introduce objectivity in farm credit analysis.

Firm failure models have been successfully extended to other related uses. Besides helping to explain why a firm failure occurred, they have helped predict what might happen in to a loan in the future given that some conditions hold true.

Characteristics of Loan Defaulters from Repayment Prediction Studies

Definition of a loan defaulter

In the credit scoring studies, loan defaulters have often been referred to as bad borrowers, unacceptable or problem borrowers, poor risk and unsuccessful clients (Dunn and

Frey, 1976; Hardy and Weed, 1980). The default definitions or classification, referred to in these studies were determined by the observed positive outstanding due balance (arrears).

Repayment prediction (scoring) models have become popular credit decision tools. A credit score is basically a forecast of what will happen to various categories of loans already issued or under consideration. As decision tools for granting a loan, they are forecasts of what the borrower's performance will be if the loan is granted. They have three major categories for application: (1) decisions whether to grant a loan or not, (2) loan review models that are associated with monitoring the risk of existing loans, and (3) bankruptcy prediction models that can be used for preliminary credit screening (Batubiza and Leatham, 1990). Decisions can be based on highly subjective and/or objective analysis aided by simple to highly sophisticated techniques. These models have helped in unifying credit decisions by different loan officers. Although the fundamental principles in credit decisions remain the same, the attributes will depend mainly on practical lending situations.

The more recent repayment prediction models have recognized that a farm business is often part of a family household, a business setting that often influences loan repayment ability of a farm borrower. Farmers often prioritize all financial obligations according to their urgency and by what is perceived to provide the best opportunities. In LDCs it is not surprising to find that first in priority is to ensure that the basic needs of food and housing for the family are met, followed by social obligations (for example a wedding of a son), educational needs for the children for the long term income security, and finally, the more long run, less urgent investment in commercial agriculture (Devereux et al., 1990).

Incorporation of financial and demographic attributes of a borrower become particularly important. Durand (1941), the pioneer of prediction studies, classified borrowers by their socio-economic characteristics in trying to provide useful insights about their contribution to credit quality.

Financial characteristics of defaulters

Farm income

Durand (1941) analyzed debt repayment performance of mixed sample of good (borrowers who were current in debt repayment) and bad (borrowers whose accounts were delinquent) consumer loans made before 1941. Durand's study provided empirical evidence that borrower's income only moderately influenced risk of default. Better indicators for credit quality for this sample were borrower possession of real estate, bank account or life insurance. Lenders at this point in time, however, emphasized the applicant's total liabilities for lending decisions other than the indicators that Durand identified. Latter studies have considered income in terms of profitability and efficiency of returns to assets.

Non-farm income

Peterson (1980) analyzed the quality of credit advance by a USA commercial bank in the late 1960s and early 1970s. This study focused on source of employment as an important factor in assessing credit risk. Sources of employment that were found to be associated with below average relative risk included government civilian employment, banking finance, and real estate. Those employed in construction, wholesale and retail trade, and manufacturing

exhibited above average credit risk. Based on the results of this study, Peterson pointed out that lenders could improve credit quality by occupation and employment source considerations in credit assessment process. Durand (1941) found that those who worked in industry had low average credit risk.

Employment status

Off-farm employment offers a borrower an additional source of income and as such, indicates that the borrower does not entirely depend on farm income. They also have opportunities of making more frequent installment payments as opposed to the unemployed. Wage income reduce the risk of fluctuations in farm income. This may result from seasonal variations in the size of the harvest and the prices (Southwold- Llewelyn, 1991).

Equity contribution

In the auto industry, Peterson and Peterson (1984) investigated the extent to which auto loans obtained from commercial banks would be improved if banks adjusted loan terms such as down payment. This study revealed that when down payment was held constant, young borrowers and borrowers employed in highly cyclical industries had what was considered above average credit risk. On the other hand, young borrowers maintained below average risk on loans that required high down payment. Turvey and Weersink (1993) showed that debt relative to equity increases for risky investment.

Collateral value

Its value indicates the gross worth of a borrower. Although not a necessary nor sufficient condition for the applicant to be considered credit-worthy, it provides some

information about the previous commitment the borrower has toward improving the farm. Relatively high security value is expected to positively influence loan repayment since it gives the lender an opportunity to recover outstanding principal and accrued interest in a foreclosure situation.

Hardy et al. (1985) constructed ratios to examine the agricultural real estate credit market. The study focused on establishing borrower, loan and farm business characteristics which were the best determinants of good loans and bad loans (borrowers whose loans had deteriorated up to foreclosure stage). They also intended to establish whether the agricultural financial institutions that existed at the time of their study differed significantly from those of earlier periods. Data for the study was obtained from loan files of the Federal Land Bank (FLB) in the Fifth Farm Credit District, Jackson Mississippi in the Spring of 1985. The stratified random sample loan accounts used represented loans closed between January 1, 1979, and December 31, 1981 in Alabama, Louisiana, and Mississippi. The sampled loans were old enough to provide adequate information whether a borrower would be capable of meeting repayment obligations over time. The sample data composed of a total of 68 observations classified as good loans and 76 observations were loans that had been foreclosed. Four borrower characteristics found to be important in discriminating between good and bad loans were: total debt service to total income ratio, acres on security to acres owned ratio, loan amount to appraised value ratio, and the debt to asset ratio. This model correctly classified 82.6 percent of the sample.

Managerial characteristics of defaulters

Cost of operations and poor records

Carson (1971) sampled successful credit farmers in South Dakota to investigate factors that determine credit quality. The sample was composed of 100 existing farm operating loans from PCA borrowers and 100 from Farmers Home Administration (FmHA) borrowers. These loans were obtained between 1955 and 1964. At origination, the borrowers were all high quality but by 1965, half of the loans were showing signs of repayment problems. Carson's (1971) study focused on loans that were at least successful for the first two years before his study. He was unconcerned about the lenders correct or incorrect evaluation of the loans at the loan granting stage. He made no distinction between the wide range of farm sizes (ranging between 80 acre crop farms to 5000 acre ranches). The data was extracted from the original loan application forms held by the lenders.

The results of this study indicated that 23 characteristics from the applications obtained in first year (1955) were not significant while the 15 characteristics of the applications of the last year (1964) showed significant differences. The significant characteristics associated with unsuccessful PCA loans were high ratio of debt to assets owned, high cost of operations, poor production records, high ratio of debt to net worth, and the large size of borrower's household. For the same category of unsuccessful loans extended by FmHA, the five most important characteristics were the ratio of FmHA loans to poor production records, the high cost of operation, the high ratio of non-real estate debt to

total debt, the high ratio of non real estate debt to the value of non-real estate assets, and the low ratio of net worth to total assets owned.

Repayment capacity

Tongate (1984) was concerned about the after-the-fact credit classification practiced by credit reviewers. According to Tongate, credit review classification does not provide an early warning of the future risk class of a loan. Tongate suggested an improved classification that incorporates the position of loan portfolio in the future. His study identified 60 to 70 factors contributing to risk. The factors were then split into two groups: environmental factors and loan specific factors. Using six years of historical data obtained from active loans and loans already charged off in 1982, the study identified five important factors: owners equity; collateral; repayment capacity; the ratio of volume of farm production to debt, and loan size.

These variables were assigned scores as follows: owners equity, up to 40 points; collateral, 20 points; repayment capacity, 15 points; and loan size, 10 points. Three risk categories were developed, low risk, moderate risk, and high risk. For owner's equity, a ratio of 60 percent or more was categorized as low risk (assigned a score of 0), a ratio of 40-60 percent as moderate risk (assigned a score of 20), and a ratio of 40 percent or less, high risk (assigned a score of 40).

Lufburrow et al. (1984) developed a credit scoring technique for pricing loans to individual farm borrowers. The sample was collected from five PCA borrowers in Illinois using 1982 data. These PCAs classify their borrowers into three risk classes for loan pricing

purposes. Class I, prime (lowest risk), Class II, base (intermediate risk), and class III, premium (highest risk). Probit model was used to test the significance of borrower characteristics important in determining the risk category of the borrower. The independent variables were liquidity, leverage, profitability, collateral, repayment ability, and repayment history. Tenure and profitability were insignificant and were thus omitted from the model. Of the three categories, Class I had the greatest accuracy of 94 percent, Class III was second with accuracy of 91 percent while Class II had the lowest accuracy of 13 percent. Lufburrow et al. suggested that the estimation procedure should be geared towards the characteristics of specific lenders, location and type of borrower.

Turvey (1990) found repayment ability as measured by interest coverage to reduce the risk of loan default among Canadian farmers.

Demographic characteristics

Age

Literature associates age with responsibility--older borrowers are more responsible and risk averse than younger borrowers (Aguilera-Alfred and Gonzalera-Vega, 1993). The age of the borrower is considered to be a factor in explaining attitude towards debt repayment. Lenders find it easier to assess repayment ability of older applicants since they may have more information on their previous financial dealings than their younger counterparts. Younger borrowers possess relatively less information in terms of past records. But younger borrowers are more innovative and ambitious than older borrowers. Mbatia

(1985) found that farmers between age 30-40 were most innovative and also had superior repayment.

Farm size

Given that technological effects on productivity is constant, in LDCs, differences in returns to scale of production can be explained by farm size differences (Feder, 1984). For a variety of reasons, input-output prices which farmers face differ systematically with holding size. Thus input/output ratios and revenues tend to vary with farm size. When credit is available, farmers can hire farm workers. Supervision level of the workers produces a systematic relationship between per acre yields and farm size. In an imperfect credit market where credit supply is evaluated in accordance to the collateral (land owned), the level of supervision of hired farm workers can produce significant differences in scale of production. The land resource utilization and returns will depend on the relative magnitude of output elasticity with respect to effective labor. Labor effort elasticity with respect to effective supervision has a systematic effect on the per acre yields.

Experience

Experience is a proxy for stability in farm management and business. As noted by Lee et al (1980), inexperience and lack of initiative are detrimental to farm operations. The longer a farmer has been engaged in managing a particular business the better the management skills. Stover et al. (1985) observed that lenders' perceived low farm management ability by borrowers has a stronger negative effects on loan decisions than the

opposing effects of high management. Poor management ability are offset by highly liquid collateral but not the reverse.

Most of these studies apply multivariate statistical techniques to data obtained from agricultural enterprises and debtor's personal information. Loans were classified in various ways as current or in default, acceptable or problem, poor risk or good risk, and successful or unsuccessful. The loan classes were determined according to statistical procedures or through experience of the developer of the model. In some cases, customers and/or loan officer opinion is obtained for classification purposes.

Conclusions

The economic theories and empirical results of the studies reviewed contribute valuable information for default analysis. The first section of the literature provides a conceptual underpinning of the problem. It looked at the evolution of incentives and imperfect information to latest difficulties of imperfect enforcement in credit markets. The broader perspective that the literature provides is insight on what is entailed in borrower-lender relationship considerations. Important factors involved in screening borrowers to reduce default risk are related to incentives within the loan policies. For example, loan related factors such as loan amount and services provided which will induce borrowers to take actions that reduce default. Expansion of resources to intensify monitoring and enforcement would limit the scope of the institution in lending. Some inferences can be drawn from this literature in identifying key factors influence credit-worthiness of borrowers.

The literature urge that borrowers have an incentive to cheat on contract. Moreover, borrowers' own initiative to evolve a healthy relationship with the lender is self-enforcing will not achieve desired performance.

The second part of the literature is largely empirical and looked at factors that influence firm failure as part the reasons for default and credit risk. These empirical studies have evolved since the 1940s. Most models have identified personal characteristics, demographic characteristics, financial characteristics to be important attributes to failure. However, risk factors are not stationary (Gustafson, 1989). Neither are they homogeneous across samples used in the various studies. Therefore, these models have been almost strictly sample dependent. This problem can also be traced to specification as well as estimation difficulties.

This study therefore states a general hypothesis that loan default for AFC can be explained by applying the concepts and insightful results from these empirical studies. The hypothesis for this study based on the literature states that demographic characteristics and loan related characteristics do influence loan repayment performance. The general model that these studies suggest is as follows:

$$Y_i = f(D, E)$$

Where Y_i = Probability of acceptable loan repayment performance,

D = Demographic characteristics of borrower i ,

E = Loan related characteristics of borrower i

In the next chapter, AFC sample is analyzed to empirically identify factors that significantly influence loan repayment performance for AFC borrowers. As already mentioned, these models are in general region specific, and the relative importance of the variables in influencing repayment performance may differ with regions.

CHAPTER 4: DATA AND MODEL DEVELOPMENT

This chapter presents the data used for estimating the empirical results for this study. First, it explains source and the sampling method of the dataset. Second, it presents a description of the AFC lending volume by Kenya's provinces, AFC operational regions, and distribution of loans by loan type within the AFC operational regions. Third, the sources of default problems using descriptive statistics is identified. Distribution of loans by various loan and borrower characteristics is examined, and the incidence and intensity of default based on the characteristics is established. Further insights from the conceptual discussion in the preceding chapter are used in identifying influential factors to be incorporated in the model. Finally, factors identified as having a strong relationship with default are then selected and used in the default analysis model.

The Data

In this study, a systematic sample of Kenya's AFC farm loans extended between January 1987 and June 1993 is used to examine the relationship between loan repayment ability and selected characteristics that are believed to be important in loan repayment performance. The data represent 1,574 borrowers holding 2,050 loan accounts. The unit of analysis for this study is the loan account. Demographic and loan information for each borrower and account were extracted from the borrowers' files contained in the AFC computerized database. Some additional information was obtained from branch offices.

The sample information extracted is the information normally gathered for making loan decisions and for collection purposes. Data on the following demographic and loan characteristics was obtained. Demographic information: (1) geographic location, (2) age, (3) highest level of education attained, (4) employment status, (5) farming experience, (6) value of collateral and other nonfarm assets, (7) total farm size owned, and; loan information: (1) loan sequence, (2) project financed by loan funds (enterprises), (3) the actual loan amount approved, (4) date of loan approval, (5) loan repayment terms--repayment mode (whether the borrower has a monthly remittances from wages, the marketing body where the farm produce is sold or a banker). (6) installment date, (7) unmatured loan balance (principal and interest), and (8) loan amount in arrears (principle and interest).

The sampling method

The systematic sampling of AFC farm clients for FY 1987/88 through 1991/92 targeted at least 1,003 farm clients. The representative sample size was based on the total number of AFC clients over the five-year period, determined from the December 1992 and March 1988 *AFC Statistical Digest*. For sampling purposes, the loans were categorized by region (western and eastern), AFC branch, and loan type, that is, small-scale and large-scale (include ranch loans).

The loan type category is based on the assumption that all farmers who owned less than or equal to fifty hectares of land held loans less than or equal to Ksh. 50,000. Likewise, farmers who owned more than fifty hectares are categorized as holding greater than Ksh. 50,000. The number of loans drawn from each category was based on the proportions of the accounts served

by each regional office to attain the expected number of observations for systematic sampling scheme.

The regional distribution of borrowers for FY 1987/87 through 1991/92 by region, farm size, and loan size is presented in Table 4.1. This classification also determines the loan scheme according to small-scale and large-scale loans. There were 12,018 borrowers for the two regions

The sampling was generally successful for information that was obtainable from the computerized database at AFC headquarters; however, information requested from the branch offices, which was mainly borrowers financial, marital, managerial, and value of off-farm income, was incomplete and therefore limiting. This study used the information obtained from the head office. A total of 1,512 small-scale loan accounts, 59 large-scale loan accounts, and 480 SCCS loan accounts were used for the analysis.

Table 4.1. Distribution of borrowers by region, FY 1987/88-92.

Farm Size	Loan size			
	Western Region		Eastern Region	
	Less than Ksh. 50,000	Greater than Ksh. 50,000	Less than Ksh. 50,000	Greater than Ksh. 50,000
Less than 50 ha.	6,574 (548)	0 (0)	4,384 (366)	0 (0)
Greater than 50 ha.	0 (0)	460 (39)	0 (0)	600 (50)
Total	6,574	460	4,384	600
Totals, Each Region	7,034 (587)	0 (0)	4,984 (416)	0 (0)

Source: *AFC Statistical Digest*, 1988 and 1992.

Note: The expected sample size per category is in parentheses.

Distribution of Loan Funds by Administrative Provinces, AFC Regions, and by Loan Type

This section focuses on factors that influence repayment performance. Many factors-- regional location, type of the loan, type of enterprises--may have some effect. Distribution of loans by geographic location of borrowers within Kenya's administrative provinces, AFC administrative regions, and by type of loan are therefore presented. Then, descriptive statistics of the data variables are analyzed. This analysis is followed by relating default incidence to selected variables.

Distribution by Kenya's provinces

Loan distribution of the entire AFC lending volume by administrative provinces is shown in Table 4.2. The table also presents the distribution by AFC administrative area (region) within each province. There are eight AFC administrative area offices: five in the western region and three in the eastern region. AFC administrative boundaries closely follow political administrative boundaries. As shown in Table 4.2, each province has one area office except for Rift Valley, which has three area offices. Notice that borrowers in the Central and Coast provinces share one AFC area office.

Distribution of loans by AFC operational regions

The size of an AFC area office's operational coverage is determined by the (1) population demanding loans, (2) efficiency in communication between branch offices that compose the area, and (3) political administration boundaries for facilitating other services

Table 4.2. Distribution of AFC lending operations within Kenya's provinces, volume of lending, by province, and AFC area offices within the province

Province	Area (1,000 Ha)	Percentage Distribution of Total Land Area	AFC Areas Offices	Number of AFC Branch Offices	Number of AFC Borrowers	Total AFC Portfolio (Ksh 000)	Percentage of Total Arrears (%)
Central and Coast	12,322.30	2.30	1	9	6,198	239,411	54.00
Coast	8,430.90	14.63					
North Eastern	12,749.40	22.13	1	5	1,145	208,811	62.00
Eastern	15,377.30	26.69	1	9	4,897	255,361	86.00
Nairobi	75.4	0.13	HQ ^a				
Rift Valley	17,512.60	30.40	3	16	17,673	1,974,454	66.90
Nyanza	1,267.30	2.20	1	5	6,655	282,369	69.00
Western	872.2	1.52	1	5	7,854	284,495	80.10
Total	57,607.20	100.00	8	49	44,422	3,244,901	60.00

^aAFC headquarters.

such as land registration (Figure 4.1). The higher the population, the more the branches in a particular area. The socio-economic activities within a geographic area differ markedly and are influenced by ecological conditions, land tenure system, and ethnicity. AFC areas that include nomadic ethnic groups, which have low agricultural potential and a communal land tenure system are generally large. Table 4.3 also shows the number of branches supervised by each area office, the number of borrowers in each area, total AFC area loan portfolios and the percentage of these portfolios in arrears as of June 1993.

Table 4.3 shows loan distribution by AFC regions for the sample. In terms of the absolute number of borrowers, the Mt. Kenya area has the highest, followed by the Eastern area. Because Mt. Kenya is dominated by very small farms, it is probable that these farms are limited as to the level of investment. The North Rift and South Rift areas have the highest loan volume. The Coast and South Rift areas are dominated by beef and wheat production, respectively, which explains the relatively higher average loan size. The Mt. Kenya and North Rift areas are dominated by dairy and mixed farms.

Figure 4.1 shows the distribution of AFC area offices within Kenya. Towards the coastal, northeastern, and north parts of Kenya the area offices are more scattered, confirming the low agricultural potentiality of the region.

AFC lending activities are reported on a loan scheme basis. Because the loan scheme is an important aspect of funding sources and lending operations, this study adopts a similar analytical framework for AFC default problems. The next section analyses the distribution of loan funds of the sample by loan scheme (AFC small scale, AFC large scale and SCCS) and by area. The following section also summarizes the descriptive statistics of the data. Average values of selected variables from the sample are analyzed by loan scheme. The last section of this chapter identifies variables that have a high incidence of defaulted accounts. Variables that are found to be important are then used in the empirical analysis presented in Chapter 5 for predicting repayment performance.

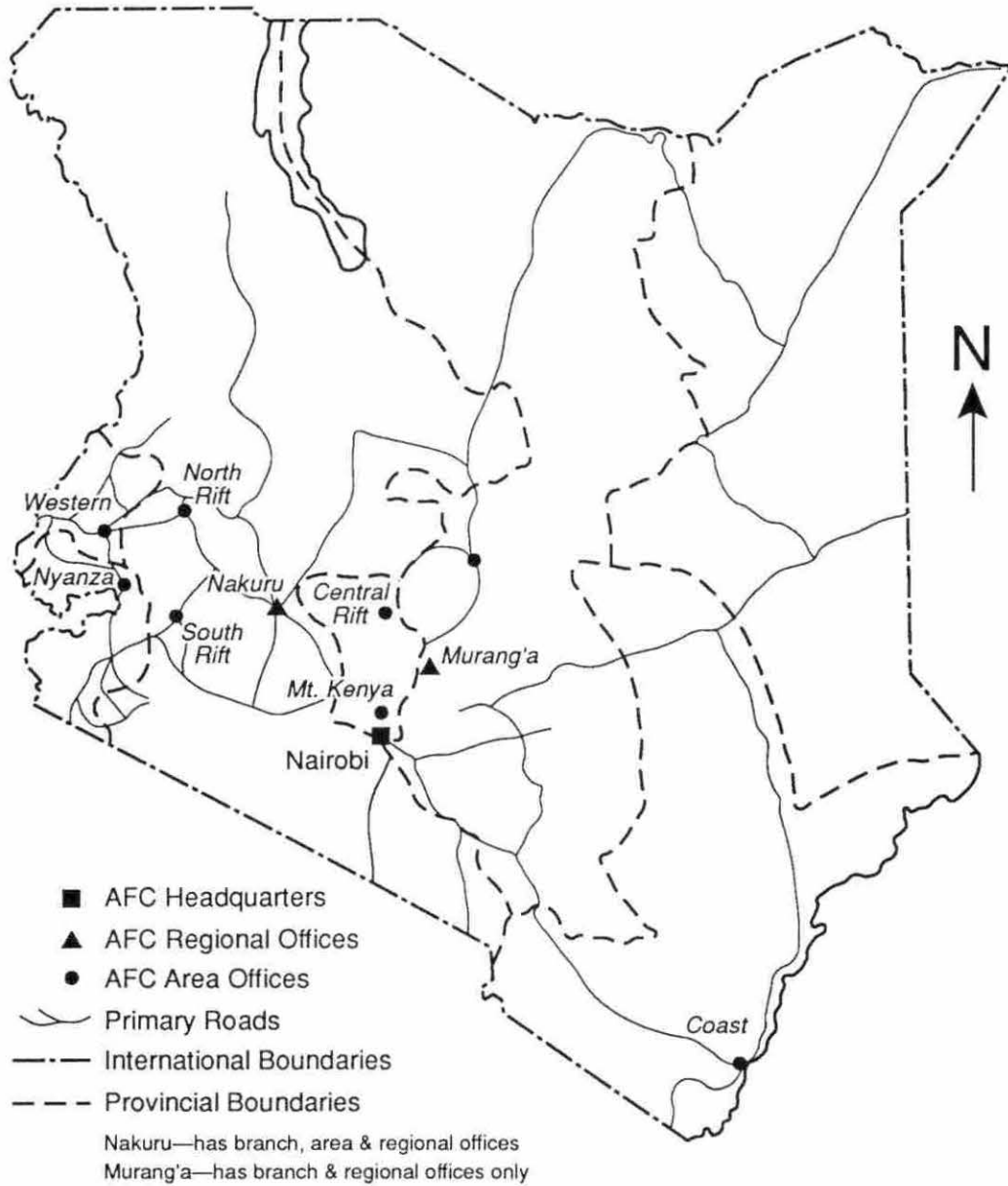


Figure 4.1 Distribution of Agricultural Finance Corporation Regional and Area Offices within Kenya's provinces.

Table 4.3. Loan distribution, by region (area)

Area	Number of Loans	Percentage Distribution of Loans	Average Loan Size (Ksh.)	Total loan Volume (Ksh.)	Percentage Distribution of Loan Volume
Eastern	320	16.0	62,625	20,040,074	9.0
Mt. Kenya	593	29.0	26,560	15,750,054	7.1
North Rift	273	13.0	268,723	73,361,391	33.9
Coast	43	2.0	352,172	15,143,399	6.8
Central Rift	251	12.0	57,723	14,488,498	6.5
Western	299	15.0	47,541	14,214,695	6.4
Nyanza	135	6.0	83,909	11,327,780	5.1
South Rift	136	7.0	431,435	58,675,125	26.0
Total	2,050	100.0		223,000,000	100.0

Distribution by loan type

The sample drawn from each region is as shown in Table 4.4. The actual number of observations exceeded the original expectations because ranch and SCCS loans were included. AFC loans are divided into two main categories: AFC scheme loans and SCCS loans. This distinction is important in assessing loan repayment performance later in this text. AFC scheme loans account for the highest share of total loans, at 77 percent, while SCCS loans account for 23 percent of total loans. Although large-scale loans account for only 3 percent of total AFC scheme loans, they account for 70 percent of the outstanding debt volume. Small-scale loans representing 74 percent of AFC scheme loans account for 30 percent of the debt volume. This imbalance implies that AFC directs a large proportion of its loan funds to a few large-scale borrowers, a situation observed in other studies on rural credit in LDCs discussed in Chapter 1.

Table 4.4. Distribution of loans, by loan type

Loan type	Number of Loan Accounts	Distribution of Loan accounts (%)	Total Loan Amount (Ksh.)	Distribution of Funds (%)
AFC Schemes				
Small-Scale Loans	1,512	74	40,194,010	18.0
Large-Scale Loans	59	3	94,038,934	42.2
Seasonal Crop Credit Scheme	480	23	88,768,072	39.8
Total	2,050	100	223,000,000	100.0

Table 4.5 shows the distribution of loan schemes by area and by loan type. The Eastern and Great Rift Valley (North, South, and Central Rift) areas benefit most in all schemes. The Great Rift Valley leads in the number of SCCS loans, while Mt. Kenya leads in the number of small-scale loans.

Descriptive Statistics of the Sample Variables

The loans show a wide variation in mean values of selected variables (Table 4.6). The coefficient of variation for some variables such as loan amount is over 100 percent. For SCCS loans, the variations are much higher because these loans are not categorized by size. Mean loan amount for large-scale loans is fifty-nine times greater than that of small-scale loans and nine times greater than that of SCCS loans. The age of the loan from the date of approval to the date of sampling shows that SCCS loans averaged four years old, followed by small-scale loans which averaged five years old. Because SCCS loans are intended to repaid

Table 4.5. Distribution of loans, by area and loan type

Area	Number of SSL ^a Accounts	Number of LSL ^b Accounts	Number of SCCS ^c Accounts
Central Rift	175	3	73
Coast	37	5	1
Eastern	297	21	2
Mt. Kenya	565	1	28
North Rift	95	7	170
Nyanza	119	10	6
South Rift	107	8	22
Western	117	4	178
Total	2,050	100	480

^aSSL = Small-scale loans less than Ksh. 50,000, with a repayment period of not less than five years.

^bLSL = Large-scale loans greater than Ksh. 50,000, with a repayment period of greater than five years.

^cSCCS = Seasonal crop credit scheme for maize and wheat production with a repayment period of one year.

on a yearly basis, the age of these loans is an indication of the aging of arrears for loans advanced prior to the 1993 crop season. The mean value of farm size between large-scale and small-scale farms is enormous, which provides a strong reason for separating the loans by scheme to reduce variations due to size in the analysis. Standard definition of the variables for large-scale farms is also substantially higher than that of small-scale farms.

Table 4.6. Mean values of selected sample variables by loan scheme

Loan Scheme	Variable											
	Loan Amount (Ksh.)			Loan Duration (months)			Loan Installment (Ksh.)			Age of the Loan (years)		
	N ^a	Mean	Standard	N	Mean	Standard	N	Mean	Standard	N	Mean	Standard
			Error			Error			Error			Error
Small-Scale	1511	26,580	42.9	1511	52.0	27.8	1,502	8,098	65.8	1,511	3.0	45.4
Large-Scale	59	1,593,880	187.7	59	113.0	61.7	58	316,629	177.2	59	2.6	62.3
SCCS ^b	480	184,999	532.4	480	15.8	69.0	480	98,789	396.0	480	4.0	31.3

Loan Scheme	Variable											
	Farm size (ha)			Security Value (Ksh.)			Other Assets (Ksh.)			Total Debt/Total Assets		
	N	Mean	Standard	N	Mean	Standard	N	Mean	Standard	N	Mean	Standard
			Error			Error			Error			Error
Small-Scale	1,511	3	153.3	1511	209,800	495	105	134,444	95.9	1511	253	73.7
Large-Scale	59	463	209.7	59	8,427,000	147	NA ^c	NA	NA	59	233.8	104.7
SCCS	480	45	657.9	480	2,587,000	1,437.8	480	886,451	327.2	480	171.4	167.2

Table 4.6. (continued)

Loan Scheme	Variables											
	Loan Installment/Loan Amount			Net farm Income (Ksh.)			Off-farm Income (Ksh.)			Total Expenses (Ksh.)		
	N	Mean	Standard Error	N	Mean	Standard Error	N	Mean	Standard Error	N	Mean	Standard Error
Small-Scale	1,502	0.32	53.4	461	47,839	79.3	303	41,557	119.7	429	25,781	8.4
Large-Scale	58	0.26	97.3	13	1,234,886	73.4	3	235,333	136.4	3	75,000	103.9
SCCS	480	1.0	28.8	193	135,842	382.9	87	29,726	135.8	152	61,755	786.5

Loans Scheme	Variable											
	Borrower Age (Years)			Farm Manager			Experience (years)			Number of Dependents		
	N	Mean	Standard Error	N	Mean	Standard Error	N	Mean	Standard Error	N	Mean	Standard Error
Small-Scale	1,500	49.0	21.7	458	Borrower	N/A ^d	357	13	72.4	447	6	59.9
Large-Scale	46	44.0	31.1	18	Hired	N/A	15	12	46.2	13	1	137.7
SCCS	473	56.0	23.1	186	Borrower	N/A	152	18	64.0	186	7	71.3

^aN = number of observations.

^bNA = not applicable

^cN/A = not available

^dSCCS = seasonal crop credit scheme

Distribution of Funds by Selected Performance Factors

This section traces performance factors identified in Chapter 3 and relates them to the repayment performance of borrowers in this study. The factors are grouped into two categories, as defined in Chapter 3: demographic (geographic location of the borrower, age of the borrower, size of the farm the borrower owns in hectares, and employment status of the borrower) and loan (loan scheme, loan duration, loan sequence (first-time or repeated borrowers), interest rates, and installment season).

Demographic factors

Geographic location

AFC borrowers are concentrated in areas with high agricultural potential, as evidenced by the branch network concentration in these areas. In areas with lower agricultural potential branch offices are sparse and so is the intensity of AFC lending operations. The main characteristics of the areas are described below.

Eastern and Coast areas: These areas run from the capital city of Nairobi to the northeastern parts of Kenya. The five branch offices in these areas are concentrated around the cities of Nairobi and Mombasa, cities that provide farmers with direct and competitive markets for farm produce.

Mt. Kenya area: This area is characterized by highly mixed farms. It lies around the vicinity of Nairobi, providing farmers with a ready market for farm produce. Intensive land use allows farmers to produce high-value horticultural crops for the Nairobi market.

North Rift, South Rift, and Central Rift areas: These three areas cover Kenya's most productive region, the Great Rift Valley. The areas contain 16 branch offices. The sum of these three areas is considered the granary of Kenya in terms of land potential and enterprise diversity.

Western and Nyanza areas: These two areas are highly populated, with the majority being traditional farmers. Production is 90 percent subsistence, and the population is highly ethnic.

Age

Distribution of loans by age reveals that older farmers (over 55 years) were the most frequent AFC borrowers, with average loans of Ksh.54,894. There were small variations in average loan amounts within the age group; however, the average loans among age group 35 to 45 were highest. Younger farmers are less frequent borrowers and held the smallest average loan size, at Ksh.48,240.

Farm size

Loan distribution by farm size is shown in Table 4.8. The highest concentration of loans was for farms of 1.0 to 2.5 hectares. Average loans within this category were below Ksh.30,000. The largest average loan size (over Ksh.1.00 million) was held by farms in the 20 to 35 hectare category, which represented 9 percent of total farms.

Table 4.8. Distribution of loans, by farm size

Farm Size ^a Category (Ha)	Number of Loans Accounts	Percentage of Total Loan Accounts	Total Loan Amount (Ksh.)	Percentage Distribution of Loan Amounts (%)	Average Loan within Farm Size (Ksh)
0 - 1.0	562	27	13,394,154	6.0	23,833
1.0 - 2.5	591	29	15,648,325	7.0	26,478
2.5 - 3.5	177	9	4,464,310	2.0	25,222
3.5 - 5.0	175	8	4,653,534	2.1	26,592
5.0 - 10.0	225	11	5,345,931	2.4	23,760
10.0 - 20.0	138	7	3,970,043	1.8	28,768
20.0 - 35.0	143	2	174,369,815	78.2	1,219,370
Over 35.0	39	7	1,154,904	0.5	29,613
Total	2,050	100.0	223,000,000	100.0	108,780

^aThe distribution for farm sizes between 20 and 35 hectares include SCCS loans. The bulk of SCCS loans fall within this farm-size category which explains the large average loan size.

Loan factors

Loan sequence: New borrowers vs existing borrowers

There were more entrants into AFC financing than there were borrowers continuing with AFC financing for second, third, and above loans. The proportion of new entrants into AFC financing was 44 percent, as opposed to 55.6 percent for existing customers. In this latter category, most borrowers were holding a second loan. The borrower with the highest number of borrowings had a twenty-third loan. This ratio suggests that the demand for AFC loans is stronger for new borrowers.

Some generalizations about loan demand and use can be made from this analysis.

This section has shown that large-scale farm borrowers are generally few, but their average

credit fund outlay is much larger than any other type of borrower; dairy loans are popular and there is a high demand of credit from new entrants.

Enterprises

A range of eighteen enterprises were financed by AFC loans during the study period (Table 4.7). Dairy enterprises were the most common loan recipients at 40.5 percent, followed by maize at 18 percent, and poultry at 10.4 percent. The other fifteen types of enterprise each accounted for less than 10 percent of loan distribution. This pattern of loan distribution indicates a higher concentration of loans for staple foods than for export crops such as tea and coffee. Within the AFC, intermediate loans for machinery tend to attract higher allocations of funds. Land is the most expensive item to finance, with loans averaging Ksh. 2 million. Beef production also ranks high, with average loans of Ksh. 300,556. Dairy production is popular among small-scale farmers and loans averaged Ksh. 35,180. Seasonal crop loans for maize and wheat had higher loan averages than those observed in the other seasonal crops. The average size of maize loans six times lower than the average size of wheat loans.

Loan duration

Twenty three percent of the loans during the period studied were short term (one to two years), 74 percent were medium term (five to six years), and 0.03 percent were long term (seven to twenty years). The distribution of loans by duration suggests that borrowers prefer medium-term rather than long-term loans, as dictated by need.

Table 4.7. Distribution of loans by enterprise, and average loan per enterprise

Loan Purpose	Number of Loans	Total Loans (%)	Total Loan Amount (Ksh.)	Distribution of Loan Volume	Average Loan Size (Ksh.)
AFC schemes ^a					
Beef	36	1.8	10,820,034	4.9	300,556
Coffee	65	3.2	1,218,400	0.5	18,745
Dairy	831	40.5	29,234,222	13.1	35,180
Fruits	13	0.6	388,900	0.2	29,915
Horticultural Crops	32	1.6	7,530,370	3.4	235,324
Infrastructure	94	4.6	2,764,540	1.2	29,410
Land Purchase	31	1.5	63,001,853	28.5	2,032,318
Machinery	12	0.7	5,671,800	2.5	515,618
Other Livestock	28	1.4	684,500	0.3	24,446
Other Permanent Crops	4	0.2	64,000	0.0	16,000
Other seasonal crops	13	0.6	237,000	0.1	47,400
Pigs	82	4.0	1,591,420	0.7	19,407
Poultry	214	10.4	5,251,755	2.4	24,541
Semi-Permanent Crops	62	3.0	2,335,400	1.0	40,266
Tea	54	2.6	1,229,900	0.6	88,921
Seasonal Crop Credit Scheme					
Maize	378	18.4	33,612,090	15.1	22,776
Wheat	101	4.9	55,155,982	24.7	541,099
Total for all schemes	2,050	100.0	223,000,000	100.0	

^aLarge-scale and small-scale loans.

Defining and Identifying Defaulters

In this section, the variables that have a strong relationship with default are identified. First, a dependent variable is defined, which is then related to the independent variables. The expected relationship of the dependent variable and the independent variables is also hypothesized. Second, the procedure used for the empirical analysis is specified. Finally, the model for predicting repayment by a borrower is defined.

The dependent variable is the observed relative default rate on principal and interest payments (arrears). For comparison across borrowers with unequal loan amounts, it is plausible to construct a relative default model as defined below:

$$\text{Default rate} = \frac{\text{Total loan amount overdue (Principal + interest) (Ksh)}}{\text{Total loan amount borrowed (Ksh)}}$$

Within the data, relative default is defined as the repayment performance of the borrower. Performance is shown to differ with region, loan scheme, and loan purpose, with the highest observed default rate among Kenyan borrowers within the seasonal crop growing regions. Ideally, the default ratio should not exceed one by a very large margin. When all installments are past due, however, the ratio is greater than one and the level of default rate will depend on the penalty charges accruing. This situation is more likely to occur with SCCS credit loans than with other schemes.

Demographic, and loan scheme and default incidence

The following section analyzes regional and loan scheme differences in default incidence. The default analysis is presented based on the following demographic and loan characteristics: borrower demographic characteristics: geographic location, age, farm size, and employment status and loan characteristics: purpose, interest rates, loan duration, repayment mode, loan sequence (new borrowers and borrowers with loans other than the first), and installment season.

Regional differences

Default incidence and geographic location

The North Rift area led all areas in default rate for AFC loans and the Mt. Kenya area had the highest incidence of defaults in terms of absolute numbers (Table 4.9). Maize production is the leading enterprise financed in the North Rift area. Because maize is a staple food crop, perhaps most of the maize produced is consumed by the borrowers' families, or perhaps the gross income level is not adequate to service debts.

The leading enterprise for defaulted loans in each area, shown in Table 4.9, is determined by comparing relative default within the area by enterprise. In other words, it is the percentage default rate, by enterprise, in a given area.

Table 4.9. Default rate, by AFC area and leading enterprise

Area	Absolute Number of Loans Accounts in Default	As a Proportion of All Defaulted Accounts	Mean Default Rate by Area (%)	Leading Enterprise in Default
North Rift	253	12	65	Maize
South Rift	97	5	63	Dairy
Nyanza	135	7	62	Dairy
Mt. Kenya	593	30	60	Poultry
Coast	43	2	58	Dairy
Western	299	15	57	Maize
Eastern	320	16	57	Dairy
Central Rift	251	13	45	Dairy
Total	1,991	100.0		

Loan scheme differences

Default incidence and enterprise financed

Although eighteen enterprises are financed by AFC, AFC has not adequately diversified its lending. As shown in Table 4.10, of the eighteen enterprises financed, five enterprises each held less than a 1 percent share of total loans and together held 2.2 percent of all loans during the study period. Six enterprises held less than a 2 percent share each and together held 6.3 percent of all loans. These eleven enterprises represented 61 percent of the eighteen enterprises financed by AFC, yet held only of 8.5 percent of all accounts. The next four enterprises each held less than 5 percent of total loans but collectively held 22.1 percent of all loans. The last three enterprises--dairy (40.5 percent), maize (18.4 percent), and

poultry (10.4 percent)--held 69.3 percent of all accounts. These figures show that AFC is likely to be vulnerable to production and price risks because its portfolio is not adequately diversified.

Seasonal crops, excluding maize, wheat, and horticultural crops had the highest default rate, at 77 percent. Beef production and refinancing of bank loans had default rates of 75 percent each. Other permanent crops, excluding tea, coffee, and fruit trees, had the lowest default rate, at 25 percent. Each enterprise had a relative default rate above 60 percent.

Short-term loans and default incidence

The default ratios are broken down into two main categories: 0 or less (current accounts) and greater than 0 (defaulters). Defaulters are further broken down into four ratio categories: greater than 0 - 0.1, 0.1 - 0.35, 0.35 - 0.75, and above 0.75 of arrears. These categories are relative default ratios calculated by dividing loan amounts by outstanding arrears. Within enterprises, default intensity varies with the enterprise financed (Table 4.10). Short-term credit (excluding maize and wheat) showed the highest default during the period studied, with a default rate of 23 percent in the above 0.75 relative default category.

Table 4.10 shows the intensity of default for AFC schemes by the four default categories and by enterprise. The AFC scheme defaulted loans are spread across the categories, while SCCS loans tend to have default concentrated at the extreme ends. At the lower end of the SCCS, a recovery rate of 90 percent was probably attained. At the upper

Table 4.10. Default intensity for AFC schemes, by enterprise

Loan Purpose	Default Ratio Categories			
	And Number of Loan Accounts in Each Category			
	To 0.1	0.1 - 0.35	0.35 - 0.75	Above 0.75
Beef	8	17	42	8
Coffee	14	22	18	8
Dairy	15	23	14	5
Fruits	15	8	15	23
Horticultural Crops	9	22	22	13
Infrastructure	15	20	18	11
Land Purchase	10	32	6	0
Machinery	33	8	0	8
Other Livestock	21	11	25	7
Other Permanent Crops	0	0	25	0
Other Seasonal Crops	15	23	15	23
Pigs	16	19	11	18
Poultry	11	18	15	16
Semi-Permanent Crops	5	14	22	7
Special Projects	0	25	50	0
Tea	22	2	7	2
Total Defaulters	222	314	242	126

Table 4.11. Default intensity, by AFC schemes and SCCS loans

Default Ratio Category	Default within AFC	
	Schemes (Large Scale and Small Scale) (%)	Default Within SCCS (maize and wheat) (%)
Below or equal to 0 (Current borrowers)	42.5	40.2
To 0.10	14.1	18.8
0.1 - 0.35	20.0	4.0
0.35 - 0.75	15.4	6.3
Above 0.75	8.0	30.7

end, 22 percent of the 1993 seasonal crop installments were still in process when the data were collected, probably affecting this end. For borrowers in default on earlier loans, the default rate is estimated at be less than 90 percent. Table 4.11 summarizes default by considering only AFC schemes and SCCS. The same trend in default is observed.

Default incidence and the SCCS (maize and wheat)

By removing the 1993 seasonal crop credit, the default rate remained the same, perhaps because most of the 1993 loans were not due for repayment. The 1993 crop held 5 percent of the total loans, with most of the installment scheduled for payment between January and March. Distribution of seasonal crop loans by area indicates that the Coast and Eastern areas are not providing this type of loan. The Western area provided 37 percent of all maize loans, and the North Rift area was second, providing 29 percent of all maize loans (Table 4.12).

Table 4.12. Distribution of seasonal crop credit by area

Area	Maize (%)	Wheat (%)	Total (%)
Central Rift	5	0.0	15.0
Mt. Kenya	4	2.0	6.0
North Rift	29	6.0	35.0
Nyanza	1	0.2	1.2
South Rift	2	2.0	4.0
Western	37	0.2	37.2

Table 4.13. Default intensity for maize and wheat

Loan Purpose	Ratio of Default to Loan Amount and the Number of Loan Accounts in Each Category			
	To 0.1	0.1 - 0.35	0.35 - 0.75	Above 0.75
Maize	18	3	6	34
Wheat	21	6	6	18
Total Number in Default	90	19	30	147
Without 1993 SCCS				
Maize	18	4	6	34
Wheat	21	5	5	18

Default incidence and borrower characteristics for SCCS loans

Default was intensive among maize producers (Table 4.13). 34 maize borrowers were under category 0.75 default rate as compared to 18 wheat borrowers. Table 4.14 shows a summary of default incidence across several loan and borrower characteristics. Farm size has a strong effect on default, large farms have higher default rates than do small farms.

Borrowers with special regular repayment remittances from wages, marketing boards, and banks and employed borrowers have lower default rates. Age of the borrower seems to have insignificant differences in default rate, although younger borrowers show a somewhat lower overall default rate. Seasonal crop default across age groups show that the default rate for older borrowers' was smaller than that of younger borrowers.

For further insights into identifying sources of default, Table 4.15 summarizes the characteristics discussed so far and compares defaulters and nondefaulters.

Table 4.14. A summary of default rate, by loan and borrower demographic characteristics

Characteristic	Characteristic Categories	Number of Accounts in Default	Proportion of Default Across Category	Default Rate Within Category ^a
Demographic Characteristics				
Age Group (Years)	24-35	85	7	47
	36-45	350	30	58
	46-55	376	31	61
	Over 55	381	32	58
Employment Status	Total	1192	100	
	Unemployed	887	73	59
	Employed	305	27	55
Total		1,192	100	
Farm Size (ha)	0.0 - 1.0	340	27	61
	1.0 - 2.5	315	29	53
	2.5 - 3.5	98	9	55
	3.5 - 5.0	108	8	62
	5.0 - 10.0	129	11	57
	10.0 - 20.0	84	7	61
	20.0 - 35.0	29	2	74
	Over 35.0	89	7	62
Total		1,192	100	
Loan Characteristics				
Loan Sequence	New loans	528	44	59
	Second loans	257	21	60
	Third and above	407	35	57
Total		1,192	100	

Table 4.14. (continued)

Characteristic	Characteristic Categories	Number of Accounts in Default	Proportion of Default Across Category	Default Rate Within Category
Loan Characteristics				
Installment Season	Jan-March	413	34	60
	April-June	252	21	60
	July-Sep	189	16	53
	Oct.-Dec.	338	28	58
Total		1,192	100	
Interest Rate (%)	12	775	65	57
	13	123	10	59
	14	4	0.3	57
	17	290	24	60
Total		1,192	100	
Repayment Mode	Irrevocable order			
	Open end	317	30	52
		875	70	61
Total		1,192	100	
Loan Scheme	AFC Schemes	905	77	58
	Seasonal Crops	287	23	60
Total		1,192	100	

^aThe default rate is obtained by considering the proportion of borrowers within that category out of the total observations (2,050 loans) and calculating the proportion of borrowers in default within the category.

Table 4.15 Comparative means of defaulters and nondefaulters, by loan type

	Defaulters				Nondefaulters		
	SCCS	Small Scale	Large Scale		SCCS	Small Scale	Large Scale
Repayment Performance	1	0	0	.	0	0	0
Loan Amount (Ksh)	163,412	26,530	1,377,011	.	221,059	26,652	1,933,328
Interest Rate (%)	17	12	12	.	17	12	12
Duration (Yr)	15	52	123	.	15	52	97
Installment (Ksh)	97,453	8,106	293,362	.	100,587	8,130	352,035
Overdue (Ksh)	34,373	8,517	448,274	.	0	0	0
Installment Season (quarters)	1	2	3	.	1	2	2
Repayment Mode	1	1	2	.	2	2	1
Penalty (Ksh)	7,682	880	43,066	.	0	0	0
Loan Sequence	3	2	2	.	3	2	2
Farm Size (Ha)	33	2	644	.	64	2	179
Security Value (Ksh)	3,837	220	6,430	.	838	196	11,553
Other Assets (Ksh)	988,387	122,249	NA	.	764,912	173,467	NA
Total Debt /Total Assets (Ksh/Ksh)	144	267	235	.	199	235	231
Current Debt/Total Debt(ksh/Ksh)	1	0	0	.	1	0	0
Net Farm Income (Ksh0)	140,553	46,442	1,089,164	.	130,015	50,122	NA
Off Farm Income (Ksh)	24,058	38,823	235,333	.	37,754	45,903	NA
Family Expenses (Ksh)	77,497	24,858	37,500	.	30,476	26,014	NA
Age (Yr)	55	49	47	.	57	47	40
Manager	1	1	3	.	1	1	NA
Experience (Yr)	17	13	10	.	17	12	NA
Dependents (No.)	7	6	2	.	6	7	NA
Employment Status	1	1	1	.	1	1	2
Education	3	3	4	.	2	3	NA

NA = not available; Manager: 1 = borrower, 2 = borrower's relative, 3 = hired manager.

Employment status: 1= unemployed, 2 = employed and Education: 1 = primary, 2 = secondary/high school, 3= college, 4 = university.

Influential Variables

Default incidence and intensity has been shown to be influenced by characteristics that can be grouped into two major categories: demographic characteristics of the borrower and loan-related characteristics. The demographic characteristics of the borrower include geographic location, age, employment status, and farm size. Loan-related characteristics include loan amount, the enterprise/project financed, security value, if new/existing client, repayment mode, installment schedule (the season of the payments, duration, and age of the loan from inception), and the debt-to-asset ratio. The location of the borrower can be considered as a proxy for quality of services the branch offices in the area provide the borrower and the agricultural suitability of the financed enterprises.

Variables identified as influential in previous studies (for example, debt-to-asset ratio, collateral, and regional characteristics) were found to be influential for this dataset. Other potential explanatory variables found to be influential, such as repayment mode and season, are included in the empirical analysis. Thus, loan default can be defined as:

$$f(\textit{demographic characteristics and loan characteristics of the borrower})$$

The next section estimates the influence of these variables on repayment performance. The dependent and independent variables are defined for the estimation model and the relationship of each independent variable in explaining the dependent variable is hypothesized.

Identification of the Procedure and Specification of Variables for Predicting Loan Repayment Performance

Dependent variables

Observed distribution of repayment performance by borrowers is important in specifying the prediction model. At the extreme ends, some borrowers made absolutely no payment, some made full repayment. In between, some borrowers made partial payments. A 0 value indicates that a borrower has no arrears, or perfect performance. Above 0, relative performance value is continuous and may increase infinitely (Figure 4.2). However, it is argued here that many borrowers differ in their repayment capacity from those who have perfect repayment, and therefore their relative abilities to repay differed. Again, the information on the characteristics of borrowers who have good repayment performance is an additional insight into distinguishing good and bad borrowers.

Maddala (1983) and Green (1992) discuss models to use when data is truncated. Green points out that the mean and the variance of the truncated random variable is of particular interest. If the truncation is from below, the mean of the variable will be greater than the mean of the original and vice versa. Truncation reduces the variance compared to the variance of the untruncated distribution.

Another characteristic of the dependent variable is that it is censored (Green, 1992; Maddala, 1983) because values in the 0 range (perfect repayment performance) are transformed and reported as a single value, although repayment capacity of borrowers is

believed to differ. The conventional regression methods therefore fail to account for the limit (zero) and the nonlimit (continuous) observations.

The dependent variable is defined as relative loan repayment performance. It is a continuous variable that measure each borrower's performance based on sample relative default, represented by *REPEFO*.

Independent explanatory variables

Independent variables include demographic characteristics of the borrower and loan-related variables. Dummy variables for regional effects are included to measure covariance in performance between regions.

AFC areas serving the borrower (AREA)

The *AREA* variables is a dummy with eight levels based on the eight operational areas adopted by AFC (1 = Eastern (intercept), 2 = Mt. Kenya, 3 = North Rift, 4 = Coast, 5 = Central Rift, 6 = Western, 7 = Nyanza, 8 = South Rift). Borrowers face similar loan conditions and regulations in the eight areas, but are served by personnel with potentially differing work ethics, discipline and efficiency. The variable *AREA* is included to reflect such differences.

AREA also provides insight into the geographic location of the borrower and information regarding land rights, which in turn affect collateral markets. For example, borrowers operating within the traditional farming areas are most likely to default. On the

other hand, the settlement areas and traditional farming areas that support export cash crops are likely to show superior repayment performance. Location and type of crop enterprise are correlated such that a borrower within the traditional area who grows an export cash crop is likely to be a current borrower within the area. In this case, nondefault within the traditional areas may be interpreted as an enterprise effect.

Areas with high SCCS accounts, for example, western with 15 of accounts, are likely to have higher incidence of default on AFC schemes than do areas with less SCCS accounts. The higher the number of AFC staff members, the more likely an area will show good performance. Differences in staffing are also expected to explain some regional differences (see farm location effects hypothesized above).

Borrower off-farm employment status (EMPLOY)

It is hypothesized that employed borrowers have lower default rates than do the unemployed. This variable is a dummy with two levels (1 if employed, 0 otherwise).

Purpose of loan funds (ENTP)

Staple food crop producers have higher incidences of default than do export and cash crop producers. Infrastructure, lifting of bank mortgages, and machinery loans are hypothesized to be positively related to default. The *ENTP* dummy has six levels for small-scale loans and three levels for large-scale loans. Small-scale loan enterprise dummies are: 1 = dairy, 2 = livestock, 3 = permanent and semi-permanent crops, 4 = other seasonal crops and horticultural crops, 5 = special investments: lifting of bank mortgage, machinery, and

contractor loans, and 6 = infrastructure loans. Large-scale loan enterprise dummies are 1 = dairy, 2 = livestock, and 3 = special investments: lifting of bank mortgages, machinery, and contract loans.

Wheat and maize (CROP)

CROP is a dummy for seasonal crop loans only (1 = wheat, 0 otherwise).

Loan installment repayment mode (RMODE)

Borrowers with special repayment arrangements in the form of standing orders have lower default rates. *RMODE* is a dummy variable with two levels (1 = periodic remittances from wages, salary, marketing board, or banker, 0 otherwise).

Loan sequence (LNUMB)

A longer time relationship (new borrowers vs old borrowers) is negatively related to default. This dummy has two levels (1 = new borrower, 0 otherwise).

Loan installment season (INSEASON)

Income streams are often irregular or have seasonal patterns. AFC prepares a constant repayment schedule, which is figured at the time of loan approval. Depending on the season, borrowers may run into difficulties trying to meet installment payments. For example, installments that coincide with seasonal cash needs have high chances of default. During school opening months (end of January, April, August, and December), which are holiday seasons, repayment performance is poor. Installments which are matched with income flows and at the same time avoid peak seasonal cash demands are expected to

perform better. Effects of this variable are expected to differ with each enterprise. These effects are more pronounced on seasonal credit loans than on other types of loans. The installment season is a dummy with three levels (1 = January to April, 2 = May to August, 3 = September to December).

Borrower age in years (AGE)

For long term loans, older borrowers are more likely to default; the reverse is hypothesized for short-term loans. Overall, older borrowers are more likely to default than are younger borrowers. Age is specified as a continuous variable.

Loan amount, expressed in (Ksh) (LAMOUNT)

LAMOUNT is expected to be positively related to default. This variable is continuous.

Loan duration in months (DURATION)

Longer-term small-scale debts have higher default rates than do shorter-term small-scale loans. The opposite applies for large-scale loans. This variable is continuous.

The size of the loan farm in hectares (FRSIZE)

This variable is positively related to default. *FRSIZE* takes on continuous values.

The value of land plus improvements offered as collateral (SECVALUE)

The collateral variable represents the security offered to secure the loan in Ksh. It is hypothesized that the security value is negatively related to default *SECVALUE* is a continuous variable.

The age of the loan in years (LONAGE)

This variable is hypothesized to be positively related to default. *LONAGE* is a continuous variable.

Total debt /total assets: Ksh./Ksh. (TDTA)

This variable is expected to be negatively correlated to default. *TDTA* is a continuous variable.

While the in-sample statistics provide some evidence and insights about the factors that influence loan repayment, the actual values of the influential variables can also be obtained using appropriate statistical methods of analysis. The variables identified above are incorporated in a model of the form:

$$Y^* = B'X + e,$$

where Y^* is the dependent variable, X is a vector of explanatory variables, and e is a random error term.

Explanation of the estimation method

This section explains the method of estimation for the model conceptualized in Chapter 3. The econometric method for the analysis is based on the observed distribution of repayment performance by borrowers (the dependent variable). Figures 4.2a, 4.2b and 4.2c show the distribution of the dependent variables for small-scale, seasonal crop credit, and large-scale loans respectively. From the figures, it can be clearly observed that the distribution of the dependent variable for each of the loan types is truncated at zero. Tobit

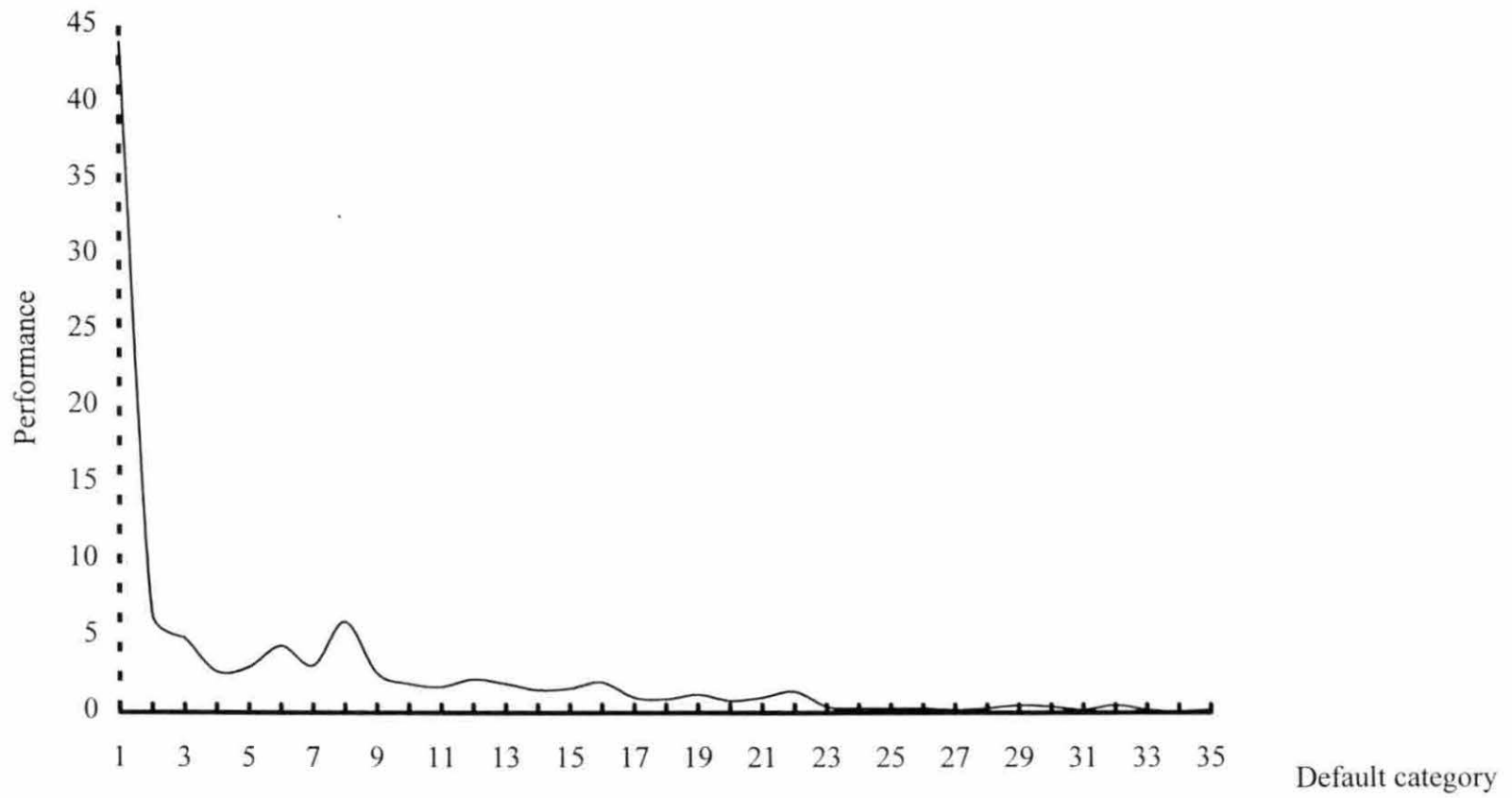


Figure 4.2. a. Distribution of loan repayment performance of AFC small scale loan borrowers

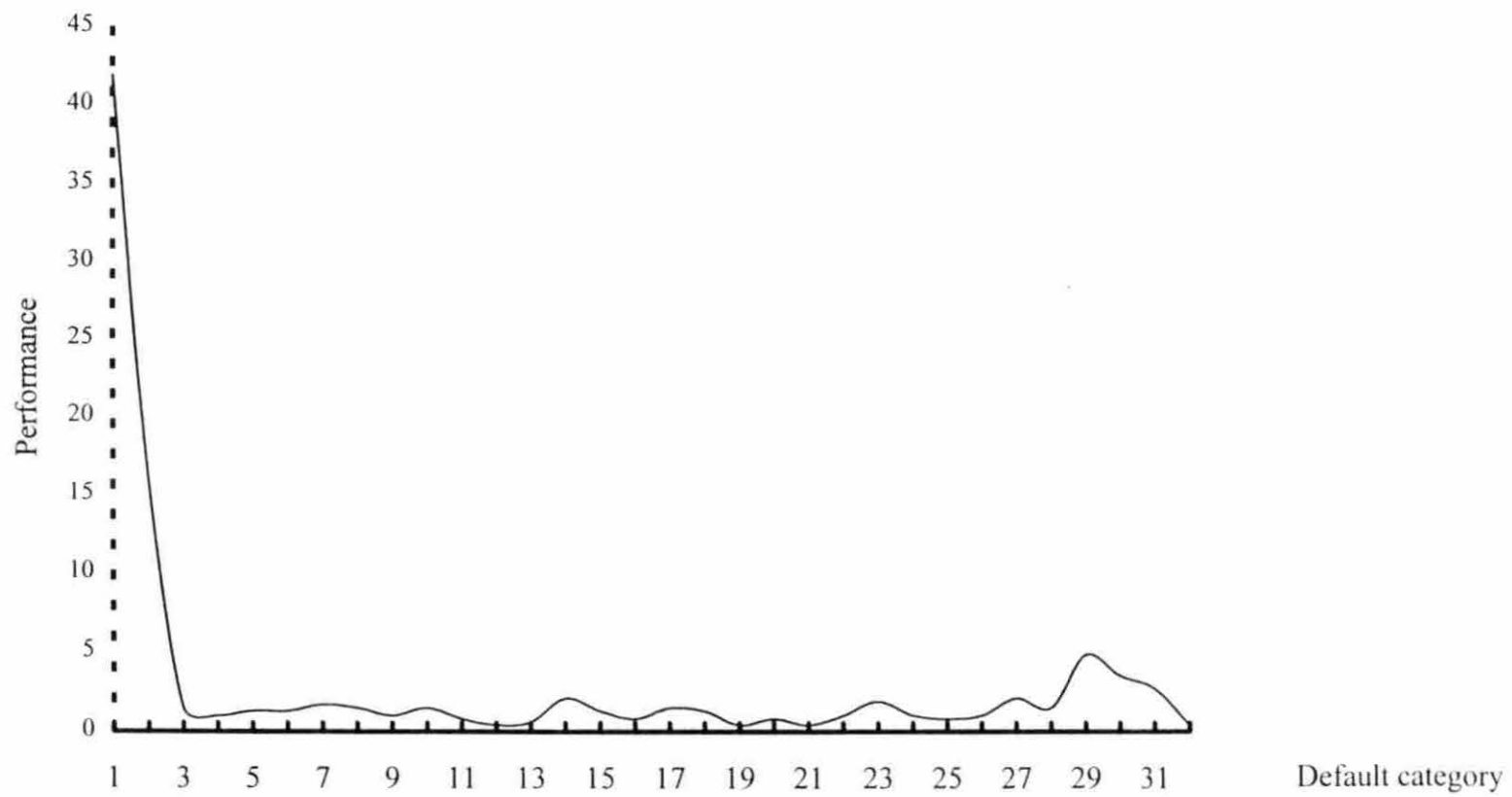


Figure 4.2. (continued) b. Distribution of loan repayment performance of AFC seasonal crop credit scheme loan borrowers

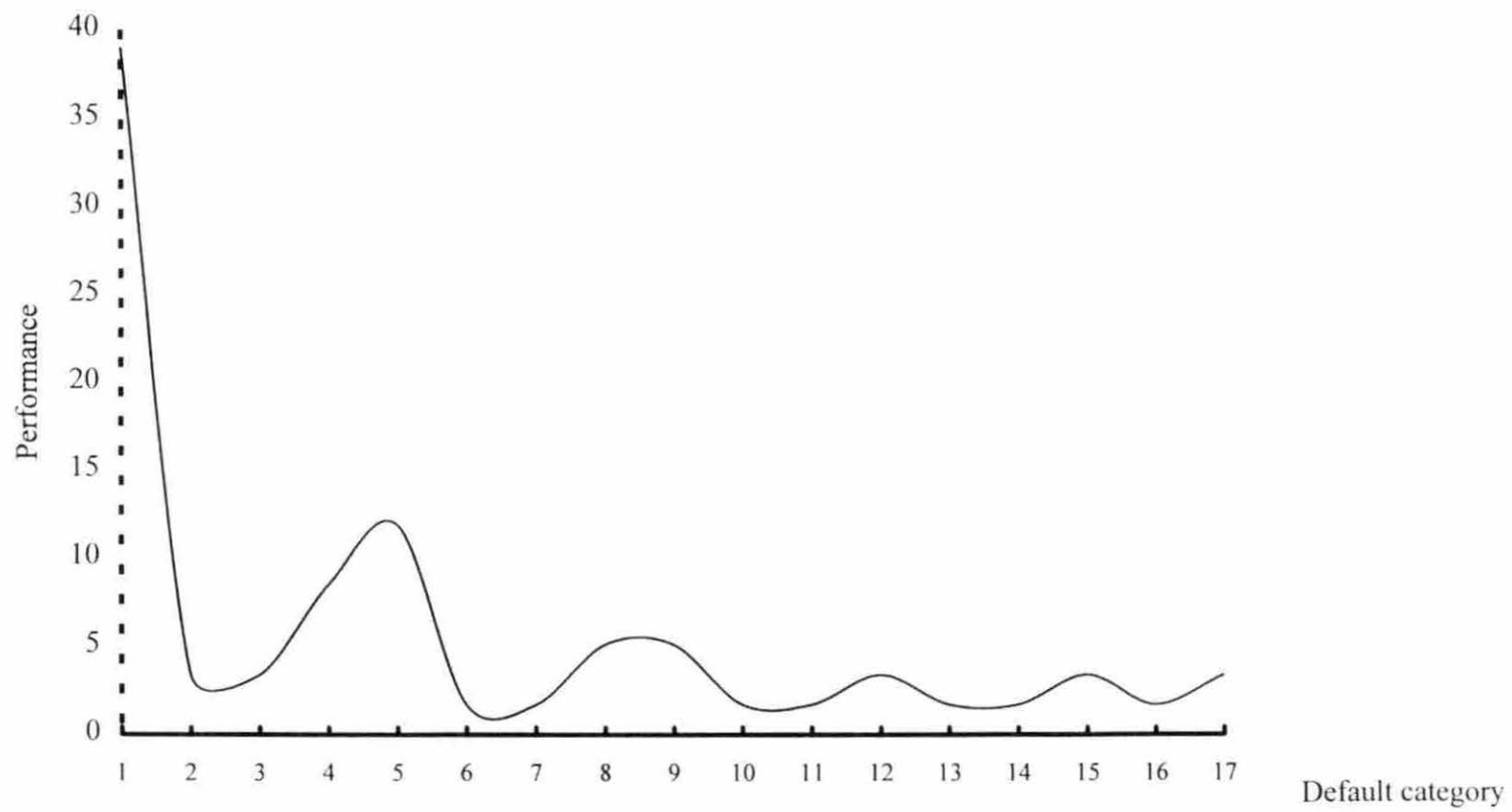


Figure 4.2. (continued) c. Distribution of loan repayment performance of AFC large scale loan borrowers

(1958; Maddala, 1983; and Green 1992) suggested the estimation of the censored truncated tobit model by maximum likelihood method. Regressing the dependent variable on the independent variables by ordinary least squares (OLS) may yield inconsistent parameter estimates due to truncation of observed repayment at zero. OLS is therefore inappropriate for estimating repayment performance when borrowers with zero default rate are taken into account.

Tobin, considered the first to use the censored truncated model, estimated incomes above or below a poverty line. Censored truncation occurs when sample data are drawn from a distribution that is limited in its range (Maddala, 1983; Green, 1992). Suppose that the sample of interest consist of observations above the poverty line so that all observations below the poverty line are lumped together and reported as if they are all at the poverty line. The distribution of the sample would therefore be truncated at the poverty line.

The censored truncated tobit model is selected over other methods because the censored values of interest introduce a distortion and bias in conventional OLS methods (Maddala, 1983). Maddala (1983) and Green (1992) recommend this method for investigating decision-making behavior when the variable of interest is limited in range. The method has also been successfully used in predicting demand for goods using household income data. Unlike pure truncation, censoring is a defect in the data in the sense that the dependent variable in the truncated section is unobserved while the independent variables are observable.

For the dependent variable in this study, the distribution of repayment performance is censored and truncated at 0.0. Instead of treating all borrowers who have zero arrears as if they had equal repayment capacity, the model assumes that they differed in their capacity to repay. Because similar information on explanatory variables for both current and defaulting borrowers is available, further insights can be obtained in inferring sources of default. The implication of this method is that repayment performance assumes continuous normal distribution and has a truncation at 0.0.

The model is derived from an underlying classical linear regression,

$$Y^* = B'X + e,$$

$$e \sim N(0, \sigma^2)$$

in which Y^* (repayment capacity) is not directly observed. The observed counterpart is a variable Y which is either censored or truncated with respect to Y^* (Green, 1990). The censored range of Y^* (accounts that show zero arrears) is the half of the line below 0.0. If Y^* is not observed, a 0 is observed for Y , otherwise the observation is Y^* (accounts with positive arrears). Maddala (1983) extended and simplified the application of these models.

Censored truncated tobit model

$$Y = \chi\beta + \mu \quad \text{if } Y > 0$$

$$Y = 0 \quad \text{otherwise} \quad (4.1)$$

where Y are the accounts with positive arrears and X is a set of explanatory variables.

Maddala (1983) provided an alternative formulation for the term of the index function by letting Y be the expenditure the individual can afford (analogous to repayment capacity) and

Y^* the-threshold expenditure (the price of the most inexpensive automobile acceptable to the individual. In this case, the level of repayment the borrower can handle):

$$\begin{aligned} Y_i &= 0 && \text{if } Y_i^* \leq 0 \\ Y_i &= Y^* && \text{if } Y_i^* > 0 \end{aligned} \quad (4.2)$$

Observed repayment are Y if $Y > Y^*$ and 0 otherwise. In this case, the formulation of the threshold Y^* is not necessarily zero and can vary from individual to individual. Among those who have arrears, there is a wide variation in the weighted arrears.

Suppose Y_i has a normal distribution with mean μ and variance δ^2 .

$$\begin{aligned} Y &= \beta' \chi_i + \mu_i && \text{if RHS} > 0 \\ Y &= 0 && \text{otherwise} \end{aligned} \quad (4.3)$$

are, respectively, density function and distribution function of the standard normal evaluated at $\beta' \chi_i / \sigma$.

For the observed y_i that are zero, all we know is that

$$\text{Prob}(y_i > 0) = \text{Prob}(\mu_i < -\beta' \chi_i) = (1 - F_i)$$

For the observations for y_i that are greater than zero, we have

$$\text{Prob}(y_i > 0) \cdot f(y_i | y_i > 0) = F_i \frac{f(y_i - \beta' \chi_i, \sigma^2)}{F_i}$$

Estimation of this model has become routine with computers. For this analysis, the LIMDEP (Green, 1992) computer package is used.

Model specification

Using the preceding statistical formulation, the equations specified below are estimated to test the probability of loan default. The equations are specified for each loan category.

The loans are divided into three categories: small-scale loans, seasonal crop credit scheme for maize and wheat , and large-scale loans . This system follows AFC's loan classification, which groups loans into categories with close similarity. For example, in small-scale loan category the maximum loan a borrower can receive is Ksh.50,000. Farm size is also limited to 20 hectares. Although loan duration ranges between three to five years, a few cases have a duration outside this range. Loan classification therefore reduce the range of important variables such as loan amount.

The variables selected were judged mainly from the descriptive analysis of default across various candidate variables and from the literature reviewed in chapter 3. Interestingly, the trends in the descriptive analysis supported what literature supported the default factors cited in the literature. Correlation matrix analysis helped in eliminate explanatory variables that contributed duplicate information. Another elimination and selection strategy was reliance on outside information. For example, beef loans are believed to be problematic due to constant drought and marketing problems. This dummy variable was expected to the increase probability of default.

Another elimination strategy was the chow likelihood test on the reduced model and full model (Pyndick and Rubinfeld 1981) and the t-test on the individual coefficients. This

strategy was useful for the regional enterprise dummy variables, which are a major components of the models. Different censored truncated tobit model equations are used for each loan type. The specifications differ due to data limitations and observed trends in the variables in the descriptive analysis.

$$\begin{aligned}
 REPEFO_{[SSL]} = & \alpha + \beta_1 AREA + \beta_2 EMPLOY + \beta_3 LNUMB + \beta_4 ENTP \\
 & + \beta_5 RMODE + \beta_6 INSEASON + \beta_8 AGE + \beta_9 AGE^2 + \beta_{10} LONAGE \\
 & + \beta_{11} DURATION + \beta_{12} LAMOUNT + \beta_{13} FRSIZE \\
 & + \beta_{14} FRSIZE^2 + \beta_{15} SECVALUE + \beta_{16} CDTD + \beta_{17} TDTA \quad (4.4)
 \end{aligned}$$

$$\begin{aligned}
 REPEFO_{[SCCS]} = & \alpha + \beta_1 AREA + \beta_2 EMPLOY + \beta_3 LNUMB + \beta_4 CROP + \beta_5 RMODE + \\
 & + \beta_6 INSEASON + \beta_7 AGE + \beta_8 LAMOUNT + \beta_9 FRSIZE \\
 & + \beta_{10} FRSIZE^2 + \beta_{10} SECVALUE + \beta_{11} TDTA \quad (4.5)
 \end{aligned}$$

$$\begin{aligned}
 REPEFO_{[LSL]} = & \alpha + \beta_2 EMPLOY + \beta_3 LNUMB + \beta_4 ENTP \\
 & + \beta_8 AGE + \beta_9 AGE^2 + \beta_{10} LONAGE \\
 & + \beta_{11} DURATION + \beta_{12} LAMOUNT + \beta_{14} FRSIZE \\
 & + \beta_{15} FRSIZE^2 + \beta_{16} SECVALUE + \beta_{17} CDTD + \beta_7 TDTA \quad (4.6)
 \end{aligned}$$

where α is a constant and β s are total effects of (a) the change in the probability that the borrower will perform at a given level, and (b) the change in the value of default given that the performance is at that level.

Summary

In this chapter, a framework for identifying factors that influence loan repayment is outlined. The models specified in (4.4), (4.5), and (4.6) represent a loan decision model for the sample by loan scheme. The analysis that follows attaches values to the selected variables. Any variable found to be statistically significant is incorporated in a the final loan repayment prediction study.

CHAPTER 5. EMPIRICAL RESULTS AND DISCUSSION

The main objective of this study is to identify factors that influence loan repayment to AFC. This chapter presents the results of the analysis and discusses parameter estimates, marginal effects, elasticity of the regression, and model fit. Policy implications of the findings and suggestions for future research are also presented.

Three equations specified in Chapter 4, (4.4), (4.5), (4.6), were estimated, one for each loan scheme. Different equations for each loan scheme were specified based on the descriptive statistics of the data discussed in Chapter 4 and on statistical tests on the contributions of the variables to the model, especially for the dummy variables. For each model, a Chow likelihood test (Pyndick and Rubinfeld, 1981) was performed on the dummy variables to confirm whether they contributed information for predicting repayment performance. The Chow likelihood test compares the sum of squares associated with two models (a reduced and full model). Because a reduced model involves more parameter restrictions than does the full model, the error sums of squares for the reduced model would be higher than that of the full model.

A comparison of the ratio of the differences leads to the decision of which variables to include in the final model. The Chow likelihood test eliminated regional and enterprise dummies in the large-scale loan model. Also, due to the small dataset for the large-scale, inclusion of the large number of variables resulted in loss of degrees of freedom. To test the contribution of individual variables, a t-test on individual β coefficients was used.

The dummy variables measure the change in the repayment performance intercept (with respect to the first dummy).

The results were obtained using the maximum likelihood of the censored truncated tobit model generated by LIMDEP econometric software (Green, 1992). The results for each of the three equations are reported in Tables 5.1, 5.2, and 5.3 for each loan type. For each model, a Chow likelihood test (Pyndick and Rubinfeld, 1981) was used to see whether the dummy variables contribute information for predicting repayment performance. Further, t-tests on individual β coefficients were used to test whether each variable contributes information to the models.

The model prediction results have three components: the latent default rate (unobserved), the observed default rate given the information that it is greater than zero, and the observed default rate not given any such information (Maddala, 1983; Green, 1990; Green 1992). The variable coefficients are the total effect of two components: the probability that the borrower will default, and the change in the value of the actual default rate for those predicted as defaulting (Maddala, 1983).

For further interpretation, marginal effects^{1,2} and elasticities³ at the means are calculated separately. The marginal effect of a variable is the partial derivative of the variable coefficient with respect to itself, holding all other variables constant. It can be interpreted as the effect of the variable on the dependent variable when all other variables are held constant. There are differences in the marginal effects in the model coefficients for the true default rate and the censored default rate. Elasticities at the means are

Table 5.1. Maximum likelihood estimates for the repayment performance for small-scale loans

Variable	Coefficient	Coefficient t-ratio	Marginal Effect	Elasticity at the Mean
Constant	-0.41958	-1.9830		
AREA2	0.06821** ^a	2.2910	0.012129	0.13212
AREA3	0.11319**	2.2930	0.003157	0.03439
AREA4	0.01812	0.2530	0.000213	0.00232
AREA5	-0.02486	-0.5750	-0.001339	-0.01459
AREA6	0.07642	1.6890	0.002737	0.02982
AREA7	0.17242*	3.9570	0.006504	0.07085
AREA8	0.02597	0.5410	0.000881	0.00960
EMPLOY	-0.07492*	-3.1660	-0.011042	-0.12028
LNUMB	-0.01339	-0.5730	-0.002830	-0.03083
ENTP 2	0.14956*	4.8540	0.015834	0.17248
ENTP 3	-0.01746	-0.4340	-0.000753	-0.00820
ENTP 4	0.01989	0.4350	0.000605	0.00659
ENTP5	-0.12186	-1.1030	-0.000618	-0.00673
ENTP 6	0.05721	1.2820	0.001686	0.01837
RMODE 2	0.06178	2.5290	0.020640	0.22484
INSEASON 2	-0.06988*	-2.5860	-0.009902	-0.10786
INSEASON 3	-0.07121*	-2.8320	-0.013362	-0.14556
AGE	0.01123***	1.4440	0.259185	2.82337
AGE2	-0.0105	-1.3790	-0.123829	-1.34890
LONAGE	0.12905*	15.3210	0.183337	1.99714
DURATION	-0.00657*	-6.1800	-0.160485	-1.74820
LAMOUNT	-0.00164	-1.0050	-0.020627	-0.22469
INSTALMT	-0.00219	-0.6040	-0.008391	-0.09141
FRSIZE	0.01553**	2.2460	0.017960	0.19564
FRSIZE ²	-0.04626**	-1.9360	-0.004438	-0.04834
SECVALUE	0.00347	0.3800	0.000343	0.00374
TDTA	0.34627*	5.1700	0.041646	0.45366
s	0.35994	37.9300		

Sample size = 1,491

^aSignificant at the 1 percent level. ** = significant at the 5 percent level. *** = significant at the 10 percent level.

Table 5.2. Maximum likelihood estimates for the repayment performance for seasonal crop credit scheme

Variable	Coefficient	Coefficient t-Ratio	Marginal Effect	Elasticity at the Mean
Constant	0.60708	2.909		
AREA2	-0.14595	-1.080	-0.15557	-0.02845
AREA3	-0.11528	-0.823	-0.17229	-0.02247
EMPLOY 2	0.02902	0.293	0.14509	0.005656
LNUMB 2	0.00349	0.035	0.00231	0.000681
RMODE 2	0.02378	0.302	0.01969	0.004634
INSEASON 2	0.34998*	3.282	2.23825	0.068211
INSEASON 3	0.4329*	5.176	1.60873	0.084372
AGE	-0.0067*	-2.634	-0.00007	-0.001310
CROPT 2	-0.23357*	-2.715	-0.66220	-0.045520
LAMOUNT	-0.00006	-0.448	0.00000	-1.20E-05
FRSIZE	0.00013	0.156	0.00000	0.000025
FRSIZE2	-0.00001	-0.212	0.00000	-1.00E-06
SECVALUE	0.00035	0.448	0.00008	0.000068
TDTA	-0.4802*	-2.743	-1.72774	-0.093590
s	0.59401	21.710		
Sample size	473			

*Significant at the 1 percent level.

Table 5.3. Maximum likelihood estimates for the repayment performance for large scale loans

Variable	Coefficient	Coefficient t-ratio	Marginal Effects	Elasticity at the Means
Constant	-0.48393	-1.47600		
ENTP2	0.09120	0.94200	0.07923	0.150236
ENTP5	-0.05870	-0.53400	-0.05102	-0.102799
RMODE2	-0.05470	-0.63400	-0.04753	-0.063837
AGE	0.00400	0.32100	0.00348	0.000057
AGE2	0.00277	0.19100	0.00241	0.000083
LONAGE	0.14703* ^a	4.28000	0.12771	0.032957
DURATION	0.00105	1.31600	0.00091	0.000006
LAMOUNT	-0.00006**	-1.90000	-0.00006	0.000000
INSTALMT	0.00044*	3.25800	0.00038	0.000001
FRSIZE	-0.00051	-1.24100	-0.00044	-0.000001
FRSIZE2	0.00001	1.34700	0.00001	0.000000
CDTD	0.01880	0.06700	0.01634	0.042857
TDTA	-0.47412*	-1.97500	-0.41182	-1.177112
s	0.18647	7.15800		
Sample size	45			

*^aSignificant at the 1 percent level, ** = significant at the 5 percent level.

calculated for each variable.

For the index variable Y^* , the marginal effect =

$$\frac{\partial E[y_i^*|x_i]}{\partial x_i} = \beta \quad (5.1)$$

For Y given the censoring, the marginal effect =

$$\frac{\partial E[y_i|x_i]}{\partial x_i} = \beta \Phi\left(\frac{\beta' x_i}{\sigma}\right). \quad (5.2)$$

Elasticity at the mean =

$$\frac{\partial y}{\partial \chi} = \frac{\bar{y}}{\bar{\chi}} \quad (5.3)$$

An elasticity measures the effect of a 1 percent change in the independent variable, that is, the percentage change in repayment performance with respect to a particular variable.

General consistency was observed for the signs of the parameters. A positive sign on the coefficient indicates that the total effect of being a defaulter increases with the value of the variable; a negative sign indicates a decrease. Signs on the dummy variables are interpreted in a similar manner. The coefficients of the dummy variables other than the intercept dummy are interpreted as the differential effects of the intercept dummy relative to the variable. For example, the Eastern area is the intercept dummy for small-scale loans. The coefficient of the dummy for the Nyanza area is interpreted as the differential effect of the Eastern area relative to the Nyanza area. Results on specific loan types are discussed in the following sections.

Discussion of Results

Repayment prediction results for small-scale loans

The results for small-scale loans are presented in Table 5.1. The model groups six dummy variables together. Three groups of dummies are regional and enterprise related. Of the demographic variables, age and employment status have the expected signs. Loan-related factors also seem to have the expected signs. Age of the loan from the first installment date (*LONAGE*), the ratio of total debt to total assets (*TDTA*), loan amount (*LAMOUNT*), loan installment (*INSTALMT*), the size of the security farm in hectares (*FRSIZE*), and the loan duration (*DURATION*) were expected to have positive signs because they reflect financial risk. All had the expected signs except for *LAMOUNT*, *INSTALMT*, and *DURATION*. *LAMOUNT* and *INSTALMT* did not have statistical significance. *DURATION* and *LONAGE* were significant implying that default rate declines with duration but intensifies with time.

Intuitively, the sign in the *LONAGE* implies that a borrower in default experiences difficulties in reversing the situation. The sign of the coefficient of *TDTA* implies that the default rate will increase with an increase in the debt-to-asset ratio. Age of a borrower (*AGE*) shows a positive sign but is statistically insignificant. The curvature term (AGE^2) indicates that the default rate is maximum when the borrower is 53 years of age. The default rate increases with age but at a decreasing rate.

The signs of the coefficients of the regional dummy variables show that all areas have positive default probability except the Eastern (*AREA 1*) and Central Rift (*AREA 6*). The coefficients of the two areas, however, have no statistical significance. As expected, Nyanza

(*AREA 7*) shows the strongest positive effect on default. A borrower from Nyanza is more likely to default than a borrower from any other region. Nyanza is predominantly subsistence farming. Surprisingly, despite the commercial nature of farming in the Mt. Kenya (*AREA 2*) and North Rift (*AREA 3*) areas, borrowers in these areas are nearly equally as likely to default as those in Nyanza. This situation is perhaps due to the problematic beef loans that dominate the two regions. The beef industry has been somewhat neglected, and ranchers have low calf turnover and a poor marketing system.

All the enterprises financed show a positive relationship with default (that is, they increase default rate) except for permanent and semi-permanent cash crops (*ENTP3*). Only livestock loans (*ENTP 2*) show a statistically significant positive coefficient. As expected, employment (*EMPLOY*) and borrower reputation (represented by a second or more loans, *LNUMB 2*) reduce default, as shown by the negative signs of the coefficients. Borrowers without a special repayment standing order are likely to default.

Installments scheduled in May through December help reduce default (*INSEASON 2* and *INSEASON 3*) compared with those scheduled in other months. May marks the beginning of harvesting. Farmers have less demand for cash for new entrants into high school in September compared to January. The months of January through March have higher cash demand, especially because this period marks the beginning of planting season.

The marginal effects on the true default rate are the coefficient estimates. However, the interpretation of the marginal effects of explanatory variables on the true default rate and observed default rate are different. For the true default rate, the marginal effect of loan

duration, for example, can be interpreted as the reduction on the true default rate by 0.00657 for an increase in duration of one month, all other explanatory variables held constant.

Repayment prediction results for SCCS loans (maize and wheat)

Results of the SCCS are presented in Table 5.2. For this loan category, the two regional dummy variables included in the model were expected to show significant differences in repayment performance. Both variables reduce the default rate because they have negative signs but are not significant. Employment status (*EMPLOY 2*), loan number (*LNUMB 2*), and repayment mode (*RMODE 2*) have no significance, although they all have positive signs as expected. The installment season variable (*INSEASON 2* and *INSEASON 3*) was expected to increase default. These two variables had expected effects with statistical significance.

Age of the borrower is negatively related to default. Wheat producers (*CROP 2*) are likely to have lower default rate than are maize producers. The amount of loan advanced (*LAMOUNT*), the size of the farm (*FRSIZE* and *FRSIZE²*), and the value of security (*SECVALUE*) were not significant. The debt-to-asset ratio (*TDTA*) was significant, indicating that the higher the ratio the more likely a borrower is to default. Elasticity at the mean was greatest for installments scheduled between the months of May and August (*INSEASON 2*).

Repayment prediction results for large-scale loans

The results for large-scale loans are reported in Table 5.3. The enterprise dummy variables (*ENTP 2*) have the expected sign but are insignificant. The dummy for refinancing of bank loans, land purchases, and machinery combined (*ENTP 5*) has an unexpected negative sign. This could be explained by the nature of the items financed. For example, machinery has a competitive secondary market which allows for ease in enforcing repayment. Similarly, purchased land has less social and family pressure and can thus be disposed of easily.

Repayment mode, age, loan duration, and farm size, although not statistically significant, have the expected signs. The age of the loan from first installment (*LONAGE*) is significant and has the expected signs. The installment amount also has the expected positive sign, which implies that high installment amounts increase the default rate. The debt-to-asset ratio is positive and significant. The debt-to-asset ratio (*TDTA*) has the highest elasticity for large-scale loans, and the age of the loan (*LONAGE*) ranked second. This was also true for marginal effects.

Comparison of the Three Repayment Prediction Models

The results of the three models show that loan-related characteristics of borrowers significantly influence loan repayment. In all three loan categories, the debt-to-asset ratio matters. For small-scale loans, the debt-to-asset ratio increased the probability of default, and vice versa for seasonal crop credit loans and large scale loans. This result may imply that

small-scale borrowers have smaller or weaker debt capacity than do borrowers using the other schemes. Moreover, for SCCS, the land and asset levels matter more than for a small-scale loan which is a medium-term credit. The results show that the age of the loan, increases the probability of default for long-term loans. Regional differences also matter for small-scale loans; areas where export and cash crops dominate are likely to have lower default rates.

Conclusions

One major aim of this study is to provide a strategy for reducing default risk at the loan-making stage and/or during the project life of a loan already granted. Providing credit to small farmers in LDCs is difficult, mainly because of the role agriculture plays in these economies. Moreover, the speed required to process loan applications at the beginning of cropping seasons does not allow for careful assessment of borrowers. When loans mature for collection, lenders have inadequate time to contact and monitor harvesting, delivery, and payment of proceeds to farmers, and security for aggressive loan collection. This is because all borrowers harvest at more or less the same time with a huge percentage of the season's installments falling due at the same time. It is therefore imperative that lenders formulate new strategies that provide efficiency in services without reducing the quality of the loans made. This section presents a summary and conclusions.

As described in Chapter 1, farm credit programs have been characterized by massive series of capital infusions to LDCs. These programs were attempts to improve the long-term

well-being of rural communities. The observed economic deterioration in most LDCs, especially in sub-Saharan Africa in the 1980s, has been quite a disappointing outcome considering the amount of resources already invested. The general characteristics of the poorest LDCs include an extremely poor export performance, which is linked to a narrow-based commodity composition (over 70 percent of the countries rely on a few primary commodities), protectionistic measures (for example, pricing and tariff structures that reduce the scope of diversification), high population growth (about 3 percent per year), low domestic private investment due to declining domestic savings, and growth prospects restrained by heavy debt burden (Jepma, 1992).

Mobilization of domestic financial resources has been difficult because low savings as a result of decreasing per capita income and lack of adequate or efficient rural financial institutions. External capital inflow has generally been inadequate in meeting government financial requirements for development. As a result, there is increasing pressure for governments to improve the efficiency and management of financial resources.

Throughout this study, an attempt has been made to inquire into the factors that influence loan repayment among AFC borrowers, given the reasoning that there is an important role for government-sponsored credit in Kenya in the process of economic growth and development. As the literature on the performance of farm credit institutions reveals, government-sponsored institutions have generally failed to attain equity and efficiency in resource allocation and utilization. This view is strongly supported by several research findings (Braverman and Gausch, 1989, and Adam and Von Pischke, 1990, among others).

The important place of specialized farm credit institutions in Kenya's economy is clear from the overview of AFC operations presented in Chapter 2. In light of this situation, it is most improbable that the society will expect AFC to play a leading role in financial intermediation. At the same time, AFC must remain viable and financially stable if farmers are to build confidence in AFC as a long-term lender. In the figures showing loan collection and approvals, loan repayment increased substantially when farmers were sure of further opportunities for borrowing.

The financial practices of borrowers have been changing with changes in the social and political structure and economic conditions. Such trends require constant adjustments in contractual credit relationships. AFC has to recognize, therefore, that the financial practices of farmers change and that such changes require appropriate institutional adjustments. AFC's potential and the growing awareness of the importance of its ability to influence economic activities has led to increased concerns about its role in rural financial intermediation. More importantly, improvements in its lending capacity to the society as a contribution toward economic growth and development is crucial for the future.

It is against this background that the overview of Kenya in Chapter 2 and the analysis in Chapter 4 have been undertaken. A statistical analysis of the characteristics that influence loan repayment in Kenya suggest that the probability of loan default is not random; it increases with some enterprises and regions, high debt-to-asset ratio and farm size. Default will tend to decrease for some enterprises (for example, export crops) and shorter loan duration.

The results of this study highlight several important factors that should be considered when evaluating loan default problems. Default problems are complex, and they encompass a wide range of factors within the borrower's demographic characteristics and loan characteristics. It is therefore important for lenders to acquire as much information as possible during loan origination and to use such information in identifying causes and sources of default.

Demographic characteristics

Specific conclusions based on the results of the findings about borrowers' demographic information. Loan default among small scale borrowers is explained by regional differences which also influence the enterprises which are AFC finances. Enterprise diversification should be considered whenever possible within a region. It is important for AFC to attempt as much as possible to avoid loans falling into default, because once they do so, it is almost impossible to correct the situation.

Loan characteristics

Loan characteristics are important and the study shows that debt to asset ratio is an important factor for term loans among small scale borrowers than it is for short-term loans and large scale borrowers. This suggests that majority of small farmers have limited resource base and have a greater financial risk in long term loan relationship. Farm size is an important factor. This implies that very small farmers may require very intensive land use program in order to attain a reasonable return to investments. Borrowers with very small

farms are more likely to default, and the relationship changes as farms get larger. Small scale borrowers benefit from longer repayment schedules.

Policy implications

This study has attempted to identify factors that play a role in default problems among AFC borrowers in Kenya. Isolating the relative importance of these factors reveals their relative influence on default and thus would improve the lenders' decision during credit granting. Overall, the use of objective credit repayment prediction methods can enhance lending decision efficiency in a more cost-effective way. It eliminates wide variations that breed mistrust among borrowers, and reduce the time required to appraise a loan.

Repayment prediction tools are being advocated on the grounds that they remove subjective evaluation methods which are often difficult to reference at a later date. They also improve the desire of loan officers to know their clients better by collecting information that is necessary for such evaluation.

Research implications

This study points out that majority of AFC borrowers are defaulting. The results emphasize that the highest default is among the seasonal crop producers, particularly maize. The majority of term borrowers who default are characterized by low asset value and their performance co-vary within regions and the enterprises they are engaged in. It is not certain whether this result is unique to our particular sample data. Again, the proportion of large

scale borrowers in the sample was relatively small, thereby limiting the predictive power of the characteristics that may influence their performance.

The results also reveal that security value, which is a highly valued decision tool does not matter in repayment performance. The entire sampled borrowers had security pledges yet security did not have any statistical significance. A future effort should attempt to analyze the role of securities pledged play. Security has always been to provide a means of recovering outstanding amounts when borrowers default. However, if the lender's ability to foreclose on defaulted mortgages are limited, it is important to consider other forms of pledges. In this study, the effects of farm income was not considered because of data limitation. Developing a model that incorporates income variables could improve this study.

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APPENDIX

A.1. Kenya's per capita of land and labor and land/labor ratio in agriculture

Year	Land per capita	Labor per capita	Ratio of land area to agri.labor
1963	0.22	0.12	0.52
1964	0.23	0.12	0.51
1965	0.24	0.12	0.49
1966	0.28	0.13	0.46
1967	0.29	0.13	0.45
1968	0.32	0.14	0.44
1969	0.34	0.14	0.41
1970	0.37	0.15	0.40
1971	0.41	0.16	0.39
1972	0.45	0.18	0.39
1973	0.52	0.20	0.38
1974	0.61	0.23	0.38
1975	0.66	0.27	0.42
1976	0.66	0.33	0.50
1977	0.79	0.41	0.51
1978	0.94	0.45	0.48
1979	0.99	0.47	0.47
1980	1.14	0.52	0.46
1981	1.31	0.60	0.45
1982	1.47	0.67	0.46
1983	1.73	0.73	0.42
1984	1.90	0.67	0.35
1985	2.13	0.74	0.35
1986	2.48	0.83	0.34
1987	2.70	0.90	0.34
1988	3.08	1.01	0.33
1989	3.27	1.04	0.32
1990	3.46	1.07	0.31
1991	3.46	1.09	0.30
1992	3.48	1.11	0.30

Source: FAO Yearbook, U.N Yearbook of national accounts, and World Development Report, various years

A.2. Distribution of AFC combined large and ranch loans, and small loans portfolio:
Outstanding unmatured principle 1980-92 (Ksh.)

Year	Large-scale and Ranch Portfolio	Small Loans portfolio	Total Portfolio
1980	27,536,929	8,445,848	35,982,777
1981	29,388,139	10,658,255	40,046,394
1982	35,959,520	9,695,173	45,654,693
1983	36,659,861	9,180,809	45,840,670
1984	39,405,077	12,072,508	51,477,585
1985	44,593,829	12,689,523	57,283,352
1986	51,699,153	17,152,755	68,851,908
1987	62,835,169	21,777,031	84,612,200
1988	66,658,585	24,492,172	91,150,757
1989	68,507,816	24,379,179	92,886,995
1990	65,138,297	26,976,811	92,115,108
1991	68,074,532	25,118,649	93,193,181
1992	72,892,573	27,179,572	100,072,145

Source: AFC annual reports, various years

A.3 Number of borrowers receiving loans by loan scheme: 1980-92

Fiscal Year	Large scale	Small scale	Ranch	SCCS	Total
1980	811	4955	107	4589	5873
1981	587	1972	68	9435	12062
1982	452	1585	106	22116	24259
1983	672	2032	121	16290	19115
1984	459	4551	109	8252	13371
1985	484	2721	199	9250	12654
1986	721	4160	180	7701	12762
1987	432	3154	130	5133	8849
1988	183	2140	95	3246	5664
1989	86	2595	4	2304	4989
1990	261	2761	74	2355	5451
1991	112	1485	37	1854	3488
1992	153	1977	55	1053	3238
Totals	5413	36088	1285	88989	131775

Source: AFC annual reports, various years

A.4 Loan amount approved by loan scheme: 1980-92 (Ksh. 000)

Year	Large ^a Scale	Small ^b Scale	Ranch ^a	SCCS ^c	Total
1980	70,820	51,847	32,988	125,400	155,655
1981	94,642	25,431	43,647	380,100	543,820
1982	64,846	35,639	21,284	396,200	517,969
1983	100,331	46,497	19,118	389,100	555,046
1984	152,154	103,793	49,622	246,600	552,169
1985	244,921	76,833	33,981	261,400	617,135
1986	120,250	343,876	20,554	256,682	741,362
1987	133,003	105,147	67,429	350,960	656,539
1988	91,952	62,038	19,878	260,068	433,936
1989	159,347	78,699	30,710	209,793	478,549
1990	147,899	92,712	15,001	200,262	455,874
1991	276,952	53,557	12,894	208,509	551,912
1992	233,085	69,312	11,790	184,645	498,832
Totals	1,890,202	1,145,381	378,896	3,344,319	6,758,798

Source: AFC Statistical Digest March 1988 and Dec. 1992

^aLong term-(over 5 years)

^bMedium term (upto 5 years)

^cShort term

A.5. Average loans by loan scheme, average loans for all AFC loans (Ksh.000) and ratio of small-scale to large-scale loans: 1980-92

Year	Average loans per AFC scheme			SCCS	Average loan per borrower	Ratio of Small-scale to Large-scale loans	Ratio of Small-scale to (Large-scale + Ranch loans)
	Large-scale	Small-scale	Ranch				
1980	87.32	10.46	308.30	27.30	26.50	8.35	37.81
1981	161.23	12.90	641.87	40.29	45.09	12.50	62.27
1982	143.46	22.49	200.79	17.91	21.35	6.38	15.31
1983	149.30	22.88	158.00	23.89	29.04	6.52	13.43
1984	331.49	22.81	455.25	29.88	41.30	14.53	34.50
1985	506.04	28.24	170.76	28.26	48.77	17.92	23.97
1986	166.78	82.66	114.19	33.33	58.09	2.02	3.40
1987	307.88	33.34	518.68	68.37	74.19	9.24	24.79
1988	502.47	28.99	209.24	80.12	76.61	17.33	24.55
1989	1852.87	30.33	7677.50	91.06	95.92	61.10	314.25
1990	566.66	33.58	202.72	85.04	83.63	16.88	22.91
1991	2472.79	36.07	348.49	112.46	158.23	68.56	78.23
1992	1523.43	35.06	214.36	175.35	154.06	43.45	49.57

Source: AFC Annual reports and accounts for the years 1979/80 to 1991/92

A.6 Loan collection: 1980-92 (Ksh. 000)

Year	Large. Scale	Small-scale	Ranch	SCCS	Total
1980	115,725	54,257	3,186	86,431	259,599
1981	92,229	44,572	27,386	107,836	272,023
1982	111,472	52,513	37,976	168,261	370,222
1983	142,367	75,038	59,632	202,415	479,452
1984	172,703	60,819	78,766	242,390	554,678
1985	136,393	65,133	37,140	94,358	333,024
1986	137,737	86,074	41,877	358,613	624,301
1987	177,159	83,457	39,849	375,911	676,376
1988	194,206	29,899	47,449	432,347	703,901
1989	199,517	108,998	32,847	225,919	567,281
1990	150,145	92,645	121,175	188,073	552,038
1991	186,578	118,720	14,923	179,213	499,434
1992	158,600	100,300	5,300	214,800	479,000
Total	1,974,831	972,425	547,506	2,876,567	6371329