

An Economic Analysis of the Factors that Affect the Success of New Freehold Growers in the South African Sugar Industry

By

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DECLARATION

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ABSTRACT

The South African (SA) Sugar Industry is committed to transformation in land ownership and supports the SA government's target to transfer 30% of freehold sugarcane land to previously disadvantaged individuals (PDIs) by 2014 via the land market under the willing buyer/willing seller principle. The medium-scale farmer scheme for emerging commercial sugarcane farmers, which was introduced in 1996 to help redistribute commercial sugarcane farmland to PDIs is an important component of the SA Sugar Industry's land reform strategy. The average financial performance of emerging commercial farmers (now called New Freehold Growers or NFGs) in the SA Sugar Industry was below that of large-scale commercial farmers during 1997-2007 (real average annual net return per hectare of R390 versus R3 075 in 2007 Rand). Given that this trend raises concerns about the long-term viability of NFGs, the first aim of this study is to identify factors that distinguish between successful, less successful and unsuccessful NFGs using a stratified random sample of 96 NFGs in KwaZulu-Natal (KZN) surveyed during July-November 2008. These NFGs were classified according to whether their mortgage loans were current (successful), in arrears (less successful) or in the process of legal action (unsuccessful).

Student t-tests indicate that successful NFGs, on average, had *statistically significantly* more experience in farming sugarcane, larger farm sizes (proxied by average annual gross farm income), greater solvency and liquidity, and larger areas annually replanted to sugarcane than the less successful and unsuccessful NFGs. The successful NFGs also placed relatively more emphasis on computerized record keeping systems that can save time in conducting production and financial analyses to improve farm profitability. They also on average tended to make more use of their own financial record keeping system in addition to the services of bookkeepers, and used more risk management strategies than unsuccessful NFGs, in particular having off-farm investments and keeping cash and credit reserves.

A multinomial logit model of factors affecting the sample NFGs' mortgage loan repayment status estimated that extension contact, production and financial risk management capacity, farm financial and production management ability, own record keeping and cash management, and having more sugarcane farm experience to operate larger farm sizes were key determinants of successful loan repayment. The results suggest that policy makers can promote the viability of NFGs by (1) encouraging them to manage solvency and liquidity levels and implement replanting schedules in line with industry norms (e.g. debt:asset ratio of 0.5 or lower, and the replanting of 10% of the area under cane (AUC) per annum); and (2) facilitate the transfer of adequate size farms (expected annual gross farm income can meet annual loan repayments) in commercial transactions or transactions funded via government grants to farmers who have the relevant farming experience. New Freehold Growers are also encouraged to build business relationships with industry support staff, implement good record keeping practices, and develop strategies to manage risk (e.g. off-farm investment and holding cash and credit reserves).

The second aim of this study was to document the NFGs' perceptions of the scheme and industry role players in order to identify what aspects could be improved for both current and future farmers. The results suggest that most sample respondents (84%) can identify with, or have experienced the relatively low current returns (cash flow problems) usually associated with the early years after land purchase, while about 60% of the sample NFGs would have preferred to first lease their land before buying. Future NFGs, or the beneficiaries of other land reform initiatives, must be informed that an investment in land has low current returns relative to capital growth and that the annual profit from farming is low relative to the land value. The possibility of leasing could also be considered for future land transfers to NFGs or other land reform beneficiaries to help manage the liquidity constraints associated with land purchase. Ninety-nine percent of the sample NFGs felt that it was important for new farmers to have a mentor. Post-settlement support thus needs attention from industry role players, and a sustainable mentorship programme could, in part, meet this need.

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Introduction

After democratic elections in South Africa in 1994, the new South African (SA) government produced a land reform policy which was intended to redress (i) the forced removals of black people¹ from land; and (ii) the historic denial of access of black people to land. This land reform policy has three tiers, namely land restitution, land tenure reform and land redistribution – which collectively aim to transfer 30% of white-owned commercial farmland to previously disadvantaged individuals (PDIs)² by 2014 (Ministry of Agriculture and Land Affairs (MALA), 2001). The challenge facing policymakers, commercial farmers, agribusinesses and researchers in South Africa, therefore, is to find appropriate ways of implementing land reform that will promote economic and political stability. The SA Sugar Industry is committed to transformation in land ownership and supports the SA government's target to transfer 30% of freehold sugarcane land to PDIs by 2014 via the land market under the willing buyer/willing seller principle (a completely voluntary transaction between a seller and a buyer) (Thompson & Gillitt, 2007). To assist the Industry in supporting this target, an innovative financing scheme was introduced in 1996 to help redistribute commercial sugarcane farmland owned by sugar millers to PDIs (Thompson & Gillitt, 2007).

These sugar millers (Tongaat Hulett Sugar Limited and Illovo Sugar Limited) sold farms to aspirant black farmers (called 'medium scale farmers') in KwaZulu-Natal (KZN) who had limited capital to buy land and thus had to borrow most of the funds required for purchase. These highly leveraged farmers were likely to face liquidity problems as the compensation required by lenders differs from the form of returns that the farmers would earn on their sugarcane land (Mashatola & Darroch, 2003). Borrowers have to make annual cash repayments (principal plus interest), the interest component of which is part real return and part inflation premium to compensate lenders for the expected loss in purchasing power of their debt claim. However, an investment in farmland typically has

¹ Reference to race group in regard to land reform in South Africa is unavoidable given that individuals were previously excluded from land markets because of racial segregation.

² Previously disadvantaged individuals (PDIs) are defined in this dissertation as people who were previously excluded from land markets in South Africa because of racial segregation.

relatively low annual current operating (cash) returns (excluding capital gains due to appreciation of the value of the land). The result is a *financing gap* as the annual cash operating returns to land in the early years after purchase fall short of the annual interest charge (and the annual principal is still to be paid) (Barry *et al*, 1995). To help overcome the expected cash flow problems, the two sugar millers provided 18% of the capital from land sold to the medium-scale farmers at market-related prices to Ithala Development Finance Corporation (now Ithala Bank) to fund a finite interest rate subsidy on mortgage loans that Ithala made to these farmers to buy the land. This generated a sliding scale of interest, starting below but gradually rising to the market interest rate after seven years as farm earnings were expected to improve and subsidy funds were used up (Simms, 1996).

New black farmers that enter the SA Sugar Industry are now called ‘New Freehold Growers’ (NFGs) and do not necessarily receive an interest subsidy. The NFGs are defined as PDIs who have acquired freehold land for commercial sugarcane production (typically about 100ha) (Armitage, 2008). In recent years, there has been an increased rate of ownership changes from white large scale growers (LSGs) to PDIs (Thompson & Gillitt, 2007). Since the graduated payments were only available for aspirant black farmers that purchased land from the sugar millers, many of the NFGs who have bought farms from LSGs used loans from commercial banks and other financial institutions. The last group of NFGs that received an interest rate subsidy was financed in 2004 (Tembe, 2009), possibly because (1) the millers have reached their threshold levels for selling off commercial land; (2) government grants are now available to buy land (particularly LRAD³); and (3) pending land restitution claims are hindering the millers from transferring any more land. If a grower qualified for a LRAD grant, the millers did not offer the interest rate subsidy.

Mashatola & Darroch (2003) studied the factors that affected whether or not the medium-scale black sugarcane farmers at that time were current or in arrears on their loan repayments as successful repayment over time was critical to farm viability. They found that the estimated probability of being current on loan repayments was higher for those

³ Land Redistribution for Agricultural Development programme (see MALA, 2001).

medium-scale farmers with higher levels of average annual gross turnover to loan size (a proxy for farm size) and substantial off-farm income. Since that study, the number of growers participating in the scheme has risen from 99 to 341, of which 291 are in KZN (Armitage, 2008). In addition, the area under sugarcane farmed by PDI growers (including NFGs) since 1999 has risen from 13 244 hectares to 37 676 hectares in 2005, or 184% (Thompson & Gillitt, 2007). However, the average financial performance of emerging black commercial farmers (including NFGs) in the SA Sugar Industry was below that of LSGs during 1997-2007 (real average annual net return per hectare of R390 versus R3 075 in 2007 Rand) (Gillitt, 2008). This raises concerns about the long-term viability of current and future NFGs which is strategic in helping the SA Sugar Industry to achieve transformation targets and maintain the support of the SA government (Armitage, 2008). The first aim of this study, therefore, is to identify what factors contribute towards the successful performance of NFGs. Such information can suggest grower and farm characteristics and/or industry structures to target to try and improve the viability of current and future NFGs. Given that the NFG scheme cannot operate without external finance, success in this study is measured by the mortgage loan repayment status of the NFGs (Armitage, 2008). Growers are classified according to whether their loans are current (successful), in arrears (less successful) or in the process of legal action (unsuccessful). Financiers can use this information to help better screen borrowers and potentially reduce the number of loans in arrears and/or default. The second aim of this study is to document the NFGs' perceptions of the scheme and of industry role players (such as financiers, CANEGROWERS and the sugar milling companies). This information will help to identify what aspects of the scheme could be improved and how industry role players can better promote the sustainability of current and future NFG farming operations.

The study is organized as follows: Chapter 1 gives an overview of land reform in South Africa since 1994, and describes the different methods of land transfer and government support programmes available to land reform beneficiaries. This is important in the context of this study since all the NFGs can qualify/or have qualified for some form of government financial support. For example, a large proportion of NFGs raised the cash

deposits to purchase their farms by accessing the Settlement/Land Acquisition Grant (SLAG) and/or the Land Redistribution and Agricultural Development (LRAD) grants (Lyne & Darroch, 2003; MALA, 2001). Chapter 2 gives an overview of the SA Sugar Industry, how it contributes to the SA economy, recent land reform initiatives in the Industry and details of how the past graduated mortgage loan repayment scheme worked. Chapter 3 reviews past research on agricultural loan repayment performance and highlights what factors affect the repayment of different types of agricultural loans. Chapter 4 describes the study areas in KZN where the NFGs are situated, the sampling method and survey questionnaire used to collect data on the NFGs' farm operations and perceptions of the scheme, and the statistical methods used for data analysis. Chapter 5 describes the socio-economic and financial characteristics of the sample NFGs. Chapter 6 outlines a conceptual model of NFG mortgage loan repayment status and reports the results of a multinomial logit model used to estimate the probability that sample NFGs would be current, in arrears or in default on their loan repayments. Chapter 7 describes the sample NFGs' perceptions of the scheme and of industry role players. A concluding section discusses some potential management and policy implications of the study results.

Chapter 1

Land Reform in South Africa since 1994

This chapter gives an overview of the land reform process in South Africa since 1994. This includes an outline of land ownership in South Africa, and the three land reform strategies - land restitution, land tenure reform and land redistribution - that have been used to try and achieve the SA government's 30% land redistribution target.

1.1 Land Ownership in South Africa

South Africa has a total land area of approximately 122 million hectares. Of this, 100 million hectares are classified as farmland (i.e. grazing land and potentially arable land, as shown in Figure 1.1 overleaf) and 82 million hectares are classified as commercial agricultural land (i.e. farmland largely owned by white commercial farmers) (Fenyés & Meyer, 2003). Since much of the country is dry and therefore only suitable to a small number of farming types (e.g. sheep, goat or game farming), only 13.7% of the total land area is classified as potentially arable. Some of this arable land is state owned, but most is owned by white commercial farmers. About 3 million hectares of agricultural land is occupied by non-whites, mostly in the former homelands: however most of it is used for subsistence farming (Bernstein, 2005). This racially biased land ownership was formalized in 1913 by the Natives Land Act, which restricted African land ownership to native reserves where the principal mode of tenure was customary and administered by traditional leaders (Lyne & Darroch, 2003).

After democratic elections in 1994, the SA government developed a land reform policy to redress (i) the forced removal of black people from land; and (ii) the historical denial of access by black people to land. The current land reform process emanates from Section 25 of the SA Constitution (Act 108 of 1996) which deals with property rights. Section 25 (6) of the Constitution states that: "A person or community whose tenure of land is legally insecure as a result of past racially discriminatory laws or practices is entitled to the extent provided by an Act of parliament, either to tenure which is legally secure or to

comparable redress”. It also provides that: “The State must take reasonable legislature and other measures, within its available resources, to foster conditions which enable citizens to gain access to land on an equitable basis” (Thompson & Gillitt, 2007: 41).

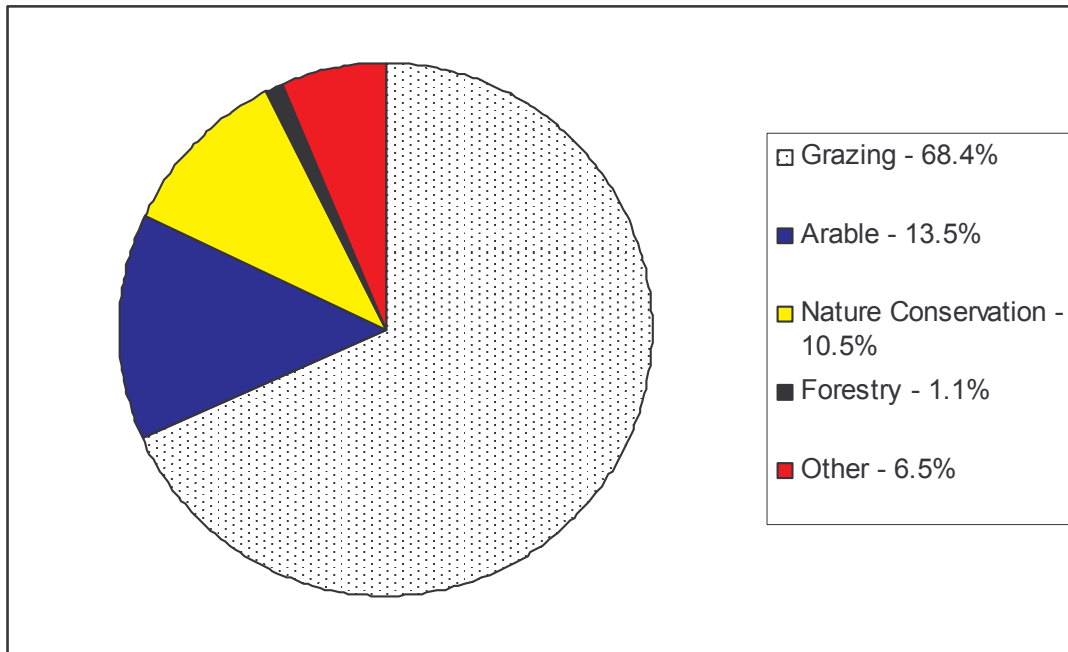


Figure 1.1 Land Utilisation in South Africa

Source: National Department of Agriculture (NDA) (2007)

In terms of the SA government’s land reform policy, land restitution is a legal process returning land, or providing financial compensation for land, to those who were dispossessed of their land after 1913; land tenure reform aims to address insecure tenure within the former homelands; and land redistribution focuses on increasing black ownership of rural land. The collective aim of these land reform strategies is to transfer 30% of all agricultural land to black SA citizens by 2014 (MALA, 2001).

1.2 Land Restitution Claims

The concept of restitution was introduced in South Africa in 1994, with the focus on redressing past injustices created as a result of racially-biased legislation or practices.

The Interim Constitution of South Africa (Section 121 to 123) served as the basis for restitution, whereby the legislature was instructed to put in place a law to provide redress for the victims of dispossession. This led to the development of the Restitution of Land Rights Act 22 of 1994, which stipulates that a claim will be accepted for investigation if the claimant was dispossessed of a right in land in South Africa after 14 June 1913, as a result of past racially discriminatory laws or practices; the claimant was not paid just and equitable compensation; and the claim was lodged no later than 31 December 1998.

The Act has been extensively amended since its commencement. Amendments during 1995 and 1996 centered around the structure, powers and procedures of the Act in order to bring it in line with the SA Constitution. The most important amendments to date are contained in the Land Restitution and Reform Laws Amendment Act, 1999. These amendments give the Minister of Agriculture and Land Affairs the authority to make an award of a right in land, pay compensation and grant financial aid where the interested parties have reached agreement as to how a claim should be finalized. This has done away with the need for a claim to be referred to the Land Claims Court, and resulted in faster implementation of the restitution process. In 2003, the Restitution of Land Rights Amendment Act 2003 was promulgated. The amendments aim to..."empower the Minister of Land Affairs to purchase, acquire in other manner or expropriate land, a portion of land or a right in land for the purpose of restoration or award of such land..." (Republic of South Africa (RSA), 2003:2). The first case of expropriation for the purposes of land restitution was of Pniel Farm in the Northern Cape on 15 March 2007 and was effected in line with Section 42E of the Restitution of Land Rights Amendment Act 2003 after negotiations between the state and the land owner collapsed (Lahiff, 2008). The Department of Public Works published the Draft Expropriation Act 2008 in April 2008 (RSA, 2008). The new Bill is intended to replace the Expropriation Act of 1975, which is inconsistent with the current Constitution of South Africa in several key areas such as: recognition of rights of tenants and farm workers; the basis for payment of compensation; and the rationale for expropriation. "The Bill seeks to align the Expropriation Act with the Constitution and to provide a common framework to guide the processes and procedures for expropriation of property by organs of state" (Didiza,

2008:1). However, this draft Bill raised a number of concerns from a variety of stakeholders and the Portfolio Committee on Public Works withdrew the Bill on 27 August 2008 (Department of Public Works, 2008). The Portfolio Committee chairperson stated that the general consensus in the Committee was to see the Bill reintroduced when either feasible or appropriate.

The number of land restitution claims settled has risen from 3 917 in 1995 to 74 747 as at 31 March 2008 as shown in Figure 1.2 below. Of these settled claims, 65 642 (or 87.82%) were classified as urban claims, while 9 105 (or 12.18%) were classified as rural. Most (69.53%) of these claims were settled by means of cash compensation, and

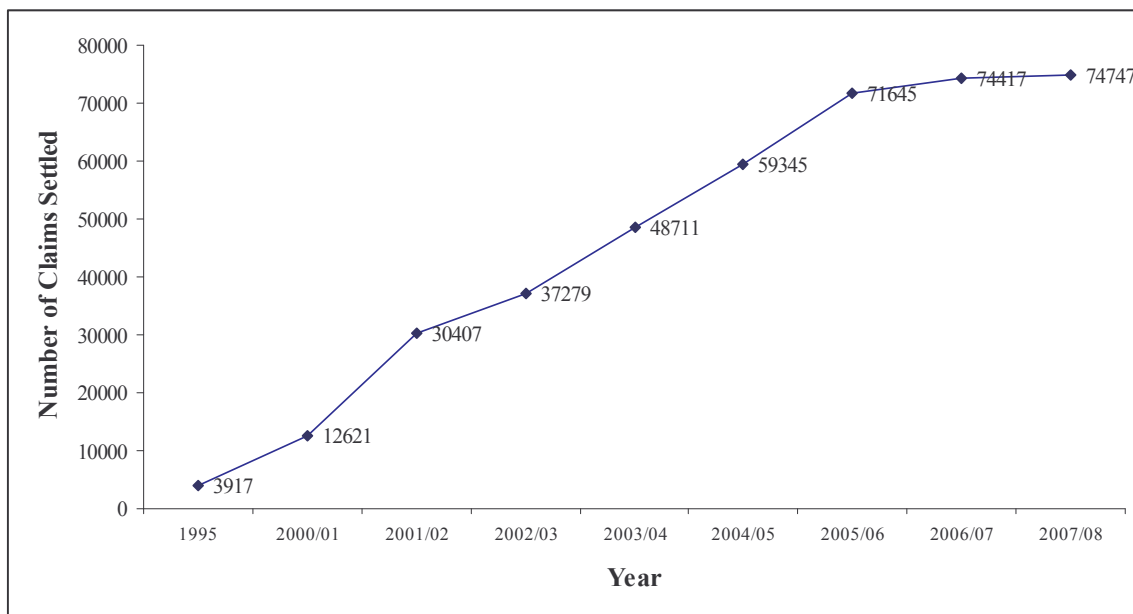


Figure 1.2 Number of Land Restitution Claims Settled in South Africa, 1995 - 2008

Source: Commission on Restitution of Land Rights (CRLR) (2008)

26.57% by means of land restoration, with the remaining 3.9% being settled by an alternative mechanism such as developmental assistance or alternate land. Approximately half (48.57%) of all rural claims were settled by means of land

restoration, whereas only 23.52% of urban claims were settled in this manner. This has resulted in the transfer of 2 078 385 hectares being restored, while there are currently (as at 31 March 2008) 4 949 claims outstanding, all of which are rural (CRLR, 2008: 57 – 58). Table 1.1 presents the outstanding claims per province in South Africa. Lahiff (2008) notes that there is an extreme amount of complexity surrounding these outstanding claims and the prospect of expropriation remains a contentious issue.

Table 1.1 Outstanding Land Restitution Claims per Province in South Africa, as at 31 March 2008

Province	Claims Outstanding
KZN	1740
Mpumalanga	851
Limpopo	674
Western Cape	599
Eastern Cape	555
Northern Cape	218
North West	215
Free State	97
Gauteng	0
Total	4 949

Source: CRLR, 2008: 57 – 58

1.3 Land Tenure Reform

The state-owned former homelands were in the past administered by traditional leaders, magistrates and the then Department of Agriculture. The aim of the tenure reform programme is “to provide persons or communities or farm occupiers and farm dwellers with legally secure tenure where they live in communal areas in the former homelands and the ex-South African Development Trust (SADT) areas, the former coloured areas

and on-site or off-site in white commercial farming areas respectively” (DLA, 2007). Since 1994 a number of laws have been promulgated in an attempt to address the tenure insecurity of people residing within these areas.

In 1996 an interim law (The Interim Protection of Informal Land Rights Act, 31 of 1996) was passed to protect homeland residents with insecure tenure from losing their rights to land while a new Land Rights Bill was being developed to transfer ownership from the state to people living on the land (Lyne & Darroch, 2003). Since the process of transferring ownership to individuals who are accustomed to more flexible and overlapping customary rights was far too complex, the drafters of the bill opted for a system of “protected rights” determined through a local process of negotiation administered by Land Rights Boards (Lyne & Darroch, 2003).

The SA government has focused its attention on enforcing the provisions of The Labour Tenants Act, 3 of 1996 (which aims to secure the rights of labour tenants on commercial farms) and The Extension of Security of Tenure Act, 62 of 1997 (which aims to protect farm workers against unlawful eviction) (Lyne & Darroch, 2003). After many drafts and reviews the Communal Land Rights Bill was promulgated on 14 July 2004 and is known as the Communal Land Rights Act, 11 of 2004. This Act aims to give secure land tenure rights to communities and persons who occupy and use land that the previous government had reserved for occupation by the African people (DLA, 2007).

1.4 Land Redistribution Mechanisms

Land redistribution aims to provide PDIs and poor people in South Africa with access to land for residential and productive purposes by means of support and grants (Thompson & Gillitt, 2007). The redistribution programme is implemented through the legal mechanism of the Provision of Land and Assistance Act, 126 of 1993. This Act provides for the acquiring and development of land for settlement and production purposes and financial assistance to people acquiring the land (Didiza, 2001). The support structures that are in place for land reform beneficiaries include cash grants and various types of

post transfer support. The next four sections discuss these structures and other mechanisms that have promoted land redistribution in South Africa since 1994.

1.4.1 Cash Grant Programmes

The World Bank recommended the use of cash grants to help PDIs in South Africa finance the purchase of land (World Bank, 1993 cited by Lyne & Darroch, 2003). Following this, the SA Government implemented the SLAG programme in 1994 that allowed PDIs that were landless and poor to apply for a cash grant to purchase and develop farmland. This grant focused on the poorest of the poor since a means test applied to applicants precluded individuals with a monthly household income greater than R1 500. A grant of R16 000 (initially R15 000) was made available per beneficiary household (Lyne & Darroch, 2003). Since land was both relatively costly and unavailable in small grant-sized parcels, people willing to acquire land with the grant had to form themselves into groups in order to acquire land (Sibanda, 2001). These groups established a legal entity (usually a community land trust or communal property association) that was formally registered as the property owner (Lyne & Darroch, 2003). By the end of 2000, 484 projects were approved under the SLAG programme, transferring some 780 000 hectares to 55 383 households (Turner & Ibsen, 2000).

By July 1999, less than 1.2 % of white-owned farmland had transferred to PDIs in South Africa. In 2000, the SA government conducted a review of the land reform programme and found that the major factors contributing to this relatively slow delivery process and poor performance of certain redistribution projects was the lengthy project cycle and approval process, and the meagre size of the SLAG grant (Didiza, 2001). In response, the SA government implemented the Land Redistribution and Agricultural Development (LRAD) programme in August 2001. Lyne & Darroch (2003: 69) noted that LRAD differs from SLAG in one major aspect: “beneficiaries do not have to be poor to qualify for a minimum grant of R20 000 – and those who have more savings and who can raise bigger loans to finance their farms qualify for successively larger grants”. This marked a distinct shift in SA government land redistribution policy away from poverty alleviation

and group settlement toward settling prospective farmers on commercial farmland. The initial minimum grant amount of R20 000 could be accessed with an own contribution of R5 000. The maximum initial grant was R100 000, which required an own contribution of at least R400 000. The SA Minister of Agriculture and Land Affairs, Ms Lulu Xingwana, announced in a budget vote speech on the 21 May 2008 that a substantial increase in LRAD grants to beneficiaries will soon be approved. The minimum grant for qualifying applicants will increase to R111 125 and the maximum grant will be increased to R430 085 (Xingwana, 2008). The discussion below still refers to the initial grants as no new published information with regards to the new grants is available. Between the minimum and maximum amount, a continuum of grant amounts is available, depending on the participants' own contribution (see Figure 1.3 below) in kind, labour and/or cash or a combination thereof (DLA, 2007).

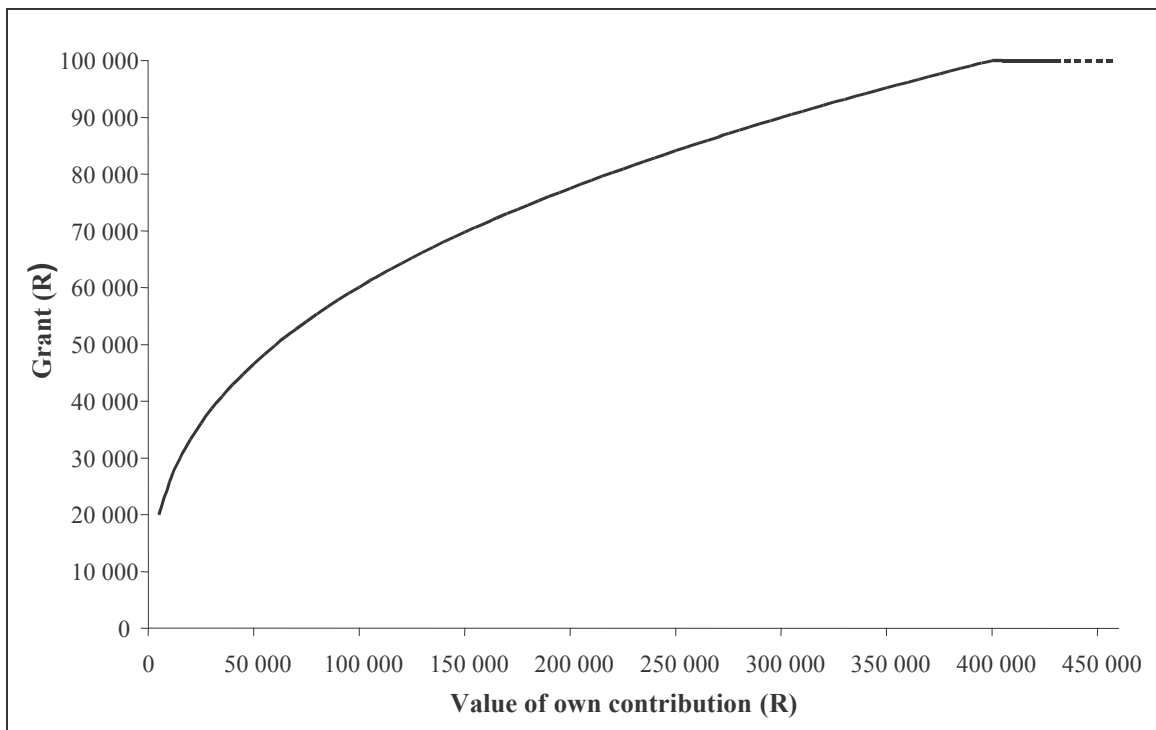


Figure 1.3 Sliding Scale of LRAD Grants and Beneficiaries' Own Contribution
Source: DLA (2007).

The own contribution can be made up as follows (DLA, 2003: 13):

- **Own contribution by applicants in labour** can be up to R5 000 per applicant (individual). For the full R5 000 in own labour towards the own contribution requirement, the farm/business plan must show evidence that the applicant intends to devote a significant amount of own labour towards the establishment and operation of the project.
- The **contribution in kind** could be calculated by costing assets that the applicant may possess, such as machinery, equipment or livestock.
- The **cash contribution** can be a beneficiary's own equity or borrowed capital or some combination of the two.

Beneficiaries of LRAD will be allowed to graduate from smaller to larger farms/businesses, and will be able to access LRAD grants to facilitate investment to increase scale. Beneficiaries are able to “trade up” through LRAD if they have sufficient own contributions up to a grant limit of R100 000 per applicant. The own contribution will be gauged in relation to the total amount of grants that have been accessed and assets acquired by means of the grant may not be counted as an own contribution when applying for a new grant (DLA, 2003: 14).

The LRAD programme has increased the SA government's contribution to land reform and has drawn private capital and expertise into the process (Lyne & Ferrer, 2006). The LRAD grants have also resulted in higher quality agricultural land being transferred as the quality of farmland (measured by the Rand amount per hectare) redistributed using combined grant and loan finance has been significantly higher than that financed only with government grants, or privately with cash. The LRAD programme does however have its flaws, a major concern being that commercial banks are unable to access grant funding since the Land Bank of South Africa is the only bank permitted to approve LRAD applications. This results in administrative delays in appraising and disbursing grants that have caused many sellers to find other buyers who are not reliant on grants.

Another aspect of land redistribution is the provision of grants to municipalities to purchase commonage land to make available for public use, primarily to livestock owners who are poor (Hall, 2007: 91). However, not much land has been made available in this way except in the Northern Cape and the Free State (Rugege, 2004). This mode of redistribution has been de-emphasized recently, with few funds available, as the focus of redistribution is on transferring land directly to new farm owners through the LRAD programme (Hall, 2007).

1.4.2 Private Sector Land Redistribution Initiatives

The two main examples of private sector land reform initiatives in South Africa are the establishment of farmworker equity sharing (FWES) projects and the SA Sugar Industry NFG scheme. This section discusses only FWES schemes as the NFG scheme is outlined in Chapter 2. FWES schemes have become an increasingly popular means of redistributing land in South Africa while trying to maintain or improve agricultural performance. Eckert *et al* (1996) attributed the growing popularity of these schemes to the costs, delays and uncertainty associated with the formal transfer of small subdivisions of land in South Africa. The Subdivision of Agricultural Land Act 70 of 1970 requires that farmers obtain permission from government to subdivide their land, which introduces uncertainty and delays that add to the costs of transferring affordable parcels of land to emerging farmers (Lyne & Darroch, 2003).

The FWES schemes are privately-owned farming operations that are generally restructured as companies with the original owner and the farm workers as shareholders. Shareholders obtain tradable shares that define their individual rights to vote for directors and to benefit from the capital gains generated by the company (Knight *et al*, 2003). This allows farmers to pool their funds and/or grants in order to purchase a larger tract of land on which to farm. This is quite distinct from a co-operative or collective farming enterprise where voting and benefit rights are egalitarian and non-marketable, resulting in free- and forced-rider problems that undermine incentives to invest both time and capital in the enterprise (Sykuta & Cook, 2001). According to Shinns & Lyne (2004), land

reform grants may address poverty more effectively when used to purchase equity in joint ventures with commercial farmers than when used to purchase land that many of the beneficiaries cannot use or transact. FWES schemes are explicitly supported by the LRAD programme (MALA, 2001:5) and beneficiaries can use grants to purchase shares in FWES schemes. Lyne *et al* (1998) (as cited by Knight *et al*, 2003) estimated that there were 50 FWES schemes in operation within South Africa in 1998 (although mainly in the Western Cape). This number has since increased, the extent to which remains unknown, and FWES schemes are now spread across all nine provinces and involve wine, fruit, vegetables, olive, poultry, cut-flowers, dairy and eco-tourism enterprises (Knight *et al*, 2003) however these projects remain marginal to the redistribution project as a whole (Lahif, 2008: 3).

1.4.3 The Land Reform Empowerment Facility

The Land Reform Empowerment Facility (LREF) (originally the Land Reform Credit Facility (LRCF)) was established in 1999 in South Africa as a deferred repayment loan fund with the intention of attracting private sector finance and human capital into commercially viable land reform projects. It was initially capitalized at R63 million, using funding from the Department of Land Affairs (R32 million), the European Union (R29.4 million) and The Danish Agency for Development Assistance (DANID) (R1.7 million), and is administered by Khula Enterprise Finance Ltd (Khula). The LREF offers unsubsidized loans with deferred or graduated repayment schedules to commercial banks or investors who finance, on similar terms, land based enterprises (or the acquisition of shares in these enterprises) by PDIs (DLA, 2001 cited by Lyne & Darroch, 2003). The emphasis is on encouraging commercial landowners to restructure the ownership of their assets to include landless households (typically farm workers), and to induce commercial banks and investors to finance commercial land reform (Sibanda, 2001).

According to Lyne & Darroch (2003: 73) the LREF inherits the (temporary) cash flow problem that occurs when conventional mortgage loans are used to purchase land (current operating rate of return (excluding capital gains on land) is likely to be less than interest

rate charged). The LREF offers a mortgage loan facility where the maximum loan per individual is R800 000 and an equity share scheme facility where the maximum loan per individual is R600 000, with the maximum loan for any project set at a ceiling of R10 million (Khula, 2008). To date, Khula have financed 49 projects with more than 3 600 beneficiaries, with a market value of R189 million (Naidoo, 2008).

1.4.4 Post-Transfer Support Programmes

Two official reviews and three official quality of life surveys have identified that post transfer support to beneficiaries has been a critical gap in the SA land reform process (Turner, 1997; May & Roberts, 2000; both cited by Hall, 2007: 100). This resulted in the SA government establishing the Comprehensive Agricultural Support Programme (CASP) in 2004. CASP is a post-settlement support programme that targets beneficiaries of land reform but also includes producers who have acquired land through private means if they are currently engaged in value-adding agricultural enterprises domestically, or the export of agricultural products. The aim of CASP is to enhance the provision of support services to promote and facilitate agricultural development to four groups of beneficiaries: the hungry and vulnerable, the household food producers, the beneficiaries of land and agrarian reform programmes and those operating within the macro economic environment. Six priority areas of support are identified within CASP: information and knowledge management; technical and advisory assistance and regulatory services; training and capacity building; marketing and business development; on- and off-farm infrastructure and production inputs and financial assistance (MALA, 2005). Medium Term Expenditure Funding (MTEF) allocations from the Department of Agriculture to CASP have risen from R200 million in 2004/05 to R415 million in 2007/08. Since its inception, CASP investment has supported 3 270 projects and 218 000 beneficiaries (Tyakume, 2008).

Financial assistance is provided for by the Micro Agriculture Finance Institution of South Africa (MAFISA), which was officially launched in May 2005. MAFISA is a state-owned scheme which is intended to provide retail agricultural financial services through

selected financial institutions on an affordable⁴ and sustainable basis. Land reform beneficiaries may apply for either a production or equipment loan to the maximum value of R100 000. The production loan will provide bridging finance to cover production, processing and marketing costs such as fertiliser, seed, packaging and contract services. The equipment loan will allow beneficiaries to finance the purchase of loose tools, small-scale plant and machinery, irrigation and other farming equipment (National Department of Agriculture (NDA), 2005).

Widespread problems have been reported with both CASP grants and MAFISA loans. In September 2006, the Department of Land Affairs reported to Parliament that approximately R60 million of the first year's funding allocation of R200 million had been carried over to the next year due to under-spending. In 2007, R250 million was allocated, with the Department again under-spending with R43 million being rolled over to the next year. A further problem highlighted was that CASP did not provide comprehensive support as it was focused on providing on- and off- farm infrastructure (Department of Agriculture (DOA): 2008). Tyakume (2008) also notes that MAFISA had faced major problems: loan disbursement had started late, many end users perceived their loans as grants, and reliance on extension officers who claimed to be already overloaded with work.

These problems led to the development of the Settlement and Implementation Support (SIS) Strategy, which was launched by MALA in February 2008, with the intention of providing improved post-settlement support to land reform beneficiaries (Lahiff, 2008: 38). The SIS strategy proposes a joint programme of government, spearheaded by MALA in partnership with organised land reform beneficiaries, private sector role-players and non-governmental organisations in order to provide comprehensive post-transfer support services to land reform beneficiaries (Lahiff, 2008: 6). The SIS strategy forms part of the Land and Agrarian Reform Project (LARP) which was launched in October 2007 with the intention of providing a "framework for delivery and collaboration

⁴ In February 2008 MAFISA charged a nominal interest rate of 8% per annum (which has not changed since the launch of the scheme), whilst at the same time the base rate was 11% (Tyakume, 2008).

on land reform and agricultural support to accelerate the rate and sustainability of transformation through aligned and joint action by all involved stakeholders.” The aim of LARP is to create a “one-stop-shop” for agricultural and other support services to land reform beneficiaries (DOA, 2008: 6-7).

The next chapter gives a brief overview of the SA Sugar Industry before highlighting its contributions to Gross Domestic Product (GDP), employment and foreign exchange earnings in South Africa. The chapter also highlights recent land reform initiatives and trends in grower incomes in the SA Sugar Industry.

Chapter 2

Overview of the South African Sugar Industry

This chapter first outlines the SA Sugar Industry structures, functions and role players. It then shows how the sugar industry contributes towards the SA economy and discusses sugarcane farming, milling and refining in South Africa. The final sections of the chapter discuss recent land reform initiatives and trends in grower incomes in the SA Sugar Industry since 1996.

2.1 Industry Structures and Functions

The SA Sugar Industry has three main structures: The SA Canegrowers' Association (CANEGROWERS), the SA Sugar Millers' Association Limited (SASMAL) and the SA Sugar Association (SASA). Sugar is sold both on the local and export markets and industry sales proceeds are divided between the growers and the millers according to an agreed formula. The total industry proceeds are comprised of income from refined and brown sugar in the local market, raw export sugar and molasses sales. The total industrial proceeds are determined by the size of the crop and the prices achieved on the local and export markets for sugar and molasses sales. The costs of administering SASA which include all the specialist services provided such as agricultural research and sugar exports are referred to as industrial costs and are subtracted from the industrial proceeds. The remaining monies are referred to as the divisible proceeds, which are split based on a fixed percentage between millers and growers (SASA, 2007).

The Total Recoverable Value (RV) of sugarcane deliveries to mills during a season is divided into the growers' share which establishes the price per ton RV for the growers' deliveries (SASA, 2007). Prior to 30 April 2000, growers were paid a price per ton of relative sucrose for their sugarcane crop. The RV payment system rewards growers on a price per ton of RV that accounts for the non-sucrose and fibre content in delivered sugarcane in addition to the sucrose content. Therefore, the RV repayment system is

based more on the quality of sugarcane delivered and hence growers benefit more if they supply higher quality sugarcane to the mills (Moor, 2002).

CANEGROWERS was established in 1927 with the purpose that one organization should be responsible for the interests of all sugarcane growers (Maloa, 2001). CANEGROWERS is a Section 21 company (incorporated not for gain) and individual growers are members through the 38 grower groups which make up its member organizations. CANEGROWERS provide a wide range of services to sugarcane growers which include information and advice, particularly agricultural economic advice; the compilation of information and statistics for the growers' benefit, such as the annual survey of cane production costs; the development and empowerment of cane growing communities through the promotion of cane development involving training and information support; and managing the interests of all growers within the industry partnership (CANEGROWERS, 2007).

The interests of all sugar millers and refiners in South Africa are represented by SASMAL. The Association's objectives cover legislative measures affecting the industry, training, scientific and technological research, and the compilation of statistics (SASA, 2007). SASA is a partnership between CANEGROWERS and SASMAL. All activities and representative structures are funded by members of the industry. This partnership provides specialist services in marketing, logistics, research and administration to add value to the cane growing and milling businesses of the industry (Maloa, 2001). SASA is administered by the Council of the Sugar Association. As equal partners, SASMAL and CANEGROWERS each elect eleven councillors to sit on the South African Sugar Association Council. In terms of the Sugar Act and Sugar Industry Agreement, statutory powers of self governance are granted to the sugar industry (SASA, 2007).

The SA Sugar Industry is governed by the Sugar Act (number 9 of 1978 as amended) and the Sugar Industry Agreement. The Act authorises the establishment of a Sugar Industry Agreement that constitutes subordinate legislation. The Act provides for the incorporation of SASA and deals with such matters relating to the Sugar Industry as are,

in the opinion of the Minister, in the interests of the Sugar Industry, but not detrimental to the public interest. The latter is the basis for Ministerial approval of the Sugar Industry Agreement that reflects the rules under which the industry operates and the bodies that have the authority to represent the industry. It also covers the partnership issues between growers and millers, between growers themselves and between individual milling companies. The Sugar Industry Agreement aims to give effect to the objectives of each group of clauses contained in the Act (Department of Trade and Industry (DTI), 2003). Apart from the regulation that the Act provides to facilitate the relationship between the growers and the millers, it also provides for the protection of the SA Sugar Industry against trade distorting measures practiced by some major sugar producing countries. The industry is protected through a dollar-based reference price tariff system that is based on the long-term average world price for sugar, adjusted for distortions, which delivers protection when the world price drops below this level (SASA, 2008).

2.2 Role of the Sugar Industry in the SA Economy

The SA Sugar Industry is one of the world's leading cost competitive producers of high quality sugar⁵ and makes an important contribution to employment, sustainable development, and to the national economy, given its agricultural and industrial investments, foreign exchange earnings, high employment and linkages with major suppliers, support industries and customers. This diverse industry combines the agricultural activities of sugarcane cultivation with the industrial factory production of raw and refined sugar, syrups, specialized sugars and a range of by-products (SASA, 2007).

The SA Sugar Industry is a major contributor to the rural economic activity in the sugarcane producing areas of South Africa, generating an estimated annual direct income of R6 billion (SASA, 2007). It also generates indirect economic activity because of the many backward linkages that exist between the sugar sector and the core businesses that

⁵ According to independent surveys of the costs of production of more than 100 global sugar industries, the SA Sugar Industry consistently ranks amongst the top 15 (SASA, 2008).

supply the Sugar Industry. Forward linkages to downstream industries also afford significant employment opportunities and therefore economic contributions to the economy (Maloa, 2001). The Sugar Industry makes an important contribution to direct employment in cane production and processing areas of South Africa, and provides indirect employment for various support industries where sugarcane is grown – in sectors such as fertilizer, fuel, chemical, transport and food services. Direct and indirect employment within the Sugar Industry is estimated at 350 000 people, with direct employment being approximately 85 000 jobs. In addition, there are about 45 300 registered cane growers (SASA, 2007).

The SA Sugar Industry also contributes significantly to foreign exchange earnings with export earnings for the 2005/06 production year estimated at R1 921 million (NDA, 2007). It currently exports approximately 50% of the total sugar production (SASA, 2007). Figure 2.1 shows the total amount of sugar produced and the proportions sold locally and on the export market during 1997/98 to 2006/07. The average annual amount of sugar sold on the local market during this period was 1 270 908 tons, while the average annual amount sold on the export market for the same period was 1 210 305 tons.

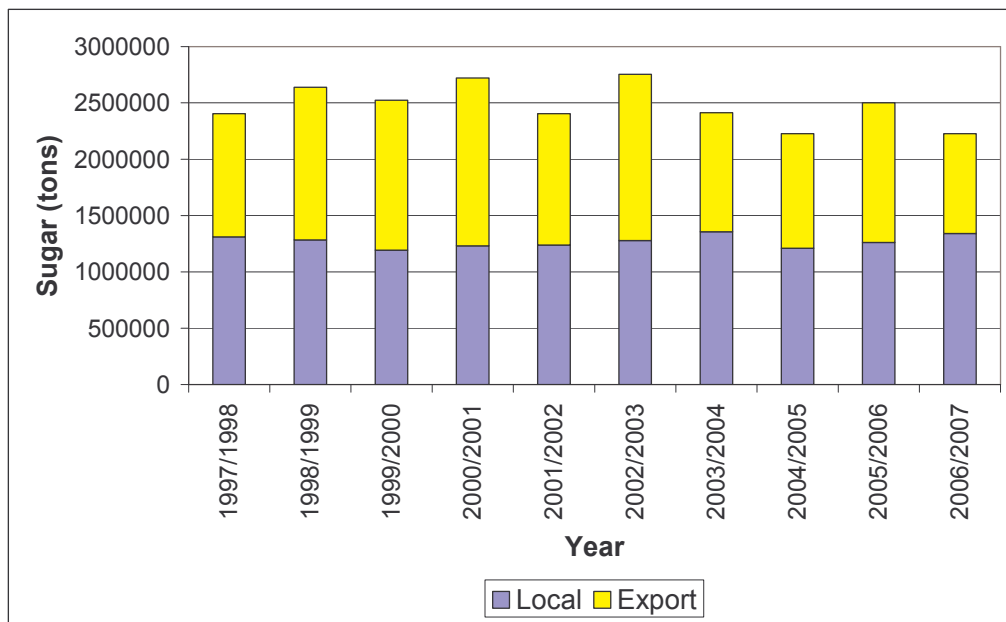


Figure 2.1 Annual South African Sugar Production (tons), 1997/98 – 2006/07

Source: Adapted from SASA (2007).

2.3 Sugarcane Farming in South Africa

The approximately 45 300 registered sugarcane growers produce on average 22 million tons of sugarcane per annum. More than 43 500 of these registered growers are small scale growers (SSGs), who produce about 11% of the total crop. The estimated 1 700 large-scale growers (LSGs) and NFGs together produce approximately 79% of the crop. Milling companies with their own sugar estates generate the remaining estimated 10% of the crop (SASA, 2007). The total area under sugarcane is estimated at 423 453 000 hectares (SASA, 2007). The total crop areas and areas harvested for milling during 1997/98 - 2006/2007 are shown in Figure 2.2 below. The area of sugarcane grown does not equal the area harvested because in certain sugarcane growing regions (mainly inland regions) the cane is harvested on an 18 to 24 month growing cycle and hence not all of the area is harvested within a 12 month period.

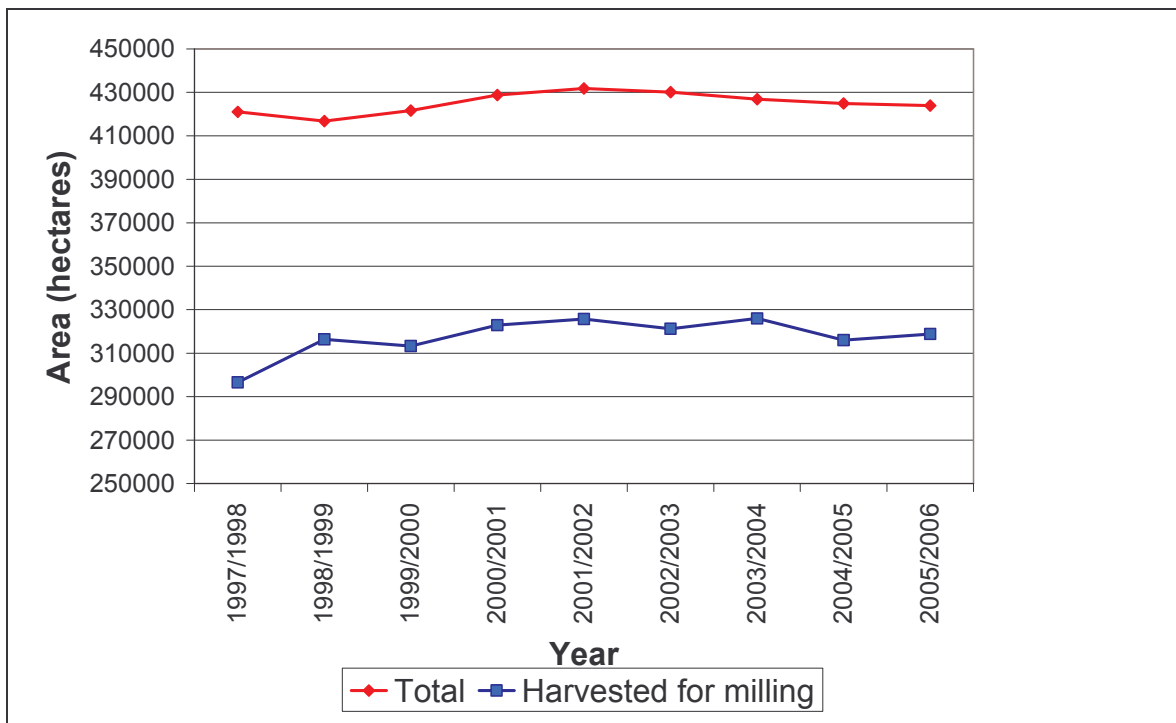


Figure 2.2 Total Area Planted to Sugarcane and Area Harvested in South Africa (hectares), 1997/98 – 2006/07

Source: Adapted from SASA (2007).

Sugarcane yields depend on a number of factors, including geographic region, sugarcane variety, age of crop at harvest, soil type, climatic conditions, nutritional status of the soil, water availability and management (Experiment Station of the South African Sugar Association (SASEX), 1977). Sugarcane requires a long, warm summer growing season with adequate moisture and heat units followed by a dry, sunny and cool but frost-free winter ripening period (Smith, 2006). Rainfall is the most important single environmental factor affecting the growth of sugarcane in South Africa. Eight-hundred and fifty to 1 500mm of rainfall are required over the growing season. The total amount of water required for irrigated sugarcane is 1 250mm per annum in cooler regions, and 1 550mm per annum in hotter areas. For optimum growth, sugarcane requires a mean daily temperature of 22-30⁰C with high solar radiation. For ripening, temperatures of 10 – 20⁰C are necessary in order to decrease vegetative growth and to increase the sugar content (Smith, 2006).

2.4 Sugar Milling and Refining in South Africa

There are 14 sugar mills in South Africa - five mills are owned by Illovo Sugar Ltd (Illovo); four mills by Tongaat-Hulett Sugar Ltd (THS); two mills by TSB Sugar RSA Ltd; one mill by UCL Company Ltd; one mill by Umvoti Transport (Pty) Ltd; and one mill by Ushukela Milling (Pty) Ltd. The two TSB Sugar RSA Ltd mills are located in Mpumalanga province while the other twelve are in the province of KZN (SASA, 2007). Four of the mills are known as “white end” mills and produce their own refined sugar. Raw sugar produced by TSB Sugar RSA Ltd is exported via the sugar terminal in Maputo, Mozambique. Raw sugar produced at the remaining mills is routed to Durban, where it is either refined at the central refinery of Tongaat-Hulett Sugar Ltd or stored at the SASA Sugar Terminal prior to export (SASA, 2007).

2.5 Recent Land Reform Initiatives in the SA Sugar Industry

The SA Sugar Industry is committed to transformation in land ownership and supports the SA government’s target to transfer 30% of freehold land under sugarcane to PDIs by 2014 using the land market under the willing buyer/willing seller principle. The Inkezo

Land Company (a Section 21 Company), developed by sugar grower and miller leadership, was founded in 2004 to assist the Industry in supporting this land redistribution target. The company, while initially funded by the Industry, is operating as an independent land reform initiative. Inkezo assists in identifying sellers and buyers, streamlining processes of land reform and promoting sustainability through outsourced support service providers and mentorship programmes with existing farmers (Thompson & Gillitt, 2007). In addition to Inkezo, the milling companies have been undertaking the land reform projects identified in the Introduction since 1996 that have seen the number of NFGs increase from 99 to 341.

Table 2.1 shows the progress made by the SA Sugar Industry in terms of the area of land that has been redistributed. The area under sugarcane farmed by PDI growers (including NFGs) since 1999 rose from 13 244 hectares to 37 676 hectares in 2005, or by 184%. The proportion of total LSG⁶ land owned by PDIs rose from 4.7% in 1999 to 12.2% in 2005. The SSGs (who are almost all PDIs) farm on about 75 000 hectares of communal land and are not considered to be commercial growers and hence are not included in the total transformation statistics. Most of the land transferred to PDI growers has been from the miller-cum-planters (MCPs). This is mainly as a result of the innovative financing of NFGs started in 1996 to help redistribute commercial sugarcane farmland in KZN.

Table 2.1 Land Ownership by Grower Categories – a Comparison of 1999 and 2005 Areas Under Sugarcane (hectares)

Year	MCP (ha)	White LSG (ha)	PDI LSG (ha)	Unspecified LSG (ha)	Total LSG (ha)	Industry Total ^(a) (ha)
1999	57 035	263 313	13 244	5 213	281 770	338 806
2005	39 051	270 435	37 676	984	309 095	348 146

Note: ^(a) Excludes small scale growers; MCP = miller-cum-planter; LSG = Large Scale Grower.

Source: Thompson & Gillitt (2007).

⁶ LSGs are classified as growers who are not directly involved with the milling of sugar and deliver on average more than 225 tons of RV per year. A LSG may deliver less than this and remain classified as a LSG as long as he/she does not remain below the threshold for four consecutive years (Gillitt, 2008).

The first round of PDIs had limited capital to purchase the land that was offered for sale and therefore had to borrow most (up to 95%) of the funds needed to purchase the land. The difference in the compensation required by lenders and the form of returns to the land was likely to cause liquidity problems for the highly leveraged NFGs (Mashatola & Darroch, 2003). Borrowers are required to make cash repayments (principal plus interest) of which part is a real return and part is a current cash return to compensate lenders for the expected loss in purchasing power of their debt claim. However, an investment in land is usually associated with relatively low current operating returns (excluding capital gains). The result is a financing gap as there is insufficient cash from the returns to land in the early years in order to meet the debt repayments (Barry *et al*, 1995).

To help overcome the expected cash flow problems, the sugar millers invested 18% of the capital from land sold to the NFGs at market-related prices with Ithala Development Finance Corporation (Ithala) to fund a finite interest rate subsidy on mortgage loans that Ithala made to the NFGs to purchase the land. This generated a sliding scale of interest, starting low but gradually rising to the market interest rate after seven years as farm earnings were expected to improve and subsidy funds were used up (Simms, 1996). When this graduated mortgage loan repayment scheme was implemented, the mortgage loan rate was 16.5 %. This was reduced to 10.1% in the first year. The subsidy was intended to decline to zero at the end of year six, in line with expected increases in nominal income associated with an annual expected inflation rate of approximately 10%. The buyer then pays the full annual interest rate of 16.5 % for the remaining 14 years of the 20-year mortgage loan (Lyne & Darroch, 2003). Table 2.2 shows how a NFG's own contribution to mortgage bond interest payments would rise from 61% to 100% over six years under the diminishing, finite interest rate subsidy scheme starting in 1996/97.

Table 2.2 Schedule to Show How a Finite, Diminishing Interest Rate Subsidy Increases a NFG's Own Contribution to Mortgage Bond Interest Payments Over Time

Year	Interest Rate Paid by NFG (%)	NFG's Own Contribution to Interest Payments (%)
1996/97	10.1	61.21
1997/98	11.3	68.48
1998/99	12.4	75.15
1999/00	13.4	81.21
2000/01	15.3	92.73
2001/02	16.5	100

Source: Adapted from Mashatola (2003).

Ithala has a cession on NFG cane deliveries to sugar mills and so can recover loan repayments directly from a sugar miller before the farmer is paid for cane deliveries. The cession aids Ithala in removing some of the risk of possible default on loan repayments. At the start of each cane-cutting season, the cession per ton of sugarcane delivered to the mill is fixed by dividing the grower's required annual loan repayment by the grower's estimate of the seasonal volume of sugarcane that will be delivered. The cession per ton cannot be adjusted by the miller, and hence for Ithala, during the season without the grower's consent. The borrower, therefore, falls into arrears if his/her actual cane deliveries are less than the estimated volume that was used to set the cession (Mashatola & Darroch, 2003). The mortgage loan repayment structure for a particular NFG is shown in Table 2.3. The initial loan amount was R852 412, repayable over 20 years. The interest subsidy fell from 39% in 1996/97 to zero Rands in 2000/01.

Table 2.3 Example of a Mortgage Bond Repayment Schedule for the First Six Years for a Selected NFG

Year	Opening Balance (R)	Installment (R)	Interest Charges (R)	Capital Redemption (R)	Interest Subsidy (R)	Effective ^(a) Interest Charges (R)
1996/97	852 412	147 608	140 648	6 960	54 853	85 795
1997/98	845 452	147 608	139 500	8 108	45 337	94 162
1998/99	837 344	147 608	138 162	9 446	37 304	100 858
1999/00	827 898	147 608	136 603	11 004	21 857	114 797
2000/01	816 894	147 608	134 787	12 820	9 435	125 352
2001/02	804 074	147 608	132 672	14 936	0	132 672

Note: ^(a) Effective Interest Charges = Interest Charges – Interest Subsidy.

Source: Mashatola (2003).

The graduated payments were only available for aspirant black farmers that purchased land from the sugar millers and who did not receive government grants (e.g. LRAD grants). The last group of NFGs that received an interest rate subsidy from Ithala was financed in 2004 (Tembe, 2009). Tongaat Hulett Sugar Limited initially allocated 12 000 hectares to the NFG scheme. In total, 99 beneficiaries were settled on this land with the average farm size ranging from 75 to 110 hectares. The initial beneficiaries were all previous Tongaat employees. In order to use all of the land allocated to the scheme, land that was not transferred to previous Tongaat employees was made available to other PDIs who had to undergo strict selection criteria. Tongaat reached their threshold for selling off land (i.e. 12 000 hectares) in 2004 when the last transfers took place (Fell, 2009). By the end of 2008, Illovo Sugar Limited had sold 9 618 hectares to 72 NFGs. The last Illovo farms that were sold to NFGs who received graduated mortgage loans were also transferred in 2004 as the growers who were transferred post-2004 were LRAD beneficiaries and so did not qualify for the graduated payments. Illovo has, however, since continued to sell their land to NFGs but have recently been restricted in transferring more land to NFGs by pending land restitution claims (Arde, 2009). Ithala Bank is no

longer the sole financier of the NFGs; many of the NFGs who have bought farms from LSGs or who did not qualify for the graduated loans used loans from commercial banks and other financial institutions.

The SA Sugar Industry has also recently embarked on an extensive mentorship programme to develop subsistence sugarcane farmers into viable and successful cane growers. When a farm is purchased by an emerging farmer, the selected mentor (usually a neighbouring commercial farmer) is paid by the SA government for a one year period (Inkezo, 2007, cited by Chisoro, 2007). According to SASA (2007), the mentorship programme is a key vehicle that has the potential to positively and effectively contribute towards the creation of sustainable economic development in the region. The NFGs are able to choose their mentor's from their neighbours and the mentors' aim to transfer both knowledge and skills to the new farmers. Mentorship can, therefore, be an effective and relatively inexpensive way of transferring knowledge, expertise and experience to emerging PDI sugarcane growers. This is a key empirical question in the context of the SA Sugar Industry that needs to be addressed in future research. According to Knight & Lyne (2002), many SA commercial farmers are willing to serve as mentors for emerging farmers and are also seeking innovative solutions to promote sustainable land reform.

2.6 Recent Trends in Sugarcane Grower Incomes

Since the NFG scheme started in 1996, the average financial performance of NFGs has been below that of the LSGs. For the period 1997/98 to 2006/07, the NFGs had an average real (2007 = 100) gross income per hectare of R9 882 compared to the LSGs' R11 857. The NFGs have also experienced higher average real costs per hectare (R9 492) versus (R8 782) over the same time period. This has resulted in the NFGs having much lower returns per hectare than the LSGs. These trends are shown in Figures 2.3 and 2.4, respectively. Figure 2.3 (overleaf) shows that the LSGs have been able to earn a moderate real return above accounting costs (excluding the opportunity cost of capital and the opportunity cost of management time) per hectare.

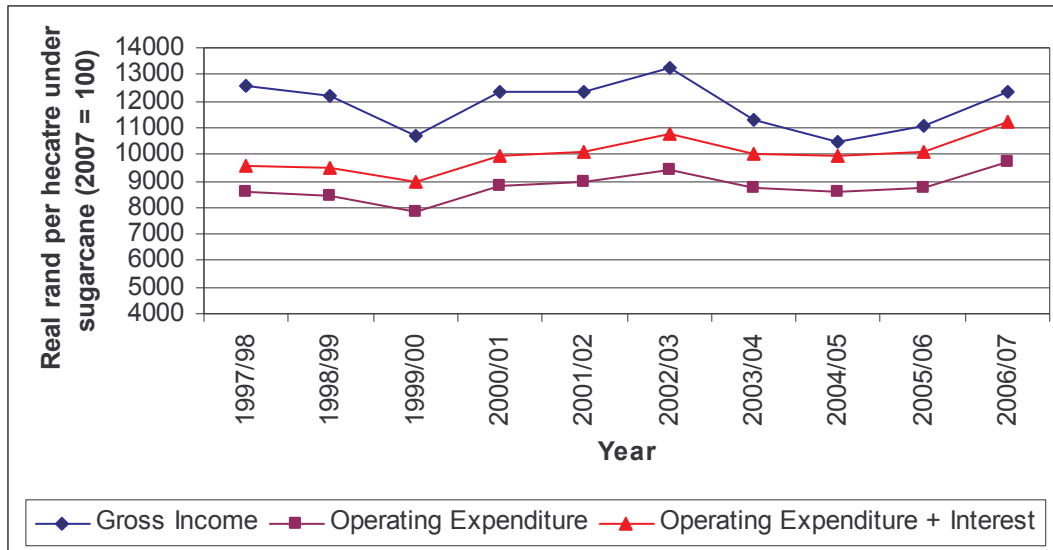


Figure 2.3 Real Gross Income and Operating Expenditure⁷ per Hectare Under Sugarcane for Large Scale Growers in South Africa, 1997/98 - 2006/07
Source: Gillitt (2008)

Figure 2.4 (overleaf) shows that the NFGs had average annual real gross incomes that were just sufficient to cover their production costs (operating expenditure plus loan interest), excluding returns to management and risk. If an opportunity cost of capital and opportunity cost of management time were added, the NFGs would on average make an annual economic loss (part of the required return to management and risk is being used to finance interest payments). This is a major cause for concern in the SA Sugar Industry that is committed to promoting the long-term viability of current and future NFGs (Armitage, 2008). The relatively poorer economic performance of the NFGs gives further support for a study of the factors affecting NFG success.

⁷ Operating expenditure = labour + chemicals + fertilizer + fuels and lubricants + mechanical maintenance + fixture maintenance + services + administration + licences + cane transport + sundry (mainly contractors).

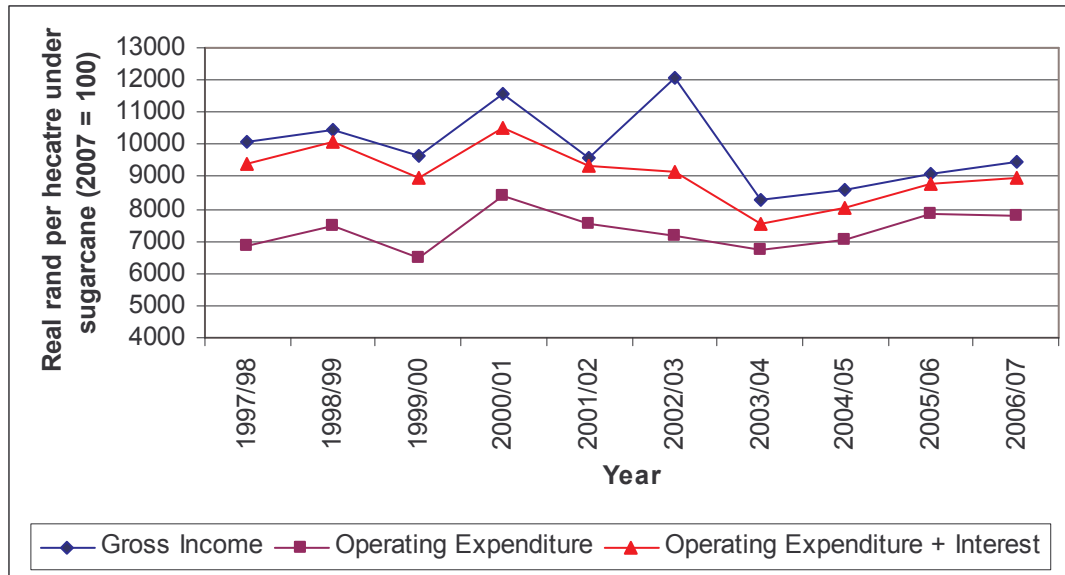


Figure 2.4 Real Gross Income and Operating Expenditure per Hectare Under Sugarcane for NFGs in South Africa, 1997/98 - 2006/07
Source: Gillitt (2008)

This chapter has highlighted recent land reform initiatives in the SA Sugar Industry to help put the emergence of NFGs into context. In addition, this chapter has shown that the average economic performance of the NFGs has lagged behind that of established LSGs. The next chapter discusses agricultural loan repayment performance as a prelude to describing the research methodology used to identify factors affecting the loan repayment status of the study sample NFGs.

Chapter 3

Agricultural Loan Repayment Performance

This chapter describes key aspects of the lender-borrower relationship, what types of loan characteristics a lender prefers and how adverse selection and moral hazard affect the lender-borrower relationship. It then describes the agricultural loan repayment problem and discusses the factors that affect agricultural loan repayment.

3.1 The Principal-Agent Relationship

An agency relationship can be defined as “...a contract under which one or more persons (the principal) engage another person (the agent) to perform some service on their behalf which involves delegating some decision-making authority to the agent” (Jensen & Meckling, 1976: 342). These principal-agent relationships provide an intuitive way in which to view the relationship between borrowers and lenders. In a credit relationship the lender (the principal) contracts with the borrower (the agent) to productively utilize and repay with interest the lender’s funds. During the course of the loan contract, the borrower is expected to comply with the objectives of the lender so that these objectives can be optimally attained. However, due to the agent’s self interest, limited cognitive powers, information asymmetries (differences), and uncertain expectations about future events, it is almost impossible to write complete and comprehensive contracts to cover all possible future events (Barry *et al*, 1992).

These discrepancies between the principal and the agent result in the principal trying to induce the agent to take the best actions that are consistent with the principal’s objectives (Varian, 1996). Inducing such behaviour is costly, and such costs are called agency costs. These costs are, therefore, incurred in structuring, administering, and enforcing loan contracts in order to align incentives between the parties, resolve informational problems, and respond to uncertainties during the term of the loan contract (Barry *et al*, 1992). In general terms, agency costs may include (i) the principal’s expenditures to monitor the agent, (ii) the agent’s bonding expenditures to insure the principal against

adverse actions taken by the agent, and (iii) any residual loss incurred by the principal arising from incomplete contracts and failure to fully align the incentives of the principal and agent (Jensen & Meckling, 1976).

In loan contracts, the lender focuses on evaluating the borrower's creditworthiness by using various approaches that range from highly subjective informal methods to scoring techniques based on sophisticated statistical analysis of the borrower's financial data. In conducting this evaluation two basic concerns of the lender are (i) whether the borrower (agent) is riskier than believed when the loan contract was established (an adverse selection problem) and (ii) whether the borrower would take on greater risks during the loan term than were originally anticipated (a moral hazard problem) (Barry *et al*, 1995). Adverse selection occurs when lenders do not know particular characteristics of loan applicants or are unable to adequately assess the distribution of returns of investments available to loan applicants. Loans may, therefore, be granted to both high- and low-risk borrowers (Wilson, 1987). The challenge for the lender in the presence of adverse selection is thus to separate high- and low-risk borrowers. This can be achieved by investing in screening technologies, or by designing contracts that encourage agents to reveal their type (Varian, 1996).

According to Kotowitz (1987), moral hazard occurs when there are actions that borrowers can take during the term of loan contract (i.e. adopting a riskier action than that originally anticipated by the lender) in maximizing their own utility, that are detrimental to the lender. Moral hazard results because the principal cannot costlessly and precisely observe the level of effort exerted by the agent (Rodriguez-Meza, 2000). To lessen the problem of moral hazard, the principal must design a contract that will induce the agent to take the desired level of action subject to the constraints imposed by the agent's optimizing behaviour (Varian, 1996).

The implication of such asymmetric information in credit markets is that the price (interest rate of credit) may not act as a market-clearing mechanism. In addition, lenders may credit-ration loan applicants, where this rationing may be in the form of additional

collateral requirements or loan size and loan term rationing (Hoff & Stiglitz, 1990; Herath, 1996). It is, therefore, important that lenders are able to reduce information asymmetries by overcoming the problems of adverse selection and moral hazard. Where a lender is unable to distinguish between potentially high- and low-risk loan applicants, there is a greater likelihood of accepting a high-risk loan applicant and incorrectly rationing the low-risk loan applicant. This may result in higher levels of default as more high-risk borrowers are accepted, forcing the lender to increase interest rates to cover the increased costs associated with increased loan default. As a result, low-risk loan applicants may opt out of the loan market, and it also increases the risk of the remaining pool of loan applicants applying for credit. This may have a negative impact on lender profits (Stiglitz & Weiss, 1981).

Similarly, the likelihood of moral hazard may increase due to inadequate loan contract monitoring and enforcement. This may negatively affect lender income and may force the lender to increase levels of monitoring or to require additional collateral to compensate for the greater loan default (Herath, 1996; Navajas, 1999). Additional monitoring increases lender costs, while there may also be additional costs associated with evaluating collateral (assets or guarantees offered to secure loans). The lender may, therefore, be encouraged to increase interest rates to compensate for increased costs, or credit may be rationed. Both of these effects may have negative consequences for low-risk borrowers (Navajas, 1999).

As lenders evaluate and improve their risk-rating systems, increasingly sophisticated tools are being introduced in the entire process as portfolio managers are moving from judgmental assessment toward greater dependence on quantitative assessment (Czuszak, 2002). Quantitative assessment results in the risk-rating process occurring at an increased rate and may result in more standardized results (Yu *et al* (2001) cited by Featherstone *et al*, 2006). When evaluating loans, financial institutions generally prefer loans that are both self-liquidating and asset-generating (Barry *et al*, 1995: 202). Self-liquidating loans can reduce the risk borne by the lender since they are made for purposes that will generate sufficient income to repay the borrowed amount within their maturity

periods. In agricultural lending, most input loans (e.g. animal feed and fertilizer) can be classified as self-liquidating since they allow for the repayment of borrowed funds upon the sale of the crops or livestock. Asset-generating loans provide a valuable source of collateral that lenders can utilize to secure loans in the event of a borrower defaulting (i.e. such loans are secured by a high degree of reclaimable assets such as machinery, equipment and buildings) (Barry *et al*, 1995). These two loan criteria (self-liquidating and asset-generating) are used in conjunction to determine the relative merits of alternative loan purposes for lenders and, in turn, for borrowers. Loan purposes ranking high in both self-liquidation and asset reclaimability are most preferred by the lender. Intermediate preference will be given to loan purposes ranking high on one criteria but low on the other and loan purposes ranking low on both criteria have a low level of preference with lenders (Barry *et al*, 1995; 203).

3.2 The Agricultural Loan Repayment Problem

Poor loan repayment performance can place an increasing burden on lenders. Default rates ranging from 27% to 60% have been reported for small-scale farmers in African countries such as Ghana and Nigeria (Okorie, 1986). High rates of default have also been reported for loans of varying term length within South Africa. For example, Lugemwa & Darroch (1995) reported a default rate of 40% for small-scale seasonal credit borrowers at the Transkei Agricultural Bank. Kuhn & Darroch (1999) also report a 56% default rate on medium term loans, with a further 17% of loans in arrears for a development finance institution in KZN in 1998. Mashatola & Darroch (2003) noted that 64 % of graduated mortgage loans issued by Ithala to finance the purchase of sugarcane land by the NFGs were in arrears.

Loan defaults discourage financial institutions from refinancing the defaulting members, causing overall agricultural production to decline (Demeke *et al*, 2004). Default is a major impediment to credit programs, as the farmers who repay their loans subsidize those that default, and there is no reason to believe that the latter are anymore likely to be poorer, or in other ways more deserving than the former (Boakye-Dankwa, 1979). Zech

& Pederson (2003) noted that there was no uniformly adopted risk-rating model in the literature on agricultural finance. Lenders thus develop different models in search of specifications that best predict farm performance and repayment capacity of borrowers in their portfolios.

3.3 Factors Affecting Agricultural Loan Repayment

Hardy & Weed (1980) found that the ratio of total liabilities-to-total assets and the ratio of expected annual loan repayment-to-total assets were key determinants distinguishing between current loans and loans in default amongst commercial farmers in the United States (US). Mortensen *et al* (1988) reported the debt-to-asset ratio, a solvency measure, and the operating ratio as the most effective treatment variables in explaining the loan performance of North Dakota farmers in the US. Miller & La Due's (1989) comprehensive review of past US studies of agricultural credit assessment showed that business solvency, repayment ability and liquidity were important factors in assessing the quality of commercial farmers as borrowers. They identified higher quality dairy farmers in the state of New York as being more liquid, more profitable and having a higher operating efficiency. According to Turvey & Brown (1990), measures of profitability, solvency, financial efficiency, and debt repayment capacity should be combined in credit scoring models for Canada's Farm Credit Corporation. Analysis of the repayment of micro credit in the US by Bhatt & Tang (2002) found that when borrowers incur lower transaction costs they tend to have higher repayment rates. In addition, the probability of loan repayment increased when the perceived threats of sanctions in the event of loan default increases. Zech & Pederson (2003) applied linear and logistic regression to South Western Minnesota farm data in the US to predict borrower repayment capacity. The debt-to-asset ratio again had a negative relation with farmer repayment capacity.

If research on agricultural loan repayment is based only on financial factors, specification error may be introduced which may lead to biased statistical results (Zech & Pederson, 2003). Demeke *et al* (2004) noted that a farmer's loan repayment performance was influenced by a complex set of socioeconomic, demographic, technical and institutional

factors. Turvey (1991) estimated that 10% to 20% of all repayment problems on selected farms in Canada occur due to personal reasons such as health, injury, death, divorce and in-family legal conflicts. The majority of repayment problems were explained by farm physical production and financial characteristics. Aguilera-Alfred & Gonzalez-Vega (1993) used a multinomial logit model to analyze the repayment performance of loans disbursed by a typical developing-country specialised lender in The Dominican Republic. Borrower characteristics (land tenure status and credit rating by the bank), loan characteristics (restriction on use of borrowed funds) and regulatory instruments (banks' own funds and international targeted funds) most affected client loan repayment. Goyal *et al* (1993) studied the repayment capacity of borrowers in cooperative societies in Hayana State, India. Non-defaulters had relatively higher average yields of major crops, higher farm asset values, higher total cash returns of the household and larger repayment capacity. Older applicants (longer customer relationship) with larger asset bases (more collateral) were less likely to have repayment problems. Defaulters used a larger proportion of their total earnings for consumption purposes – this meant less funds for investments in production processes, and lower repayment capacity.

Purdy *et al* (1997) examined factors that influenced the financial performance of a sample of Kansas farms in the US. Operator age, financial efficiency, farmland tenure position and leverage negatively impacted farm financial performance, while farm size had a positive impact on financial health. This was supported by Ohlson (cited by Miller & La Due, 1989) who in the finance literature, reported that larger companies are less likely to fail. Durguner (2007) applied panel data techniques to a sample of 264 unique Illinois farmers in the US from 2000 to 2004, and found that one-year lagged soil productivity and the debt:asset ratio were the key factors explaining the repayment capacity of these farmers.

Several studies listed below have focused on determinants of a binary loan outcome, defining borrowers as either current on their loan repayments or in default. Seasonal or short term loan repayment was positively related to factors such as the amount of capital borrowed, the level of loan supervision, the timeliness of loan disbursement, a proven

client credit history, lower debt-asset ratios, the amount of informal loan, having off-farm income, enterprise profitability, farm size and borrower age and literacy level (Kamajou & Baker, 1980; Vogel, 1981; Vigano, 1993; Lugemwa & Darroch, 1995; Orebiyi, 2002; Demeke *et al*, 2004; Oni *et al*, 2005). Using multiple loan repayment categories (current, in arrears, and default), Kuhn & Darroch (1999) studied rural medium-term loan repayment performance in KZN. Loan default tended to be greater for first time borrowers, and clients that have modest loans, smaller own direct equity contributions, and who manage contract ploughing and broiler ventures. Mashatola & Darroch (2003) used a binomial logit model to determine the factors affecting the repayment of graduated mortgage loans by the NFGs in KZN. The estimated probability of a farmer in the scheme being current on loan repayments was higher for clients with higher average annual farm gross turnover relative to loan size, and for clients with substantive off-farm income.

Table 3.1 overleaf summarises the variables that various past studies have found to affect the repayment of agricultural loans over the period 1980 - 2007. Table 3.1 indicates that solvency had a statistically significant affect on loan repayment in seven of the 16 studies identified. Repayment ability and off-farm income are the next most prominent variables in Table 3.1, with each affecting loan repayment four times in the cited studies. The next chapter will discuss the research methodology used in this study to estimate factors affecting the mortgage loan repayment status of sample NFGs in the SA Sugar Industry.

Table 3.1 Determinants of Agricultural Loan Repayment in Past Research, 1980 - 2007

Factor	Study^a															
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Farm Size									X							X
Average Yields							X									
Farmer Age							X		X							X
Farmer Education																X
Farmer Health						X										
Farmer Divorce						X										
Liquidity					X											
Solvency	X		X	X	X				X				X			X
Profitability					X											
Collateral							X	X								
Financial Efficiency			X		X				X							
Loan Repayment : Assets	X															
Turnover : Loan Size												X			X	
Repayment Ability				X	X		X	X								
Credit History								X								
Off-Farm Income								X				X		X	X	
Loan Size		X								X					X	
Household Expenditure							X									
Informal Loan Amount														X		
Transaction Costs												X				
Soil Productivity																X

^a A = Hardy & Weed (1980); B = Kamajou & Baker (1980); C = Mortenson *et al* (1988); D = Miller & La Due (1989); E = Turvey & Brown (1990); F = Turvey (1991); G = Goyal *et al* (1993); H = Lugemwa & Darroch (1995), I = Purdy *et al* (1997); J = Kuhn & Darroch (1999); K = Bhatt & Tang (2002); L = Mashatola & Darroch (2003); M = Zech & Pederson (2003); N = Demeke *et al* (2004); O = Oni *et al* (2005); P = Durguner (2007).

Chapter 4

Research Methodology

This chapter discusses the research methodology that will be used in this study. It first describes the study area and then discusses how the study data will be collected. Section 4.3 discusses the rationale for the questions in the survey questionnaire. Measures for assessing the NFGs' risk preferences are described in Section 4.4. The final section outlines the statistical techniques that will be used to analyse the survey data and NFG mortgage loan repayment status.

4.1 The Study Area

The SA Sugar Industry lies between the latitudes $25^{\circ}21'$ and $31^{\circ}0'$ South, and longitudes $29^{\circ}54'$ and $32^{\circ}20'$ East (SASEX, 1977). The study area covers the North Coast, Midlands and South Coast regions of the industry in KZN. The NFGs from the North Coast deliver sugarcane to the Maidstone, Gledhow and Darnall mills. Midlands NFGs deliver their sugarcane to the Eston mill, and NFGs in the South Coast region deliver sugarcane to the Sezela mill (see Appendix 1 on page 121).

The mean annual rainfall for the coastal belt is approximately 1 000mm, most of which (approximately 75%) falls in the summer months, while the average rainfall for the Midlands is approximately 950mm. The mean annual temperature for the coastal belt is 20.7°C . In the KZN Midlands, the mean annual temperature is 16.6°C (SASEX, 1977). The sugarcane harvesting cycle for growers on the coastal belt is 12 months, whereas growers that are situated more inland from the sea (parts of the South Coast and the Midlands) harvest on a cycle ranging from 14 to 24 months (Stranack, 2007).

4.2 Study Data Collection

The literature review in Chapter 3 shows that socio-economic data are required to try and explain the factors that contribute towards the success or failure of the study NFGs.

Primary data were collected by means of a survey using the questionnaire described in Section 4.3 and presented in Appendix 2 on page 122. Stratified random sampling was applied to the population of 291 KwaZulu-Natal based NFGs, by dividing them into mutually exclusive subgroups or strata that are as homogeneous as possible given the available information (Barnett, 1991). Three strata were used to classify the 291 NFGs by geographic region - North Coast, South Coast, and Midlands. These regions are relatively homogeneous, been distinguished by their different cutting cycles (12, 12 to 18 and 18 to 24 months, respectively). A fixed, constant proportion (sampling fraction) of 30% was selected from the NFGs in each of the three strata to make up the stratified random sample. The researchers purposely chose this sampling fraction, which exceeded the 15% that would be sufficiently representative for multivariate analysis, in order to allow for non-response and the relatively high search costs of collecting data from spatially dispersed sampling units (Barnett, 1991; Ramroop (2003) and Lyne (2003) cited by Clover & Darroch, 2005). Regional Economic Advisors (REAs) from CANEGROWERS assisted with personal interviews with the sample NFGs to obtain the primary data using the survey questionnaire. Loan status data showing whether NFGs were current, in arrears or in default were obtained from the lenders that finance the NFGs. Further information on the NFGs' financial records was obtained from the CANEGROWERS CANEFARMS book-keeping system if the NFGs gave their permission. CANEGROWERS also provided information about sugarcane yields on the sample NFG farms. A pilot study with seven (four male, three female) NFGs was conducted in March 2008 to assess if the length of the questionnaire, and the questionnaire content, were suitable. Adjustments were made to the questionnaire in Appendix 2 based on these NFGs' responses.

4.3 Study Questionnaire Design

The questionnaire shown in Appendix 2 on page 122 identifies potential socioeconomic, farm specific and industry factors that may affect the NFGs' success, and elicits the NFGs' perceptions of the scheme. This section discusses the rationale for selecting the questions that are based on past research, and consultation with Darroch (2008) and

CANEGROWERS staff. Questions 1 and 2 relate to the NFG's age and gender, factors that have both been identified as potential determinants of success (Goyal *et al*, 1993; Christen *et al*, 1994; Purdy *et al*, 1997; Oni *et al*, 2005). Goyal *et al* (1993) identified household expenditure as a factor affecting loan repayment, so Question 4 tracks the number of dependents who live in the household. As the number of dependents increases, household expenditure is expected to increase. This variable could also be a proxy for family expenditure if Question 34 (which records actual household expenditure) does not elicit a good response.

A NFG's level of formal education and previous agricultural, financial and management experience (Questions 5 and 6) may affect loan repayment. Dyke *et al* (1992) highlighted the positive link between owner's experience and small firm success. Mashatola & Darroch (2003) noted that NFGs with relatively higher levels of education may use better, or more readily adopt, technologies that may positively impact sugarcane yields. Knowing why the NFGs purchased their farms (Question 7) (for example, to make a profit from farming or to supplement income), can help identify whether commercial reasons dominate. Whether or not NFGs would have preferred to first lease in their farms (with an option to buy), say for five years (Question 8), may show that land renting could be a feasible alternative for these, and other, growers with limited own equity. The lease option could give growers that can successfully manage commercial farms time to demonstrate their abilities and to accumulate more substantial own equity for a down-payment when they purchase land. Question 9 captures physical farm size as previous studies (e.g. Purdy *et al*, 1997; Oni *et al*, 2005) have shown that farm size may affect farm loan repayment. Note, however, that Barry *et al* (1995) recommend gross income as a better measure than physical size for comparing the growth in the size of businesses of similar type. Question 10 notes distance to the nearest urban centre which could be a proxy for transaction costs (i.e. the greater the distance to the lender, the greater the transaction costs of loan repayment) which may negatively affect loan repayment (Bhatt & Tang, 2002).

Responses to the statement that annual profit from sugarcane farming is low relative to land value (Question 11) could indicate the extent to which the NFGs have experienced the relatively low current returns usually associated with the early years after land purchase. CANEGROWERS wish to ascertain how many NFGs have long-term sugarcane supply agreements and whether or not such agreements (if any) are perceived to constrain growers from diversifying their enterprises. Questions 12 and 13 collect this information.

Questions 14 to 17 assess aspects of whether or not the farm is managed on a part-time or full-time basis. Borrowers with off-farm income may have greater probability of success as supplementary earnings can help to fund loan repayments and family living expenses (Mashatola & Darroch, 2003). Productive farms that are purchased by emerging farmers (such as NFGs in this case) may lose their competitiveness if the new owners, who may lack farming experience and expertise, are not effectively organized and mentored, and do not have access to capital, training and effective extension services (Ortmann, 2005). Questions 18 to 23 analyze what mentorship is provided to NFGs and how the NFGs perceive the quality of, and need for, such mentorship. Effective mentoring can transfer technical and financial knowledge and skills to NFGs and thereby improve productivity (Mincemoyer & Thomson, 1998). This in turn could improve the probability of successful loan repayment by the sample NFGs.

Questions 24 to 29 ascertain which institutions financed farm purchase and production credit. These questions also assess what the NFGs perceive about the quality of these service providers and how they may improve their service. Question 30 probes the source of own contribution used by the NFGs to buy their farms, and Question 31 obtains the purchase price of the farm. If own contribution is sourced from other borrowings, this may put pressure on mortgage loan repayments by diverting funds to meet other debts. Questions 32 to 34 track average annual turnover, farm debts, farm assets and household drawings that may affect loan repayment (see Table 3.1 on page 34). Questions 35 and 36 identify the source and level of off-farm income (if any). Question 37 captures the

source and level of post-transfer support (if any). Again, higher levels of off-farm income and post-transfer support may improve liquidity and the probability of success.

Question 38 documents the NFGs' risk-management practices to manage/reduce income variability and promote loan repayment. Stranack (2007) identified fertilizer and weed control, soil sampling, replanting with treated seedcane, and the use of herbicides as critical to producing above-average sugarcane yields. Questions 39 to 43 cover the extent to which the NFGs apply these principles. Stranack (2007) also emphasized that the harvesting operation affects farm profitability. Questions 44 to 50 detail this operation on the NFG farms. Gloy *et al* (2002) note that the quality of a farm's labour force (which may affect farm profitability), is influenced by the amount of training conducted by the employee's current and previous employer and the quality of labour provided by the employee. Questions 51 and 52 aim to determine the number of permanent staff the NFGs employ and whether or not these staff have any formal training in their area of responsibility.

Armitage (2008), Church (2007) and Stranack (2007) also identified several other factors that could affect the NFGs' earnings as covered by Question 53 which asks NFGs to rank these factors on Likert-type scales from 1 (extremely unimportant) to 10 (very important). Since many of the NFGs use contractors for land preparation and harvesting (Stranack, 2007), their earnings may be affected by both contractor availability and reliability. Labour availability and reliability may negatively affect farm profitability. One of the major contributors to this could be the HIV/AIDS pandemic in South Africa: HIV/AIDS has been directly linked to reduced worker productivity and increased costs of doing business (Daly, 2000; Morris *et al*, 2000). According to Gray *et al* (2007), two-thirds of KZN farmer respondents in their study believed that HIV/AIDS negatively affects current farm profitability, with timber and sugarcane farmers perceiving the largest negative impact. NFGs are paid for their sugarcane crop based on their RV yields which reward growers for supplying higher quality sugarcane to the mills (see Section 2.1, page 19) (Moor, 2002). Hence, the lower the RV price, the less money the NFGs will receive for their crop and, therefore, the lower will be their profit levels. The

prevailing climatic conditions and the presence of Eldana Sugarcane Borer (*Eldana saccharina*) (Eldana) may also negatively affect sugarcane quality and income. The primary effect of Eldana is on the sucrose percentage (a sugarcane quality measure). There is a direct correlation between the percentage of red stalk length (i.e. average length of stalk damaged by Eldana) and the sucrose yield. A 1% red stalk length equates to about a 1% decrease in sucrose yield (Stranack, 2007). Therefore, the greater is the effect of Eldana, the lower is the profitability of the affected NFGs. Adverse climatic conditions may also negatively affect the quality of a sugarcane crop (Smith, 2006). Rates of return on debt above the interest rate will increase profits (positive leverage) while rates of return below the interest rate will reduce profits. The interest rate charged on a loan effectively measures the price the borrower has to pay for the loan (Barry *et al*, 1995). Hence the higher the interest rate charged by the lending institution, the higher the cost to the borrower.

According to Nothard *et al* (2005), information as a business input can have a positive effect on sugarcane production. CANEGROWERS thus intends to ascertain whether a lack of information supplied by the industry constrains NFG success. Question 54 and 55 deal with how the growers may respond to financial stress. The type of record keeping system adopted by a farmer is an indication of the amount of time and importance the farmer places on financial management (Gloy *et al*, 2002). Farmers who either keep their own records, or outsource their record keeping, may generate greater profits than those who do not keep records. Farmers who use a computerized record keeping system, compared to farmers who use a manual record keeping system, are able to dedicate more time to analysis of their records and focus on turning their data into profitable information. Questions 56 and 57 note what type of record keeping systems the NFGs use.

The NFGs' risk preferences will be estimated by questions 58 and 59 as discussed in more detail below in Section 4.4. This is important since the risk preferences of NFGs may impact on their leverage levels. Barry *et al* (1995: 175) note that lower levels of risk aversion are generally associated with higher leverage, and higher levels of risk aversion

are usually associated with lower leverage. In addition to this, more risk-averse persons seek to avoid reduced access to future loan funds by making efforts to meet their repayment obligations (Sharma & Zeller, 2000). Finally, Question 60 is open-ended to give the NFGs the opportunity to make any other comments about the scheme or their experiences with industry role players.

4.4 Measurement of the NFGs' Risk Preferences

Each NFG's degree of risk aversion will be measured using the Arrow-Pratt absolute risk aversion coefficient. The Arrow-Pratt risk aversion coefficient is defined as:

$$-U''(x)/U'(x) \quad (4.1)$$

where $U'(x)$ and $U''(x)$ are the first and second derivatives of a von Neumann-Morgenstern utility function, $U(x)$. The negative exponential utility function, $U(x) = -\exp(-\lambda x)$, will be assumed since it has a constant Arrow-Pratt coefficient (λ) (Ferrer *et al*, 1997). To estimate this utility function, farmers will answer two hypothetical questions relating to a situation where they are faced with two options: Option A, take a gamble and Option B, receive a certain cash amount. In both questions the NFG will have to choose between an amount dependent on the gamble and another amount with certainty. The certain amount will then be adjusted until a level is reached where the NFG is indifferent between the two choices. If the certain amount selected equals the expected income of the coin toss gamble, then the NFG is defined as risk neutral (Ferrer, 2008).

The gamble will be based on the toss of an assumed unbiased coin, therefore overcoming the probability preference problem. The gamble will thus take the form (x_{\max}, x_{\min}, p) , offering a monetary prize of x_{\max} with probability p , or x_{\min} with probability $1-p$. The first lottery question has an expected value of R2 500 with zero downside risk and the possibility of a R5 000 gain. The second lottery question has an expected value of R4000 and a potential loss of R2000 and a potential gain of R10 000. Following Ferrer *et al* (1997), the Arrow-Pratt risk aversion coefficients will be adjusted for the range and scale

of the data and will be estimated for all respondents and both lotteries by fitting the respective functions:

$$f = 0.5 + 0.5\exp(-\lambda^*(x_{\max} - x_{\min})) - \exp(-\lambda^*(x^* - x_{\min})) \quad (4.2)$$

In this analysis equation (4.2) reduces to:

$$f = 0.5 + 0.5\exp(-\lambda^*) - \exp(-\lambda^*x^*) \quad (4.3)$$

The Arrow-Pratt absolute risk aversion coefficients will be adjusted in order to facilitate comparison with those obtained by Ferrer *et al* (1997) and Mac Nicol (2007). The NFGs' risk preferences can then be compared with the risk preferences of commercial sugarcane growers in South Africa since both these studies found that such growers were slightly to moderately risk averse. In order to obtain a measure of risk preference, the mean adjusted Arrow-Pratt absolute risk aversion coefficients over both lottery questions will be used. The coefficients for the two questions are expected to differ, since the first question involves no downside risk. Risk aversion levels are, therefore, expected to be lower than those for the second question. It is expected *a priori* that the NFGs will also be risk averse as they have relatively less own equity than established commercial sugarcane farmers in South Africa.

4.5 Statistical Methods

4.5.1 Principal Component Analysis (PCA)

Principal Component Analysis (PCA) is a multivariate statistical technique which attempts to reduce the dimensionality of a data set consisting of a large number of interrelated variables, while retaining as much of the variation present in the data set as possible (Dunteman, 1989: 7). The reduction replaces the original set of variables with a new set of variables, the principal components (PCs), which are orthogonal (uncorrelated) and ordered so that successive PCs contain diminishing proportions of the

total variation present in the original data (Jolliffe, 1986:1). Given the range of socioeconomic explanatory variables used in this study to explain NFG success, multicollinearity between some of these variables is possible since many of them could be intercorrelated. In the presence of multicollinearity, the coefficient estimates have large standard errors and cannot be estimated with great precision (Gujarati, 2003). If this problem arises in the explanatory variables, PCA will be used estimate orthogonal dimensions (PCs) to replace the explanatory variables. Principal components are obtained by linear transformations of the observed variables as follows (Koutsoyiannis, 1977: 424):

$$\begin{aligned}
 PC_1 &= a_{11}X_1 + a_{12}X_2 + \dots + a_{1k}X_k \\
 PC_2 &= a_{21}X_1 + a_{22}X_2 + \dots + a_{2k}X_k \\
 &\vdots \\
 PC_i &= a_{i1}X_1 + a_{i2}X_2 + \dots + a_{ik}X_k
 \end{aligned} \tag{4.4}$$

where PC_1 is the first component accounting for the maximum proportion of total variation in the set of original variables (X_1, X_2, \dots, X_k); and the a_{ik} are the component loadings, which are selected such that the PCs are uncorrelated and $\text{var}(PC_1) > \text{var}(PC_2) > \text{var}(PC_i)$. The size of each a_{ik} shows the relative importance of its associated X variable in the newly derived PC, whilst the sign has a specific meaning relative to the signs of the coefficients estimated for the other variables (i.e. different signs mean that the variables being analyzed are related to the PC in opposite directions) (Kim & Mueller, 1994). Only PCs that can be *meaningfully interpreted* and that satisfy a formal selection criterion should be retained for the analysis. Koutsoyiannis (1987) suggests retaining PCs that satisfy Kaiser's criterion (eigenvalue ≥ 1) and have estimated coefficients greater than 0.300.

The PCs derived from the X s depend upon which data matrix is used for the analysis. If the original X s are measured in reasonably similar units or comparable scales, unstandadized variables and the sample covariance matrix should be used to derive the

PCs. Conversely, when the Xs have different units or widely different scales, standardized variables and the sample correlation matrix are preferred (Morrison, 1975). This avoids one or more of the Xs that have relatively larger variances than the other variables from having an undue influence on the PCs (Manly, 1994).

One assumption of PCA is that the Xs are measured as interval data, since such data are used to construct covariance or correlation matrices for extracting the PCs (Kim & Mueller, 1994). Since the values of Xs in interval data have order and equal intervals, meaningful comparisons between these values can be made (Gujarati, 2003: 31). If dichotomous and /or ordinal data are used, distortions in data scaling will result in the correlations between variables being distorted, and hence, distort the PCA results (Kim & Mueller, 1994). Kim & Mueller (1994) indicate, however, that the correlation coefficients are fairly robust with respect to ordinal distortions in measurement, and such distortions can be restricted if (1) PCA is used to find general dimensions of the variables in the data and (2) the underlying correlations among the variables are moderate (correlation coefficients less than 0.600 – 0.700).

4.5.2 Analytical Tools for Variables with Polychotomous Outcomes

Discriminant analysis and logistic regression are widely used as multivariate statistical methods to analyse groups of data with categorical outcome variables such as farmer loan repayment status that is current, in arrears or in default. Discriminant analysis requires that, within the groups, variables follow a multivariate normal distribution, with equal covariance matrices (Manly, 1994). Models that use categorical explanatory variables hence violate this assumption. Unlike discriminant analysis, both logit and probit regression models yield asymptotically consistent, efficient and unbiased estimators even when the assumption of multivariate normality among the explanatory variables is violated (Zech & Pederson, 2003). Since this study also uses dichotomous explanatory variables – such as gender, adoption of risk management strategies and use of record-keeping systems - as potential determinants of success, discriminant analysis will not be used. Logistic regression is preferred in this study because the logistic cumulative

density function (cdf) has a simpler algebraic form than the standard normal cdf used in the probit model (Gujarati, 2003).

4.5.2.1 Logistic Regression

The statistical analysis of qualitative dependent variables can be seen as the problem of predicting probabilities for the various possible responses of the dependent variable (Gujarati, 2003). Binomial logit analysis is a well known technique that is used when there are only two responses such as successful or unsuccessful. Theil (cited by Aguilera-Alfred and Gonzalez-Vega, 1993) developed a multinomial logit model (MNL) that allows for both discrete and continuous independent variables when a case with more than two responses exists, such as loans which are current, in arrears or in default. Given that P_j ($j = 1, \dots, 3$) are the probabilities of each one of the three mortgage loan repayment categories occurring, the MNL can be expressed in equation (4.5) as:

$$\ln\left(\frac{P_j}{P_1}\right) = \beta_{0j} + \beta_{1j}X_{1i} + \dots + \beta_{kj}X_{ki} + \mu_{ji} \quad (4.5)$$

for $j = 2, 3$ and $i = 1, \dots, n$, and $k = 1, \dots, K$

where P_1 is the probability of loans being current, P_2 of loans paid in arrears and P_3 of loans being in default. The X_{ki} are vectors of the explanatory variables, the β_{kj} refer to the parameters to be estimated, n is the number of observations and k is the number of explanatory variables.

The reference or base category (P_1) is selected from amongst the multiple distinct categories ($P_1 \dots P_3$) as the category of most interest to the researcher. In this case, the base category is mortgage loans that are current, as the researcher wants to identify factors that explain why NFGs deviate from being current on their repayments. The MNL parameters for the X_{ki} characteristics are estimated by the method of maximum likelihood which aims to maximize the likelihood (or the odds) that the observed values

of the polychotomous dependent variable may be predicted from the observed values of the X_{ki} ⁸. The estimated MNL parameters (coefficients) are in turn used to estimate the probability that a particular category will be selected *relative* to the probability of being in the base (reference) category (Maddala, 1992). In order to achieve this, different MNL parameter values for the X_{ki} characteristics are estimated for each distinct category except the base category. The parameters specific to the base category are set to zero so that the probabilities sum to one (Carter Hill *et al*, 2008). It is then possible to identify whether a particular individual is more or less likely to be in any particular category relative to the base category by interpreting the sign and level of statistical significance of each parameter estimate (Kennedy, 2003).

The main explicit assumption of the MNL is that the X_{ki} do not have to be multivariate normally distributed. The MNL can thus be estimated using continuous, dichotomous and ordinal explanatory variables (Aldrich & Nelson, 1989). It is also critical that the MNL is correctly specified (i.e. includes all relevant X_{ki} and excludes all irrelevant X_{ki}), and there is low multicollinearity between the X_{ki} . The estimated standard errors for the estimated β_{kj} will increase as the degree of multicollinearity increases, thus reducing the reliability of the β_{kj} (Garson, 2009). The MNL implicitly assumes that the odds between any two categories are independent or irrelevant alternatives (IIA) (i.e. the ratio of the probabilities of any two categories is not affected if an extra category is added). This implies that the MNL is less appropriate if two or more of the categories being researched are very similar/close substitutes (Carter Hill *et al*, 2008; Kennedy, 2003). The three specified NFG mortgage loan repayment groups (current, in arrears, or in the process of legal action) are conceptually sufficiently different to overcome the potential problem of IIA. The MNL is preferred to the ordered probit model as the loan repayment classification is arbitrary (no natural ordering) and the MNL is computationally easier to estimate (Kennedy, 2003). The conceptual empirical multinomial logit model of NFG mortgage loan repayment status is specified in Chapter 6, Section 6.2. The next chapter describes the socio-economic characteristics of the sample NFGs.

⁸ Greene (2000) and Maddala (1992) discuss the maximum likelihood estimation of regression models with polychotomous dependent variables.

Chapter 5

Socio-Economic Characteristics of the Sample NFGs

The survey was intended to interview 30% of the KZN NFG population, which would have resulted in a sample size of 87 NFGs. A total of 96 NFGs were surveyed, with 66 respondents farming on the North Coast, 23 from the South Coast, and seven that owned farms in the Midlands. This chapter first presents the sample NFGs' demographic profiles and personal characteristics. Section 5.2 describes their physical farm characteristics, while section 5.3 reviews some farm management practices commonly adopted by the sample NFGs. Their farm financial characteristics are shown in section 5.4, while section 5.5 describes the source used by the sample NFGs to fund their own equity contribution when purchasing their farms. Finally the chapter describes the NFGs' attitudes towards risk and reviews strategies that the NFGs use to manage risk (income variability).

5.1 Demographic Profiles and Personal Characteristics of the Sample NFGs

Table 5.1 presents the demographic profiles and personal characteristics of the sample NFGs. The average age of the sample NFGs was 50.41 years, with the youngest being 26 years old, and the eldest 76 years old. Female NFGs only accounted for 9.4% of the sample. The majority of sample NFGs were married (83.3%), 8.3% were single, 3.1% were in a common law marriage (marriage ceremony presided over by a traditional leader) and 5.2% were widows (ers). On average the sample NFGs had between five and six dependents. The sample NFGs had on average 11.05 years of formal education and sugarcane farming experience when they purchased their farms, with the latter ranging from zero to 36 years. The sample NFGs also lacked experience at the management level with an average of only 1.84 years of experience within a management position.

Table 5.1 Demographic and Personal Characteristics of the Sample NFGs by Region, 2008

Characteristic	KZN (n =96)	North Coast (n = 66)	South Coast (n = 23)	Midlands (n = 7)
Mean age (years)	50.41	49.92	49.87	56.71
Male (number)	87	60	20	7
Female (number)	9	6	3	0
Marital status				
Single (number)	8	7	0	1
Married (number)	80	54	21	5
Common law marriage (number)	3	2	1	0
Divorced (number)	0	0	0	0
Widow(er) (number)	5	3	1	1
Mean number of dependents ^a	6	5	6	5
Mean formal education (years)	11.05	11.06	10.91	11.43
Mean sugarcane farming experience (years)	11.05	12.06	8.96	8.14
Mean management experience (years)	1.84	3.82	2.65	2.57

Note ^a: dependents are individuals that rely on the NFG household for finance.

Table 5.2 shows that most of the sample NFG growers (73%) were between the ages of 40 and 60 years. These results confirm what Mashatola (2003) found in that there is a relative lack of younger growers participating in the NFG scheme. This may be attributed to their lacking sufficient experience and own equity to purchase commercial sugarcane farms.

Table 5.2 Age Distribution of Sample NFGs by Region, 2008

Age (Years)	KZN (n =96)	North Coast (n = 66)	South Coast (n = 23)	Midlands (n = 7)
≤ 30	1	0	1	0
31 – 40	13	11	2	0
41 – 50	37	25	10	2
51 -60	33	23	7	3
> 60	12	7	3	2

5.2 Physical Farm Characteristics of the Sample NFGs

The average physical farm size for the sample NFGs was 177.55 hectares, with 130.7 hectares planted to sugarcane (see Table 5.3). Midlands growers have a larger area planted to sugarcane on average than the North and South Coast NFGs. This is because Midlands growers have a longer growing cycle than coastal growers and, therefore, require slightly larger areas under sugarcane to harvest similar annual quantities (Stranack, 2007). Eighty-two percent of the sample NFGs have long term sugarcane supply agreements that are intended to help the millers obtain a consistent supply of sugarcane in order to better utilize mill capacity. In return, the growers are guaranteed that their sugarcane deliveries will be accepted at their area mill. The average length of the long term sugarcane supply agreement for the sample NFGs is 26.52 years and ranged from five to 50 years. Sample NFG farms were, on average, located 11.94km and 17.12km from the nearest town and mill, respectively.

Table 5.3 Mean Values of Sample NFG Farm Physical Characteristics by Region, 2008

Characteristic	KZN (n =96)	North Coast (n = 66)	South Coast (n = 23)	Midlands (n = 7)
Farm size (hectares)	177.55	167.29	200.72	198.14
Area under sugarcane (hectares)	130.70	125.62	130.99	177.71
Cane Supply Agreement (years)	26.52	28.58	20.87	25.71
Distance from town (km)	11.94	11.45	13.83	7.43
Distance from mill (km)	17.12	14.3	25.04	13.57

5.3 Key Farm Management Practices Adopted by the Sample NFGs

The re-establishment (replanting) of sugarcane is an extremely important aspect of sugarcane husbandry and increases the likelihood that a farm will remain productive in the long run, given that normal weather conditions prevail (Stranack, 2007). According to Table 5.4, the sample NFGs on average, replanted 5.92% of their area under cane

(AUC) annually, which falls below the industry recommendation of 10% of the AUC. Most NFGs who planted much less than this recommendation cited a lack of finance as the reason. Stranack (2007) also emphasized the importance of soil health on the production potential of a farm, and the importance of whole cycle soil sampling in maintaining a healthy soil. While most sample NFGs (85.4%) took whole cycle soil samples when replanting a field, only 65% of them applied the full recommended amount of fertilizer/lime to each field. This the NFGs mainly attributed to the costs of these operations or their inability to secure production finance.

Table 5.4 Key Farm Management Practices Adopted by the Sample NFGs by Region, 2008

Management Practice	KZN (n=96)	North Coast (n = 66)	South Coast (n = 23)	Midlands (n = 7)
Mean annual area replanted (% of AUC)	5.92	6.32	5.30	4.27
Whole cycle soil sample (%)	85.40	86.40	87.00	71.40
Apply ripeners (%)	45.80	59.10	13.00	28.60
Production Record Keeping				
Own manual system (%)	88.50	89.40	91.30	71.40
Own computerized system (%)	7.30	10.60	0.00	0.00
Specialized computerized system (%)	9.40	10.60	4.30	14.30
External Consultant (%)	0.00	0.00	0.00	0.00
No formal system (%)	4.20	3.00	8.70	0.00
Financial Record Keeping				
Own manual system (%)	40.60	48.50	26.10	14.3
Own computerized system (%)	4.20	6.10	0.0	0.00
CANEFARMS (%)	47.90	57.60	17.40	57.10
External Consultant (%)	52.10	43.90	78.30	42.90
No formal system (%)	1.00	1.50	0.00	0.00

A large proportion of the sample NFGs (88.5%) kept their own type of manual production records, 7.3% used their own computerized system, and 9.4% opted for specialized software for keeping up-to-date production records. Some 40.6% of the sample NFGs used their own manual system to keep financial records. Most of the sample NFGs either used CANEFARMS bookkeeping services or had an external consultant prepare their financial records. Only 4.2% of the sample NFGs used a

computer for these purposes⁹, while only one of the sample NFGs had no formal financial records.

5.4 Farm Financial Characteristics of the Sample NFGs

Table 5.5 presents mean values of the farm financial characteristics of the sample NFGs. Average annual gross farm turnover ranged from R100 000 to R3 200 000, with a mean of R937 282 (Midlands NFGs had lower gross farm incomes). The average annual off-farm income was R110 693, although this was biased upwards by a relatively small group of NFGs with high annual off-farm incomes. On average, a NFG spouse had an annual off-farm income of R31 302.

Table 5.5 Mean Farm Financial Characteristics of the Sample NFGs by Region, 2008

Characteristic	KZN (n=96)	North Coast (n = 66)	South Coast (n = 23)	Midlands (n = 7)
Annual gross farm income (Rands)	937 282	935 592	992 174	772 857
Annual off-farm income (Rands)	110 693	104 621	118 152	143 429
Annual spouse off-farm income (Rands)	31 302	24 784	56 326	5 886
Debt : Asset ratio	0.43	0.47	0.30	0.46
WCTFR ratio	0.11	0.08	0.21	0.12
Asset : Turnover ratio	0.34	0.35	0.31	0.26
Monthly living expenses (Rands)	8 723	7 665	12 130	7 500

Although the debt:asset ratio varied substantially across farms, the NFGs were on average within the maximum debt:asset ratio of 0.50 or lower that is usually recommended by financiers (see Barry *et al*, 1995: 111). The sample NFGs were on average in a relatively weak liquidity position, with a mean working capital:gross farm income (WCTFR) ratio of 0.11 (the higher the ratio the greater is the NFG's ability to generate cash to meet short term financial obligations). Becker *et al* (2005) developed a farm financial scorecard which ranks farmers from a vulnerable to a strong financial

⁹ Note: These do not sum to 100% since some farmers used a combination of these record keeping systems.

position. Farmers that have an asset:turnover ratio (which measures financial efficiency) below 30% are classified as vulnerable, and if this ratio is over 45% farmers are said to be in a strong financial position. The average asset:turnover ratio for the sample NFGs was 0.34 (or 34%), ranking them in the middle of the financial scorecard for this ratio. Monthly living expenses were, on average, higher in the South Coast group.

5.5 Source of NFG Own Contribution to Purchase Farmland

The use of borrowed funds to finance the deposit for the land purchase may result in additional cash flow problems and put pressure on mortgage loan repayments as funds will be diverted to meet other debts. Table 5.6 shows the sources of funds used by the sample NFGs to finance the deposit on the purchase price of their farms.

Table 5.6 Sources of Funds Used by the Sample NFGs to Finance Deposit on Land Purchase by Region, 2008

Source of Funds	KZN (n =96)	North Coast (n = 66)	South Coast (n = 23)	Midlands (n = 7)
Personal savings	25	14	8	3
Sale of assets	4	3	1	0
Sale of business	1	0	1	0
Pension	5	4	1	0
Retrenchment package	3	2	1	0
Loan from family member	0	0	0	0
Insurance Policy	1	1	0	0
LRAD + Personal savings	19	15	3	1
LRAD + Retrenchment Package	21	3	0	0
LRAD + loan from family member	3	17	3	1
LRAD + Insurance Policy	1	1	0	0
Personal savings + Retrenchment Package	9	3	4	2
Personal Savings + Insurance Policy	3	3	0	0
Retrenchment Package +Insurance Policy	1	0	1	0

Personal savings accounted for the largest single source of funds that the sample NFGs used to purchase their land. Forty-four sample NFGs obtained an LRAD grant which

they combined with either personal savings, retrenchment packages, loans from family members or insurance policy payouts in order to finance their down-payment.

5.6 Risk Attitudes of, and Risk Management Strategies Commonly Adopted by, the Sample NFGs

The sample NFGs' attitudes towards risk were estimated using the Arrow/Pratt Absolute Risk Aversion (APARA) Coefficient, which was estimated by asking specifically formulated questions. A positive coefficient implies that farmers are risk averse (Ferrer, 2008). On average, the sample NFGs were found to be risk averse, with a mean value for the APARA Coefficient for both lottery questions and all survey respondents of 3.680. The mean value of 3.680 is higher than values reported by both Ferrer *et al* (1997) (1.492) and Mac Nicol (2007) (0.650), indicating that the sample NFGs are relatively more risk averse as a group than their samples of commercial sugarcane growers within KZN.

Farmers face a variety of risks, such as production risk, price or market risk, institutional risk, human or personal risk, business risk and financial risk (Hardaker *et al*, 2004: 6). Risk management involves choosing among alternatives for reducing the effects of risk on a farm, and in so doing affecting the farm's financial position, (Harwood *et al*, 1999). Hardaker *et al* (2004: 13) define risk management as "the systematic application of management policies, procedures and practices to the tasks of identifying, analyzing, assessing, treating and monitoring risk".

Table 5.7 shows the risk management strategies that the respondents use to deal with various types of risk. The majority (89.6%) of the sample NFGs have crop insurance that protects against crop loss due to fire. This type of insurance was a compulsory contractual obligation for many of the NFGs obtaining finance to purchase their land. The relatively low percentage (13.5%) of NFGs who use enterprise diversification as a risk management strategy is expected as most (79) of the NFGs signed a long-term sugarcane supply agreement which restricts them to only planting sugarcane. Enterprise

diversification was most prevalent amongst sample NFGs on the South Coast, and was mainly on a small scale (one or two hectares) with growers planting vegetables such as cabbages and potatoes. Most of the risk management strategies adopted are *ex-post* strategies, allowing the NFGs to deal with risk after an income shock is experienced. Very few NFGs used *ex-ante* risk management strategies (e.g. enterprise diversification) which reduce exposure to risk or put in place risk management strategies prior to an income shock (Valdivia *et al* (1996)).

Table 5.7 Risk Management Strategies Commonly Used by the Sample NFGs by Region, 2008

Strategy	KZN (n =96)	North Coast (n = 66)	South Coast (n = 23)	Midlands (n = 7)
Fire insurance (%)	89.60	89.40	91.30	85.70
Enterprise diversification (%)	13.50	13.60	17.40	0
Off-farm investment (%)	47.90	40.90	65.20	57.10
Keep cash reserves (%)	67.70	69.70	65.20	57.10
Keep credit reserves (%)	68.80	66.70	78.30	57.10

This chapter has provided a detailed description of the socio-economic characteristics of the sample NFGs including demographic profiles and personal characteristics, physical farm characteristics, key farm management practices adopted, farm financial characteristics, source of funds used to purchase farmland, and the risk attitudes of sample NFGs. In summary, the average sample NFG was 50 years old and had 11 years of formal education and sugarcane farming experience. The average sample NFG farm size in KZN was 177.5 hectares, with 130.7 hectares planted to sugarcane. On average, sample NFGs replanted 5.92% of their area under sugarcane annually, 85.4% of the sample used whole cycle soil sampling and 45.8% applied ripeners to their cane. Eighty-nine percent of the sample kept manual production records, while only 7.3% kept computerized production records. The average sample NFG had an annual gross farm income of R937 282, with a debt:asset ratio of 0.43. On average, sample NFGs were found to be risk averse. The most commonly adopted risk management practice amongst respondents was the adoption of insurance against fire outbreak, followed by the holding

of credit and cash reserves, off-farm investments and enterprise diversification. The next chapter describes the mortgage loan repayment status of the sample NFGs and specifies the conceptual model of NFG mortgage loan repayment status, and reports the empirical results for this model.

Chapter 6

Conceptual Model and Empirical Analysis of NFG Mortgage Loan Repayment Status

This chapter describes the conceptual model used to estimate NFG mortgage loan repayment status and presents the results thereof. It first describes the loan repayment status of the sample NFGs. Section 6.2 specifies the conceptual model of NFG mortgage loan repayment status and identifies factors that could affect such status. Section 6.3 presents the mean values of these factors for the sample NFGs in each repayment category (successful, less successful, and unsuccessful) and reports statistical tests of whether these mean values are statistically different across the three groups. The chapter concludes with Section 6.4 which presents the results of the empirical model.

6.1 Mortgage Loan Repayment Status of the Sample NFGs

Following Aguilera-Alfred & Gonzalez-Vega (1993), mortgage loan repayment performance by the sample NFGs was monitored *over time* to avoid distortions in the delinquency measurement. Primary data on the status of the NFGs' mortgage loans were obtained from their financing institutions: 74 sample NFGs were financed by Ithala Bank, 11 by Land Bank, nine by First National Bank and two by ABSA Bank. The repayment status of these loans as at a selected cut-off date of 31 March 2008¹⁰ was classified into three categories: (1) current (most installments over time were paid within 30 days of the cut-off date); (2) paid in arrears (most installments over time were paid within 31 to 90 days of the cut-off date); and (3) in default (due installments still unpaid beyond 90 days after the cut-off date). Given this classification, 75% (or 72) of the 96 sample NFGs were current on their loan repayments (successful), 13.5% (or 13) were in arrears (less successful) and 11.5% (or 11) were in default and had been handed over for legal action (unsuccessful). The next section specifies and discusses a conceptual model of factors that could be used determine the mortgage loan repayment status of the sample NFGs.

¹⁰ The annual installment for Ithala Bank clients is raised at the end of their financial year (31 March). In order to compare growers, this cut-off date was used when analyzing all of the financial institutions that financed land purchases by the sample NFGs.

6.2 Conceptual Model of NFG Mortgage Loan Repayment Status

As outlined in Section 4.5.2.1, multinomial logistic regression was selected to model the factors affecting the sample NFGs' mortgage loan repayment status. For this model, the mortgage loan outcome of being current on repayments (successful NFGs) is chosen as the benchmark for comparison, and the probability of membership in the other two categories is compared to the probability of being in the benchmark category (Aldrich & Nelson, 1989). Given that P_j ($j = 1, \dots, 3$) are the probabilities of each one of the three repayment categories occurring, the multinomial logit model (see Aldrich & Nelson (1989) for a summary of the models statistical properties) can be expressed in equation (6.1) as:

$$\ln\left(\frac{P_j}{P_1}\right) = \beta_{0j} + \beta_{1j}X_{1i} + \dots + \beta_{kj}X_{ki} + \mu_{ji} \quad (6.1)$$

for $j = 2, 3$ and $i = 1, \dots, n$, and $k = 1, \dots, K$

where P_1 is the probability of loans being current, P_2 of loans paid in arrears and P_3 of loans being in default. The X_{ki} are vectors of the explanatory variables, the β_{kj} are the multinomial logit parameters to be estimated, n is the number of observations and k is the number of explanatory variables. Using equation (6.1), the loan repayment status of the i^{th} NFG will be estimated as a function of the k explanatory variables described in Table 6.1 overleaf. The rationale for selecting these variables is given in Section 6.2.1.

6.2.1 Factors Affecting NFG Mortgage Loan Repayment Status

Some past studies of loan repayment status have estimated non-statistically significant coefficients for AGE as a determinant of loan repayment (e.g. Lugemwa & Darroch, 1995; Demeke *et al*, 2004). However, other studies report that older farmers are more likely to be current on loan repayments (Aguilera-Alfred & Gonzalez-Vega, 1993; Baker & Dia, 1993; Oni *et al*, 2005). Over time, farmers acquire experience on the farm and in formal credit use, while older farmers may also accumulate more wealth than younger

Table 6.1: Hypothesized Determinants of NFG Mortgage Loan Repayment Status

Variable	Definition	Expected sign
AGE	Age of NFG in years	-
GENDER	Dummy variable (1=male, and 0=female)	+ or -
EDU	Level of education obtained by NFG	-
EXPSF	Years of experience NFG has in farming sugarcane	-
FMEXP	Years of experience NFG has in financial management	-
MEXP	Years of experience NFG has in general management position	-
CMEET	Annual number of meetings with CANEGROWERS' economics advisory staff	-
SMEET	Annual number of meetings with SASRI extension officers	-
MMEET	Annual number of meetings with sugar miller support staff	-
FMEET	Annual number of meetings with financial institution representative	-
FSIZE	Annual gross farm income (turnover) (Rand)	-
OFI	Annual off-farm income the NFG receives (Rand)	-
SOFI	Annual off-farm income the NFG's spouse receives (Rand)	-
SOLV	Debt : Asset Ratio	+
LIQUID	Working Capital : Gross Farm Return Ratio	-
FEFCY	Asset Turnover Ratio	-
PROFIT	Rate of Return on Farm Equity (%)	-
FAMHE	Ratio of annual family household expenditure to total hectares operated	+
RMS_{1...m}	Dummy variable = 1 if the m th risk management strategy is adopted, and 0 otherwise	-
RMS₁	Enterprise diversification	-
RMS₂	Off-farm investment	-
RMS₃	Insurance against fire outbreak	-
RMS₄	Keep cash reserves	-
RMS₅	Keep credit reserves	-
APRA	Mean adjusted Arrow-Pratt absolute risk aversion coefficient for the i th NFG	-
REPLNT	Percentage of total area under sugarcane (AUC) that is replanted annually (%)	-
SSAMP	Dummy variable = 1 if whole cycle soil samples are taken at replanting, and 0 otherwise	-
HCDEL	Harvest-to-crush delay (hours)	+
PRECSYS_{1...m}	Dummy variable = 1 if NFG uses the m th production record keeping system, and 0 otherwise	-
PRECSYS₁	Own manual system	-
PRECSYS₂	Own computerized system	-
PRECSYS₃	Specialized computerized system	-
PRECSYS₄	External consultant	-
PRECSYS₅	No formal system	-
FRECSYS_{1...m}	Dummy variable = 1 if NFG uses the m th financial record keeping system, and 0 otherwise	-
FRECSYS₁	Own manual system	-
FRECSYS₂	Specialized computerized system	-
FRECSYS₃	CANEFARMS bookkeeping service	-
FRECSYS₄	External consultant	-
FRECSYS₅	No formal system	-

farmers. Therefore, it is hypothesized that older NFGs will have a lower likelihood of experiencing loan repayment problems. A general research finding about rural borrowers is that women have better microfinance repayment records (Christen *et al*, 1994). GENDER in Table 6.1 is a dummy variable which = 1 if the household head is male, and 0 otherwise. Given a lack of comparative studies on the impact of gender on loan repayment, GENDER in this study could positively or negatively affect NFG success.

If education is an allocative input that facilitates the adoption of new technologies, then farm scale offers a benchmark for measuring returns to these allocative skills (Welch, 1978). According to Mashatola & Darroch (2003), sugarcane growers in KZN with relatively higher levels of education are expected to use better, or more readily adopt, technology such as ripeners and heat treated seed cane, and to employ consultants for advice in areas in which they feel their own management skills are deficient. Nothard *et al* (2005) noted that higher levels of education lead to higher success rates for new business ventures. Educated people may also be better able to assemble and interpret information and, therefore, face lower information costs (Welch, 1978). New Freehold Growers with higher levels of education (EDU) are, therefore, hypothesized to more likely be current rather than in default on mortgage loan repayments. A NFG's number of years of previous experience gained in sugarcane farming (EXPSF), financial management (FMEXP) and/or general management (MEXP) may increase the likelihood that he/she can more readily adapt to the challenge of managing a commercial sugarcane farm. Dyke *et al* (1992) identify a positive link between the owner's previous experience gained in general management and management within the industry concerned and small firm success. The NFGs with relatively higher EXPSF, FMEXP and/or MEXP, therefore, could be better farm managers, and hence be less likely to default on mortgage loan repayments, *ceteris paribus*.

Growers in the NFG sample that annually meet more regularly with CANEGROWERS' economics advisory staff (CMEET), SASRI extension officers (SMEET), sugar miller support staff (MMEET) and financial institution representatives (FMEET) have relatively more exposure to extension advice that could improve their production and financial

management (Armitage, 2008). These NFGs are thus more likely to be current on mortgage loan repayments. Sanderatne (1986) argues that when a grower owns a large farm, he is usually predisposed to settle his obligations, which, if the capital were borrowed, would include loan repayment. This may be due to the ability to benefit from economies of size and/or scale. Large farms can reduce the average cost per unit of output sold by spreading fixed annual machinery, labour, interest and management costs, and information and transaction costs in the formal credit market, over more output. This is implied in Welch's (1978) assertion that larger-size farms have more to gain from lower average cost. Larger-size farms (relatively larger annual farm gross income) may also be those managed by farmers that have the specialist skills (relatively greater ability) required to produce on a larger scale (Pasour, 1981). Mbowe and Nieuwoudt (1998) reported that smaller sugarcane farms in KwaZulu-Natal (under eight hectares, or farms with a gross annual income of less than R40 000 in 1998 Rand) require significantly more resources to produce a Rand's worth of output than do larger farms. Those NFGs with relatively larger average annual gross farm income (FSIZE) are thus expected to be more able to repay mortgage loans as they can spread the fixed costs associated with information, management, and machinery investment/contracting services over a larger income. Successful NFGs had an average annual GFI of R1 110 820 versus R484 615 and R336 364 for the less successful and unsuccessful sample NFGs, respectively.

Access to off-farm income could help to alleviate on-farm liquidity constraints and act as a risk management strategy (Barry *et al*, 1995). Growers with material annual sources of own (OFI) or spouse's (SOFI) off-farm income may be able to rely less on drawings from the farm to finance family expenditure, and/or to supplement their farm income in low-income (e.g. drought) years in order to repay their loans. Consequently, having a substantial amount of off-farm income is expected to decrease the probability that the NFG is in arrears or in default relative to being current on mortgage loan repayments. Following the references in Table 3.1 on page 39 of this dissertation, typical financial measures in loan repayment studies also include indicators of liquidity, solvency, profitability and financial efficiency. Splett *et al* (1994) argued that greater uniformity of the explanatory variables used in research can be accomplished if researchers use the

farm financial variables recommended by the Farm Financial Standards Council (FFSC) in the US. This approach is adopted in this study as outlined in the financial variables that follow.

The Debt-to-Asset ratio (Total Farm Liabilities/Total Farm Assets) measures farm solvency (SOLV) or the degree to which a NFG can meet long term debt commitments. Since higher debt levels indicate increased financial obligations, higher levels of SOLV increase the likelihood of sample NFGs being in arrears or in default on their mortgage loan repayment (positive sign in Table 6.1), *ceteris paribus*. Farm liquidity (LIQUID) is measured by the Working Capital-to-Gross Farm Return ratio ($[(\text{Current Assets} - \text{Current Liabilities}) / \text{Annual Turnover}]$) that shows the amount of funds available to buy inputs and inventory items after the sale of current farm assets and payment of all current liabilities. The higher is LIQUID, the greater is the NFG's ability to generate cash to meet financial obligations, and the less likely is loan payment default. The Asset Turnover Ratio ($\text{Annual Turnover} / \text{Average Value of Total Farm Assets}$) proxies the financial efficiency (FEFCY) of the NFGs - the higher is FEFCY, the more efficiently assets are being used to generate revenue (FFSC, 1997). Those NFGs with higher FEFCY are hence less likely to default on mortgage loan repayments.

Farm profitability (PROFIT) is measured by the Rate of Return on Farm Equity ($[(\text{Net Farm Income} - \text{Unpaid Labour Charge for Family Labour}) / \text{Average Total Farm Equity}]$). The FFSC (1997) also suggest using the return on farm assets to measure farm profitability. This measure is not used here since Boessen *et al* (1990) showed that higher leveraged farmers exhibited greater variability in the return to equity compared to the return on assets. Therefore, following Durguner (2007), the former was selected as a measure of farm profitability. In the long run, a farmer should be able to continue farming if a positive return on equity is maintained (Boessen *et al*, 1990). This suggests that as PROFIT increases, the likelihood of being in arrears or in default falls relative to being current on mortgage loan repayments. Lower levels of annual family expenditure could provide the sample NFGs with relatively more cash to cover their business financial obligations as they fall due. It is thus hypothesized that NFGs with higher

annual family household expenditure relative to total hectares operated (FAMHE) (see Durguner, 2007) will be more likely to default.

Risk (income variability) is a feature of the farm production environment and cannot be avoided when addressing most economic problems (Moschini & Hennessy, 2001). Risk management involves choosing among alternatives for bearing or reducing the effects of risk on a farm, and in so doing, reducing losses (Harwood *et al*, 1999). This suggests that NFGs who adopt such strategies are less likely to default on their mortgage loan repayments, *ceteris paribus*. This study initially tries to assess the impact of enterprise diversification, off-farm investment, insurance against fire outbreak, keeping cash reserves and holding credit reserves as risk management strategies (RMS_{1...m}) on mortgage loan repayment. The NFGs' individual risk preferences (proxied by the mean adjusted Arrow-Pratt absolute risk aversion coefficient, APRA) may also affect their loan repayment performance, as more risk-averse persons seek to avoid reduced access to future loan funds by making efforts to meet their repayment obligations (Sharma & Zeller, 2000). Higher values of APRA equate to greater risk aversion (see Ferrer *et al*, 1997) and, therefore, less likelihood of being in arrears or in default relative to being current on mortgage loan repayments.

The annual re-establishment of sugarcane area (REPLNT) is an important aspect of prudent sugarcane husbandry and management, as newly replanted fields increase the likelihood that the production potential of the farm is maintained (Stranack, 2007). The more productive is the farm, the more likely farm profitability will increase (Miller & La Due, 1989). Stranack (2007) also stressed the importance of soil health in maintaining the production potential of a farm, and hence the need for whole cycle soil sampling at replanting (SSAMP) in maintaining soil productivity. These comments suggest that NFGs with higher levels of REPLNT and SSAMP are more likely to be current than in arrears or default on mortgage loan repayments. Reducing the harvest-to-crush time delay (HCDEL) of sugarcane can considerably reduce the loss of recoverable sugar caused by cane deterioration and thereby increase grower incomes (Barnes *et al*, 1998). It is, therefore, hypothesized that NFGs with higher HCDEL times are more likely to be

in arrears or default on their mortgage loan repayments. Finally, following Gloy *et al* (2002), NFGs who keep good up-to-date physical (e.g. crop production) and financial records are likely to have a lower probability of loan repayment problems. Such records can improve management decision-making and reduce the time taken to conduct production and financial analyses of the farm business. This in turn could generate higher profitability and hence promote loan repayment. These comments again suggest that the coefficients estimated for the production record keeping system (PRECSYS_{1...m}) and financial record keeping system (FRECSYS_{...m}) variables should be negative, *ceteris paribus*.

6.3 Values of the Factors Affecting NFG Mortgage Loan Repayment Status

6.3.1 Successful Versus Unsuccessful NFGs

Table 6.2 overleaf shows the mean values of farmer and farm variables for the successful and unsuccessful NFGs in the study sample. The third column lists the associated estimated t-values which identify whether or not these mean values are statistically significantly different (Rayner, 1967). The following variables were, however, excluded from the analysis: GENDER, PROFIT and FAMHE. Women only accounted for 9.4% (nine) of the sample and were not represented in each of the three loan repayment categories. Unfortunately, reliable data on farm input costs could not be obtained to estimate PROFIT (Rate of Return on Equity) for all sample NFGs as this information was not available from external bookkeepers. Inconsistencies in answers given during the NFG interviews regarding the level of monthly family expenses meant that FAMHE was excluded. Successful NFGs on average were marginally younger than unsuccessful NFGs (about 50 years versus 52 years), although these differences were not statistically significant. There were also no statistical differences between the mean years of formal education per farmer, with both groups having an average of 11 years of formal education. Successful NFGs had more experience in sugarcane farming (EXPSF), financial management (FMEXP) and general management (MEXP) when compared to unsuccessful NFGs. These differences were statistically significantly different at the 1%, 5% and 1% levels, respectively.

Table 6.2 Comparison of Mean Values of Farmer and Farm Variables for Successful and Unsuccessful Sample NFGs (n = number of cases), KZN, 2008

Variable	Successful NFGs		Unsuccessful NFGs		t-value
	n	Mean	n	Mean	
AGE	72	49.60	11	52.18	-0.821
EDU	72	11.08	11	11.09	-.008
EXPSF	72	12.89	11	2.00	7.683***
FMEXP	72	2.18	11	0.00	3.199**
MEXP	72	3.69	11	0.46	3.423***
CMEET	72	12.14	11	1.91	2.585**
SMEET	72	12.51	11	4.14	1.802*
MMEET	72	13.51	11	5.00	1.923*
FMEET	72	4.31	11	1.83	2.039*
FSIZE	72	1110820.00	11	336363.60	10.907***
OFI	72	145683.3	11	4036.36	1.041
SOFI	72	36142.65	11	11236.36	1.407
SOLV	72	0.31	11	0.95	-10.288***
LIQUID	72	0.26	11	-0.44	4.185***
FEFCY	72	0.36	11	0.27	1.581
RMS_{1...m}					
RMS ₁	72	0.14	11	0.09	0.432
RMS ₂	72	0.62	11	0.09	4.903***
RMS ₃	72	0.93	11	0.73	1.411
RMS ₄	72	0.82	11	0.09	5.902***
RMS ₅	72	0.78	11	0.27	3.671***
APRA	72	3.79	11	4.12	-0.309
REPLNT	72	7.15	11	0.76	11.200***
SSAMP	72	0.92	11	0.55	2.308**
HCDEL	72	40.34	11	50.29	-0.917
PRECSYS_{1...m}					
PRECSYS ₁	72	0.89	11	0.82	0.665
PRECSYS ₂	72	0.08	11	0.00	2.541**
PRECSYS ₃	72	0.13	11	0.00	3.185**
PRECSYS ₄	72	0.00	11	0.00	0.00
PRECSYS ₅	72	0.04	11	0.00	0.683
FRECSYS_{1...m}					
FRECSYS ₁	72	0.46	11	0.09	3.388**
FRECSYS ₂	72	0.06	11	0.00	0.795
FRECSYS ₃	72	0.44	11	0.73	-1.760*
FRECSYS ₄	72	0.58	11	0.27	1.946*
FRECSYS ₅	72	0.00	11	0.00	0.00

Note: *, **, *** denote statistically significant at the 10%, 5% and 1% levels of significance, respectively.

Successful NFGs had relatively more contact with industry role players and financiers than did the unsuccessful NFGs. The successful NFGs met 12 times per annum with CANEGROWERS' economic advisory staff (CMEET) compared to the unsuccessful NFGs who only met twice (statistically significant difference at the 5% level). Mean annual contact with SASRI extension staff (SMEET) was also statistically significantly different at the 10% level (successful NFGs had about 13 meetings versus about four for the unsuccessful NFGs). There was a statistically significant difference at the 10% level between the number of meetings with sugar milling company employees (MMEET) for the successful (14) and unsuccessful (five) NFGs. Successful NFGs, on average, met their financiers (FMEET) every three months compared to every six months for the unsuccessful NFGs (statistically significant difference at the 10% level).

Successful NFGs had an average annual FSIZE (annual gross farm income or turnover) of R1 110 820 that was over three times greater than that for the unsuccessful NFGs (R336 364) (statistically significant difference at the 1% level). Grower annual off-farm income (OFI) and spouse's annual off-farm income (SOFI) were not statistically significantly different between the two groups. Successful NFGs had on average higher OFI and SOFI than unsuccessful NFGs (R145 683 and R36 143 versus R4 036 and R11 236, respectively).

The successful NFGs in the sample were on average more solvent (lower SOLV level) than the less successful NFGs, and hence more likely to meet long-term debt commitments. Successful NFGs had a statistically significantly lower mean debt:asset ratio (0.31) compared to the unsuccessful NFGs (0.95) at the 1% level. Although the leverage norm varies substantially across farm businesses, the successful NFGs were on average within the maximum debt:asset ratio of 0.50 or lower that is usually recommended by financiers (see Barry *et al*, 1995:111). The successful NFGs were also relatively more liquid and hence better able to meet short-term debt commitments as shown by the mean working capital:gross farm return ratio (WCTFR). The successful NFGs had a mean ratio of 0.26 versus a mean ratio of -0.44 for the unsuccessful NFGs (statistically significantly different at the 1% level). No statistically significant difference

in the financial efficiency (FECY) measure was found between the two groups. The successful NFGs also had statistically significantly higher (at the 1% level) monthly living expenses (R10 038) versus (R5 382), mainly due to their spending relatively more on education and medical expenses for their dependents.

Regarding the use of risk management strategies ($RMS_{1...m}$), most of the sample NFGs only farmed sugarcane, so enterprise diversification (RMS_1) was not statistically significantly different between the two groups. Mean off-farm investment (RMS_2) was statistically significantly higher at the 1% level for successful compared to unsuccessful NFGs. There was no statistically significant difference between the groups for the use of insurance against fire outbreak as this insurance was made compulsory for most NFGs by their respective financiers. Fifty-nine successful NFGs and one unsuccessful grower in the sample kept cash reserves to manage risk, with the successful group statistically significantly more likely (at the 1% level) to practice this strategy (RMS_4). Fifty-six successful NFGs and three unsuccessful NFGs had access to credit reserves (RMS_5) (e.g. have an overdraft facility), with the successful group again statistically more likely (at the 1% level) to have such access. The APARA shows that both successful and unsuccessful NFGs were relatively risk averse, with no statistical difference between their measures of risk aversion.

On average, over the last five years, successful NFGs in the sample replanted 7.15% of their AUC annually. This REPLNT figure was almost 10 times greater than the mean for unsuccessful NFGs (0.76%), and the difference was statistically significant at the 1% level. The use of whole cycle soil sampling at replanting (SSAMP) was statistically significantly different at the 5% level between the two groups (92% of the successful group adopted this management practice compared to 55% of the unsuccessful group). No statistically significant differences were found between the two groups for HCDEL, although the successful sample NFGs had a lower mean of about 40 hours.

Most sample NFGs had their own type of manual production record keeping system in place and hence no significant differences were found between the two groups.

However, successful NFGs were statistically significantly more likely to use their own computerised production record keeping system (PRECSYS₂) (e.g. Microsoft Excel spreadsheets) and specialised computer software (PRECSYS₃) (e.g. CanePro or Plan-a-Head) at the 5% level. Of the 96 NFGs, 39 had some form (either manual or computerised) of their own financial record keeping system in addition to the bookkeeping services they obtained from CANEFARMS (FRECSYS₃) or an external consultant (FRECSYS₄). Thirty-three of these NFGs were classified as successful, five as less successful and only one as unsuccessful. The use of an own manual financial record keeping (FRECSYS₁) was statistically significantly different between successful and unsuccessful NFGs at the 5% level.

6.3.2 Successful Versus Less Successful NFGs

According to Table 6.3 overleaf, successful NFGs (about 50 years old) were slightly younger on average than less successful NFGs (53 years), but the difference was not statistically significantly different. Both groups of NFGs had an average of 11 years of formal education. Successful NFGs had statistically significantly more (at the 5% level) mean sugarcane farming experience (EXPSF) compared to the less successful NFGs (about 13 years versus eight years). No statistically significant differences were found between the mean financial management (FMEXP) and general management (MEXP) experience levels of these two groups.

Although successful NFGs met more times on average annually with CANEGROWERS advisory staff (CMEET), sugar milling company support staff (MMEET) and SASRI extension staff (SMEET), the difference was not statistically significant. Successful NFGs did, however, meet more frequently with their financiers – FMEET being once every three months versus once every six months – with the difference being statistically significant at the 10% level. Successful sample NFGs had a statistically significantly higher (at the 1% level) average annual FSIZE (GFI of R1 110 820 compared to R484 615). On average, successful NFGs earned an annual off-farm income (OFI) of R145 683, while on average their spouse's earned an average off-farm income (SOFI) of

Table 6.3 Comparison of Mean Values of Farmer and Farm Variables for Successful and Less Successful Sample NFGs (n = number of cases), KZN, 2008

Variable	Successful NFGs		Less Successful NFGs		t-value
	n	Mean	n	Mean	
AGE	72	49.60	13	53.39	-1.249
EDU	72	11.08	13	10.85	0.267
EXPSF	72	12.89	13	8.33	2.072**
FMEXP	72	2.18	13	1.54	0.371
MEXP	72	3.69	13	4.62	-0.392
CMEET	72	12.14	13	8.23	1.477
SMEET	72	12.51	13	9.00	0.943
MMEET	72	13.51	13	9.67	0.945
FMEET	72	4.31	13	1.75	2.011*
FSIZE	72	1110820.00	13	484615.40	4.078***
OFI	72	145683.30	13	7146.15	1.107
SOFI	72	36142.65	13	22266.67	0.806
SOLV	72	0.31	13	0.61	-5.436***
LIQUID	72	0.26	13	-0.23	3.211**
FEFCY	72	0.36	13	0.26	1.589
RMS_{1...m}					
RMS ₁	72	0.14	13	0.08	0.546
RMS ₂	72	0.62	13	0.31	2.121**
RMS ₃	72	0.93	13	0.85	1.013
RMS ₄	72	0.82	13	0.85	-0.250
RMS ₅	72	0.78	13	0.83	-0.430
APRA	72	3.79	13	2.71	1.098
REPLNT	72	7.15	13	3.39	5.691***
SSAMP	72	0.92	13	0.77	0.262
HCDEL	72	40.34	13	51.28	-1.141
PRECSYS_{1...m}					
PRECSYS ₁	72	0.89	13	0.92	-0.365
PRECSYS ₂	72	0.08	13	0.08	0.076
PRECSYS ₃	72	0.13	13	0.00	3.185**
PRECSYS ₄	72	0.00	13	0.00	0.00
PRECSYS ₅	72	0.04	13	0.08	-0.547
FRECSYS_{1...m}					
FRECSYS ₁	72	0.46	13	0.39	0.487
FRECSYS ₂	72	0.06	13	0.00	0.864
FRECSYS ₃	72	0.44	13	0.46	-0.113
FRECSYS ₄	72	0.58	13	0.39	1.324
FRECSYS ₅	72	0.00	13	0.08	-1.000

Note: *, **, *** denote statistically significant at the 10%, 5% and 1% levels of significance, respectively.

R36 143 per year. The less successful NFGs and their spouse's had relatively lower mean annual off-farm incomes (R7 146 and R22 267 respectively) that were not statistically significantly different. The less successful sample NFG group were statistically significantly less solvent (at the 1% level) and less liquid (at the 5% level) than the successful NFGs who had on average lower debt:asset ratios and WCTFR ratios (0.31 and 0.26 versus 0.61 and -0.23, respectively). Although successful NFGs were slightly more financially efficient than the less successful NFGs (FECY of 0.36 versus 0.26), this difference was not statistically significantly different. The successful NFGs also had statistically significantly higher (at the 1% level) monthly living expenses (R10 038) compared to the less successful NFGs (R5 654).

Only the use of one risk management strategy, off-farm investment (RMS₂), was statistically significantly different (at the 5% level) between sample successful and less successful NFGs, with the successful NFGs more likely to adopt this strategy. Fifty-nine successful NFGs and 11 less successful NFGs kept cash reserves to manage risk, while 56 successful and 11 less successful NFGs had access to credit reserves. Again, no statistically significant differences were found between these groups for the measure of NFG risk aversion (APRA).

Successful sample NFGs replanted approximately twice as much AUC than less successful NFGs, an average REPLNT of 7.15% versus 3.39% - with this difference being statistically significantly different at the 1% level. No statistically significant differences were found between these two groups in the use of whole cycle soil sampling at replanting (SSAMP) or for HCDEL. No statistically significant differences were found between these two groups in the use of a manual production record keeping system or in the use of their own computerised production record keeping system. The successful sample NFGs were statistically significantly more likely (at the 5% level) than the less successful NFGs to adopt specialised software for production records (PRECSYS₃) such as CanePro or Plan-a-Head. No statistically significant differences were found between these two groups in the use of financial record keeping systems.

6.3.3 Less Successful Versus Unsuccessful NFGs

Table 6.4 overleaf shows that less successful sample NFGs had mean age (53 years) and education (11 years) that were not statistically different compared to unsuccessful NFGs (marginally younger at 52 years with similar average level of education). The less successful sample NFGs had statistically significantly more EXPSF (8 years) at the 5% level compared to the unsuccessful group (two years), although there were no statistical differences for mean FMEXP and MEXP. Less successful NFGs had relatively more contact with industry role players and financiers than did the unsuccessful NFGs. Less successful NFGs met with CANEGROWERS economics advisory staff (CMEET) a mean eight times per annum, with SASRI extension staff (SMEET) nine times and sugar miller support staff (MMEET) almost ten times. Unsuccessful NFGs met with these industry role players two, four and five times per annum, respectively. The mean differences between these two groups for SMEET and MMEET were statistically significantly different at the 10% level. On average, both groups met with their financiers (FMEET) once every six months.

Less successful NFGs had a statistically significantly higher (at the 5% level) average annual FSIZE (mean GFI of R484 615 compared to R333 364). Less successful NFGs earned an average annual off-farm income (OFI) of R7 146, with their spouse's earning an average off-farm income (SOFI) of R22 267 per year. While unsuccessful sample NFGs and their spouse's earned relatively lower average annual off-farm incomes of R4 036 and R11 236 per annum, respectively, these differences were not statistically significantly different. Both less successful and unsuccessful sample NFGs had mean debt:asset ratios (SOLV) which exceed the usual recommendations from financiers (≤ 0.50). The values of 0.61 and 0.95, respectively, were statistically significantly different at the 5% level. The less successful sample NFGs were also statistically significantly more liquid at the 10% level, while both groups had similar average monthly living expenses (R5 654 versus R5 382), that were not statistically significantly different.

Table 6.4 Comparison of Mean Values of Farmer and Farm Variables for Less Successful and Unsuccessful Sample NFGs (n=number of cases), KZN, 2008

Variable	Less Successful NFGs		Unsuccessful NFGs		t-value
	n	Mean	n	Mean	
AGE	13	53.39	11	52.18	0.281
EDU	13	10.85	11	11.09	-0.245
EXPSF	13	8.33	11	2.00	3.107**
FMEXP	13	1.54	11	0.00	0.917
MEXP	13	4.62	11	0.46	1.212
CMEET	13	8.23	11	1.91	1.322
SMEET	13	9.00	11	4.14	1.905*
MMEET	13	9.67	11	5.00	1.905*
FMEET	13	1.75	11	1.83	-0.054
FSIZE	13	484615.40	11	336363.60	2.474**
OFI	13	7146.15	11	4036.36	0.654
SOFI	13	22266.67	11	11236.36	0.717
SOLV	13	0.61	11	0.95	-3.430**
LIQUID	13	-0.225	11	-0.44	1.902*
FEFCY	13	0.262	11	0.27	-0.014
RMS_{1...m}					
RMS ₁	13	0.08	11	0.09	0.907
RMS ₂	13	0.31	11	0.09	1.344
RMS ₃	13	0.85	11	0.73	0.692
RMS ₄	13	0.85	11	0.09	5.361***
RMS ₅	13	0.83	11	0.27	3.137**
APRA	13	2.71	11	4.12	-1.087
REPLNT	13	3.39	11	0.76	5.181***
SSAMP	13	0.77	11	0.55	0.266
HCDL	13	51.28	11	50.29	0.134
PRECSYS_{1...m}					
PRECSYS ₁	13	0.92	11	0.82	0.751
PRECSYS ₂	13	0.08	11	0.00	0.917
PRECSYS ₃	13	0.00	11	0.00	0.917
PRECSYS ₄	13	0.00	11	0.00	0.000
PRECSYS ₅	13	0.08	11	0.00	0.000
FRECSYS_{1...m}					
FRECSYS ₁	13	0.39	11	0.09	1.756*
FRECSYS ₂	13	0.00	11	0.00	0.000
FRECSYS ₃	13	0.46	11	0.73	-1.308
FRECSYS ₄	13	0.39	11	0.27	0.559
FRECSYS ₅	13	0.08	11	0.00	0.917

Note: *, **, *** denote statistically significant at the 10%, 5% and 1% levels of significance, respectively.

There were no statistically significant differences between the two groups in the use of enterprise diversification, off-farm investment, or insurance against fire outbreak. Less successful sample NFGs were statistically significantly more likely to hold cash and credit reserves at the 1% and 5% significance levels, respectively. Eleven less successful NFGs and only one unsuccessful NFG kept cash reserves to manage risk, whilst 11 less successful and three unsuccessful NFGs kept credit reserves. Again, both groups of sample NFGs were relatively risk averse on average, although the mean levels of risk aversion (APRA) were not statistically significantly different.

These two groups both replanted much lower percentages of AUC compared to the industry recommendation of 10% per annum (Stranack, 2007), although the less successful sample NFGs had a statistically significantly greater (at the 1% level) REPLNT (3.39%) compared to the unsuccessful NFGs (0.76%). Seventy-seven percent of the less successful sample NFGs took whole cycle soil samples at replanting (SSAMP), while 55% of the unsuccessful group adopted this farm management practice. This difference was not statistically significantly different, nor was the HCDEL for the two groups. There were also no statistically significant differences between sample less successful and unsuccessful NFGs in the adoption of production record keeping systems. However, there was a statistically significant difference (at the 10% level) between these groups in the use of their own financial record keeping systems (FRECSYS₁), with the less successful NFGs more likely to have their own manual system. Table 6.5 overleaf summarises the farmer and farm characteristics for which the mean values were statistically significantly different between successful, less successful and unsuccessful sample NFGs. Variables that have statistically significant mean differences between the groups will be included as potential factors affecting NFG mortgage loan repayment status in the multinomial logit model. Nineteen variables that had at least one statistically significant difference in mean values between the groups included EXPSF, FMEXP, MEXP, CMEET, SMEET, MMEET, FMEET, FSIZE, LIQUID, RMS₂, RMS₄, RMS₅,

Table 6.5 Summary of the Statistical Significance Levels of the Differences between the Mean Values of Farmer and Farm Variables for Successful, Less Successful and Unsuccessful Sample NFGs, KZN, 2008

Variable	Successful vs Unsuccessful	Successful vs Less Successful	Less Successful vs Unsuccessful
AGE	ns ^a	ns	ns
EDU	ns	ns	ns
EXPSF	1%	5%	5%
FMEXP	5%	ns	ns
MEXP	1%	ns	ns
CMEET	5%	ns	ns
SMEET	10%	ns	10%
MMEET	10%	ns	10%
FMEET	10%	10%	ns
FSIZE	1%	1%	5%
OFI	ns	ns	ns
SOFI	ns	ns	ns
SOLV	1%	1%	5%
LIQUID	1%	5%	10%
FEFCY	ns	ns	ns
RMS_{1...m}			
RMS ₁	ns	ns	ns
RMS ₂	1%	5%	ns
RMS ₃	ns	ns	ns
RMS ₄	1%	ns	1%
RMS ₅	1%	ns	5%
APRA	ns	ns	ns
REPLNT	1%	1%	1%
SSAMP	5%	ns	ns
HCDEL	ns	ns	ns
PRECSYS_{1...m}			
PRECSYS ₁	ns	ns	ns
PRECSYS ₂	5%	ns	ns
PRECSYS ₃	5%	5%	ns
PRECSYS ₄	ns	ns	ns
PRECSYS ₅	ns	ns	ns
FRECSYS_{1...m}			
FRECSYS ₁	5%	ns	10%
FRECSYS ₂	ns	ns	ns
FRECSYS ₃	10%	ns	ns
FRECSYS ₄	10%	ns	ns
FRECSYS ₅	ns	ns	ns

Note: ^a ns denotes not statistically significant.

REPLNT, SSAMP, PRECSYS₂, PRECSYS₃, FRECSYS₁, FRECSYS₃, and FRECSYS₄. The next section describes the intercorrelations between some of these explanatory variables and how these 19 variables were further reduced to 15 for estimating the multinomial logit model of NFG mortgage loan repayment status.

6.4 Empirical Multinomial Logit Model of Factors Affecting NFG Mortgage Loan Repayment Status

6.4.1 Intercorrelations Between the Explanatory Variables

It is important to consider the intercorrelations between potential explanatory variables in regression models as the presence of multicollinearity may result in biased parameter estimates (Norušis, 1990: 53). The bivariate correlation matrix (see Appendix 3 starting on page 132) is used to identify statistically significant correlations between the potential explanatory variables to be included in the multinomial logit model. Personal borrower characteristics such as age, level of education, and sugarcane farming experience show statistically significant correlation coefficients. For example, AGE was significantly negatively correlated with EDU levels, and significantly positively correlated with EXPSF and level of NFG risk aversion (APRA), indicating that older farmers in the sample have more farming experience and are more risk averse than their younger counterparts. Grower AGE was also statistically significantly negatively correlated with number of meetings with financier (FMEET), number of meetings with miller support staff (MMEET), and the use of both specialised computer production and financial record keeping software.

Grower education level (EDU) was significantly negatively correlated with EXPSF and significantly positively correlated with regular soil sampling at replanting (SSAMP), the adoption of computerised production (PRECSYS₂ and PRECSYS₃) and financial (FRECSYS₂) record keeping, and enterprise diversification (RMS₁). Sample NFGs with more sugarcane farming experience (EXPSF) were likely to have more financial (FMEXP) and general management (MEXP) experience, larger FSIZE, replant a greater

AUC annually and be more likely to use fire insurance (statistically significant positive correlations). They were also likely to be more solvent (statistically significantly lower debt:asset ratios), have lower HCDEL and be less likely to diversify into other farm enterprises (significant negative correlations). Sample NFGs who have more regular contact with CANEGROWERS economics advisory staff (CMEET) are also more likely to regularly meet miller support staff and SASRI extension officers (significant positive correlations with MMEET and SMEET). This variable was also significantly positively correlated with the use of computerised production records (PRECSYS₃), off-farm investments (RMS₂) and the holding of credit reserves (RMS₅).

The FSIZE proxy (annual gross farm income) was significantly positively correlated with EXPSF, FMEXP and MEXP, MMEET and SMEET, SOFI, REPLNT, SSAMP, the use of both own (PRECSYS₂) and specialised (PRECSYS₃) computer production records, off-farm investment (RMS₂) and keeping credit reserves (RMS₅). Sample NFGs with larger farms also had statistically significantly lower debt:asset ratios as shown by the negative SOLV coefficient estimate. Growers with higher debt:asset ratios were likely to be less liquid, report lower REPLNT percentages and have lower SSAMP. They were also less able to manage risk as they were statistically significantly less likely to have off-farm investments, cash reserves or credit reserves.

6.4.2 Explanatory Variables Specified in the Empirical Multinomial Logit Model

The 19 variables which had statistically significant mean differences between the three groups of NFGs were all considered for inclusion as explanatory variables in the multinomial logit model. The following four variables which had significant differences between the means were excluded from the analysis: FEXP, PRECSYS₃ (the use of specialised production record keeping software), FRECSYS₃ (financial record keeping by CANEFARMS bookkeeping services) and FRECSYS₄ (financial record keeping by external consultant). Only 8.33% of the sample NFGs had FEXP, so this variable was ignored. Only nine NFGs (9.4%) used specialised computer software for production record keeping purposes, so this variable was combined with the use of own

computerised production records to form a single variable (PRECSYSC) which captures the use of computerised production records. The differences between FRECSYS₃ and FRECSYS₄ were mainly due to area differences, since less South Coast NFGs used the CANEFARMS bookkeeping service (more of these growers opted for an external consultant) and these variables were therefore excluded from the analysis.

The remaining 15 variables that had statistically significant differences between their group means were retained as explanatory variables for the multinomial logit model. Table 6.6 overleaf shows the bivariate correlation matrix estimated for these explanatory variables. In order to remedy the effects of multicollinearity in the 15 variables, PCA was used to condense the variables into fewer orthogonal variables, each measuring different dimensions within the data (Manly, 1994:59). The results of the PCA of potential factors affecting sample NFG mortgage loan repayment status are presented in Table 6.7 on page 82. Koutsoyiannis (1987) suggests retaining PCs which satisfy Kaiser's criterion (eigenvalue ≥ 1), have estimated coefficients greater than 0.300, and which can be *meaningfully interpreted*. Five principal components (PCs) with eigenvalues ≥ 1 were derived from the 15 potential determinants of mortgage loan repayment, and these PCs together accounted for 63.22% of the variation within the data. The PCs were extracted using the correlation matrix, since the variables included have different units of measure (Morrison, 1975). This avoids the problem of assigning a greater weight to a variable simply because of this variable having a relatively larger variance than the other variables (Manly, 1994). Varimax rotation was then used to transform the variables into factors that were more clearly interpretable (Manly, 1994).

Table 6.6 Correlation Matrix for the Multinomial Logit Model

Variable	Loan status	EXPSF	MEXP	CMEET	MMEET	SMEET	FSIZE	SOLV	LIQUID	REPLNT	SSAMP	PRECSYSC	FRECSYS ₁	RMS ₂	RMS ₄	RMS ₅
Loan status	1															
EXPSF	-0.363**	1														
MEXP	-0.106	0.334**	1													
CMEET	-0.290**	0.153	0.233*	1												
MMEET	-0.310**	0.085	0.161	0.551**	1											
SMEET	-0.314**	0.150	0.298**	0.626**	0.647**	1										
FSIZE	-0.520**	0.354**	0.256*	0.147	0.333**	0.384**	1									
SOLV	0.746**	-0.251*	-0.003	-0.177	-0.184	-0.235*	-0.440**	1								
LIQUID	-0.468**	-0.005	-0.143	0.109	0.237*	0.108	0.199	-0.549**	1							
REPLNT	-0.543**	0.245*	0.087	0.182	0.374**	0.222	0.473**	-0.439**	0.365**	1						
SSAMP	-0.343**	0.068	0.113	0.121	0.085	0.242*	0.257*	-0.257*	0.188	0.342**	1					
PRECSYSC	-0.117	0.003	0.205*	0.144	0.179	0.096	0.211*	0.022	-0.024	0.242*	0.106	1				
FRECSYS ₁	-0.226*	0.028	0.224*	0.155	0.280**	0.342**	0.129	-0.010	-0.009	0.288**	0.041	0.256*	1			
RMS ₂	-0.331**	0.087	0.149	0.397**	0.212*	0.345**	0.240*	-0.286**	0.140	0.168	0.278**	0.075	0.141	1		
RMS ₄	-0.351**	-0.062	0.078	-0.014	-0.012	0.068	0.094	-0.301**	0.109	0.320**	0.220*	0.130	0.208*	0.083	1	
RMS ₅	-0.300**	0.064	0.176	0.284**	0.193	0.403**	0.271**	-0.307**	0.193	0.262*	0.294**	0.060	0.054	0.152	0.063	1

Note: * and ** denote statistical significance at the 5% and 1% levels, respectively.

Table 6.7 Rotated PC Loadings for Potential Factors Affecting NFG Mortgage Loan Repayment Status

Principal Component		PC1	PC2	PC3	PC4	PC5
Eigenvalue		3.925	1.788	1.409	1.294	1.067
Cumulative % variance explained		26.188	38.088	47.481	56.107	63.223
Loan repayment determinants	Communalities (b)					
EXPSF	0.764	0.033	0.113	-0.085	-0.034	0.862
MEXP	0.652	0.179	-0.339	0.275	0.242	0.608
CMEET	0.696	0.807	0.006	0.029	0.196	0.074
MMEET	0.778	0.789	0.280	0.242	-0.122	0.068
SMEET	0.700	0.774	0.043	0.137	0.255	0.123
FSIZE	0.619	0.183	0.418	0.191	0.170	0.588
SOLV	0.729	-0.071	-0.750	0.052	-0.334	-0.216
LIQUID	0.699	0.126	0.809	-0.082	0.073	-0.127
REPLNT	0.698	0.102	0.624	0.455	0.164	0.255
SSAMP	0.616	-0.006	0.163	0.108	0.758	0.062
PRECSYSC	0.475	0.076	-0.048	0.675	0.008	0.109
FRECSYS ₁	0.592	0.268	-0.019	0.720	-0.042	0.007
RMS ₂	0.435	0.390	0.055	-0.004	0.527	0.047
RMS ₄	0.597	-0.254	0.241	0.529	0.420	-0.137
RMS ₅	0.432	0.314	0.165	-0.067	0.537	0.117
Successful NFG mean index scores		0.088	0.351	0.079	0.138	0.167
Less-successful NFG mean index scores		-0.444	-1.369	-0.552	-1.004	-0.663
Unsuccessful NFG mean index scores		-0.109	-0.784	0.030	0.088	-0.373

The first component, PC1, explained 26.19% of the variance in the explanatory variables, and due to the relatively high positive factor loadings for CMEET, MMEET, and SMEET, was labelled “Extension Contact”. A negative relationship is expected between Extension Contact and mortgage loan repayment status in equation (6.1) on page 61 as NFGs who receive more extension contact and training are more likely to be current on their loan repayments, *ceteris paribus*. The second component, PC2, accounted for 11.92% of the variance in the explanatory variables and shows relatively high positive loadings for REPLNT (% of AUC replanted annually) and for LIQUID (the WCTFR ratio) and a relatively high negative loading for SOLV (the debt:asset ratio). This component shows that sample NFGs with higher liquidity and annual replantings have higher solvency and is labelled “Farm Financial and Production Management Ability”. A negative relationship is also expected between loan status and PC2 in equation (6.1) as NFGs with

better all-round farm management ability are less likely to default on their loan repayments, *ceteris paribus*. The third component, PC3, explains 9.34% of the variation and shows relatively high positive loadings for PRECSYSC, FRECSYS₁, and RMS₄. This PC was, therefore, called “Own Record Keeping and Cash Management” and is again expected to have a negative relationship with loan repayment status in equation (6.1) (higher values of PC3 increase the likelihood of being current rather than in arrears or default on mortgage loan repayments).

The fourth component, PC4, explained 8.63% of the variation within the explanatory variables and had relatively high positive loadings for SSAMP (whole-cycle soil sampling at replanting), RMS₂, RMS₄ and RMS₅. Since all of these variables represent risk management strategies, PC4 was labelled “Production and Financial Risk Management Capacity”. Based on the discussions of risk management in Sections 4.3 and 4.4, a negative relationship between PC4 and mortgage loan repayment status is expected in equation (6.1). The fifth component in Table 6.7 accounts for 7.17% of the variance and has relatively high positive loadings for EXPSF, MEXP and FSIZE and was labelled “Link between Farming and Management Experience and Farm Size”. Farmers with larger farms and who have more sugarcane farming and management experience are expected *a priori* to be less likely to experience repayment problems and hence a negative relationship between PC5 and mortgage loan repayment status is expected in equation (6.1).

Table 6.8 overleaf shows the estimated t-values for differences between the mean scores for the five PCs for the three groups of sample NFGs. Statistically significant mean differences were found between successful and unsuccessful NFGs for all of the PCs (PC1, PC2, and PC5 at the 1% level, and PC3 and PC4 at the 5% level). Mean scores for PC2 and PC4 were also statistically significantly different between successful and less successful NFGs at the 1% and 10% levels, respectively. Further, statistically significant mean differences between less successful and unsuccessful NFGs were estimated for PC2 and PC5 at the 5%, level and for PC3 at the 10% level. These five PCs or dimensions of NFG farm management ability, practices, links and financial performance were

substituted into the multinomial logit model in place of the 15 retained explanatory variables. The empirical multinomial logit model results are reported in Section 6.4.3.

Table 6.8 Summary of the Statistical Significance Levels of the Differences between PC Mean Scores for Successful, Less Successful and Unsuccessful Sample NFGs

Principal Component	t-values		
	Successful vs Unsuccessful NFGs	Successful vs Less Successful NFGs	Less Successful Vs Unsuccessful NFGs
Extension Contact (PC1)	2.274***	0.634	1.118
Farm Financial and Production Management Ability (PC2)	6.624***	4.677***	2.191**
Own Record Keeping and Cash Management (PC3)	2.812**	0.159	1.770*
Production and Financial Risk Management Capacity (PC4)	2.603**	1.764*	1.289
Link between Farming and Management Experience and Farm Size (PC5)	3.841***	0.174	2.645**

Note: *, **, and *** denote statistically significant at the 10%, 5% and 1% levels of significance, respectively.

6.4.3 Multinomial Logit Model Results

The dependent variable (LOANSTAT) was estimated as a function of the five PCs shown in Table 6.7 for the multinomial logit model specified in equation (6.1). The estimated model shown in Table 6.9 has a residual deviance of 35.297 and a χ^2 distribution with 174 degrees of freedom. The deviance test was not statistically significant ($p = 1.000$), indicating a good model fit to the data (Menard, 2002: 47). The χ^2 estimate of 105.775 with 10 degrees of freedom is highly statistically significant ($p = 0.000$), and thus the five PCs explain the dependent variable well. The statistical significance of the individual parameters is most accurately measured by the likelihood ratio test, which has a χ^2 distribution with two degrees of freedom (Menard, 2002: 43). According to Table 6.9 overleaf, the parameter estimates for PC2, PC4 and PC5 as a group are statistically

significant at the 1% level, while those for PC1 and PC3 as a group are statistically significant at the 5% level. These results indicate that all of the PCs contribute strongly towards the explanatory power of the model. The model correctly classifies 91.7% of the sample NFGs – 97.2% of successful, 61.5% less successful, and 90.9% of unsuccessful NFGs. These classification results are, however, biased upwards (the extent was not estimated), as the same data were used to both estimate the model and to assess its classification accuracy (Darroch, 2008). This could have been overcome by first estimating the MNL with all but one of the case NFGs and then using the model to classify the repayment status of the omitted case. This would then have to be repeated for every case in turn in order to calculate overall classification accuracy (Norusis, 1990).

Table 6.9 Parameter Estimates for the Multinomial Logit Model of NFG Mortgage Loan Repayment Status, KZN, 2008

Variable name	$\ln(P_3/P_1)$	$\ln(P_2/P_1)$	$\ln(P_3/P_2)$	Likelihood ratio test (χ^2 distribution)
Constant	-13.756** (5.229)	-3.936*** (1.128)	-9.820* (5.124)	
Extension Contact (PC1)	-4.262* (2.218)	-1.147* (0.659)	-3.115 ^{15%} (2.145)	10.239**
Farm Financial and Production Management Ability (PC2)	-11.988** (4.279)	-5.967** (1.950)	-6.021 ^{15%} (3.798)	61.958***
Own Record Keeping and Cash Management (PC3)	-4.112* (2.207)	-0.924 ^{20%} (0.665)	-3.189 ^{15%} (2.119)	10.469**
Production and Financial Risk Management Capacity (PC4)	-5.509** (1.895)	-2.827** (0.998)	-2.682 ^{15%} (1.684)	25.202***
Link between Farming and Management Experience and Farm Size (PC5)	-4.862** (1.778)	-1.792** (0.689)	-3.069* (1.641)	24.068***
Overall χ^2				105.775***
Residual deviance = 35.297				
Overall correct loan repayment classification rate = 91.7%				
Sample NFGs correctly classified as successful (current) = 97.2%				
Sample NFGs correctly classified as less successful (in arrears) = 61.5%				
Sample NFGs correctly classified as unsuccessful (in default) = 90.9%				

Note: *, **, *** denote statistically significant at the 10%, 5% and 1% levels of significance, respectively.

The signs of the estimated coefficients all agree with *a priori* expectations. For management and policy purposes, the sample NFGs who have relatively less extension contact; less farm financial and production management ability; less production and financial risk management capacity; and who are less likely to keep own farm records and cash reserves; who have less sugarcane farming and general management experience; and who manage smaller farms are more likely to default on their mortgage loan repayments than be current ($\ln(P_3/P_1)$ contrast). The same factors, excluding own record keeping and holding cash reserves, increase the probability of being in arrears rather than being current on mortgage loan repayments ($\ln(P_2/P_1)$ contrast). Finally, the probability of a sample NFG defaulting on mortgage loan repayments relative to being in arrears ($\ln(P_3/P_2)$ contrast) is higher for those NFGs with relatively less farming and management experience and who own smaller farms. The next chapter describes the sample NFGs' perceptions about various aspects of the NFG scheme, including the decision to buy or lease land, and cash flow, sugarcane supply agreement and mentorship issues.

Chapter 7

The NFGs' Perceptions of the NFG Scheme

This chapter reviews the NFGs' perceptions about various aspects of the NFG scheme, providing industry role players with information that will help to identify what aspects of the scheme could be improved and how industry role players can better promote the sustainability of current and future NFG farming operations. The chapter first documents the NFGs' reasons for purchasing land and their preference for leasing land. It then details the NFGs' perceptions about the impact land purchase had on their cash flows; the impact of long-term sugarcane supply agreements on enterprise diversification; and mentorship issues. The chapter concludes with a section summarizing their perceptions about factors affecting the variability of their farm incomes.

7.1 Farmland Purchase and Leasing Issues

The main reason why 39% of the sample NFG respondents purchased a sugarcane farm was to run their own business. Twenty-three percent cited owning land as the main reason for buying a farm. A further 17% purchased a sugarcane farm because of their passion for and knowledge about farming; six percent because they were retrenched from a milling company; five percent were SSGs who wanted to expand their farming operations; and four percent inherited their farms. Other reasons given included a change in lifestyle, the opportunity to leave an inheritance for dependents and the opportunity to partake in an empowerment deal. Given a choice, most of the sample NFGs (59.38%) would have preferred to first lease their land before purchasing. The main reasons given included: to build-up collateral in order to have a greater deposit and to increase their working capital; to gain relevant experience at managing their own businesses; and to determine whether or not they could succeed at managing their own farms. The majority of NFGs who did not see the need to first lease their farms felt that they had sufficient farming experience and that leasing would not have benefited them. They perceived that leasing would constrain them from investing (eg replanting and fertilization) in the farm, since the benefits of their investments may not be fully recovered by the time the lease

expires. Other NFGs who would not prefer to first lease their farms stated that they wanted to either own land or have their own business and would rather repay a loan than pay rent.

7.2 Perceptions of the Cash Flow Problem Associated with Land Purchase

An investment in land is usually characterized by low current returns relative to capital growth. Empirical evidence has shown that average annual current (cash) returns to land in South Africa are typically low, at about 5% of land value (Nieuwoudt, 1980; Ortmann, 1987). Nineteen percent of the respondents strongly agreed with the statement that annual profit from sugarcane farming is low relative to land value, 65% agreed, 11% were uncertain and 5% did not view annual profit as low relative to land value. These results suggest that most of the respondents (84%) can identify with, or have experienced the relatively low current returns (cash flow problems) usually associated with the early years after land purchase.

7.3 Long-term Sugarcane Supply Agreements and Enterprise Diversification

Seventy-nine sample NFGs had long-term sugarcane supply agreements with the sugar millers. Eighty-six percent of the NFGs who had long-term sugarcane supply agreements felt that these agreements constrain them from diversifying into other farm enterprises. Only 13% of NFGs who had long-term sugarcane supply agreements felt that this agreement does not constrain them from diversifying, while one NFG was uncertain. Most of the NFGs who did not feel constrained by long-term sugarcane supply agreements had additional land that was not planted to sugarcane.

7.4 Mentorship Issues

Mentoring can be defined as “a relationship in which a person of greater rank or expertise teaches, guides and develops a novice in an organization or profession. This relationship benefits the mentee in terms of both personal and professional development” (Alleman *et*

al, 1984: 329). Successful mentoring programs that result in the transfer of technical and financial knowledge and skills can improve productivity, and hence enhance the long-term viability of mentees (Mincemoyer & Thomson, 1998). Ninety-five of the 96 sample NFGs felt it is important for a NFG to have a mentor. The one NFG who disagreed had considerable sugarcane farming experience (22 years) and did agree that if the proper procedures are put in place mentorship can help farmers who lack appropriate experience. Sample NFGs were, however, divided as to who should provide them with mentorship. Forty-seven percent suggested that financial and technical mentorship should be provided by the same person or organization. Of the respondents who propose this, three suggest that the mentorship be provided by CANEGROWERS, 24 felt that local farmers or their neighbours would best be suited as mentors, and seven sample NFGs propose that the combined mentorship should be provided by an expert in sugarcane growing who has relevant experience. The remaining six sample NFGs who propose a combined mentor were uncertain as to who should provide this mentorship.

The remaining NFGs suggest that financial and technical mentorship be provided by individual people or organizations. Thirty-five of these respondents suggest that financial mentorship be provided by CANEGROWERS, eight felt that financial mentorship should be provided by their respective financiers and seven suggested that it is the NFG's responsibility to find a personal financial advisor who can provide financial mentorship. Of the NFGs proposing separate technical and financial mentors, 22 felt that technical mentorship should be provided by local farmers within their community, 13 suggested that this was the responsibility of SASRI, five said that technical mentorship should be provided by the millers, and the remaining 10 felt that technical mentorship should take the form of co-ordinated support from different industry role players such as the millers, CANEGROWERS, SASRI and commercial farmers.

Many sample NFGs felt that technical mentorship should focus on general sugarcane husbandry with emphasis on variety selection, fertilization, weed and pest control and harvesting management. They also felt that technical mentors should help identify areas where production improvements can be made and to help NFGs develop "soft skills"

such as labour management and negotiation skills, conflict management and decision-making skills. The NFGs felt that financial mentors should provide assistance with budgeting, debt management, value-added tax (VAT) planning and cash flow management. The NFGs further suggest that financial mentors should help them develop an effective savings plan, introduce them to financing organizations and stress the importance of reinvesting capital in the farm. Fifty-eight sample NFGs stated that there must be interaction between the financial and technical mentors and that they should be able to choose their mentors. They also understood that effective mentoring is about building mentor-mentee relationships, but indicated that such relationships must be clearly defined, with both the mentor and mentee understanding their role. Thirty-seven NFGs also emphasized that these relationships must be voluntary and cannot be forced upon either party. It was also suggested that a neutral party monitor the aims and objectives of the mentorship programme and that language barriers in some cases need to be overcome.

Most (39% strongly agree; 53% agree) of the sample NFGs agreed that there is a need for a co-ordinator to monitor their financial performance, at least for the initial three to five years of operation, and to advise industry role players on how to improve this performance. The majority (77%) of respondents who strongly agreed or agreed suggest that the financial co-ordinating role should be the responsibility of CANEGROWERS as they have the relevant experience and expertise to help NFGs obtain financial management skills. The remaining NFGs who agree with having a financial co-ordinator were divided between this role being the responsibility of neighbouring farmers, the financiers or an independent financial advisor. Many NFGs who agreed or strongly agreed that there is a need for a financial co-ordinator felt that this person or organization would fulfill the role of a financial mentor, hence the similarity between these two support roles. The main reason cited for needing a financial co-ordinator was so that NFGs can be taught relevant financial management skills such as budgeting, debt management and cash flow management. Thirty-nine NFGs felt that they would learn important skills from a financial co-ordinator's previous experience, however, they felt

that a financial co-ordinator must guide them and not dictate as to how NFGs manage their finances.

Thompson & Gillitt (2007) note that sugarcane supply to the sugar mills may be jeopardized if inexperienced farmers who lack necessary agronomic, financial and labour management skills do not receive post-settlement support such as mentorship. Effective mentoring could provide NFGs with fundamental business and technical skills required to successfully manage their farming operations and thus enhance the success of both current and future NFGs whilst at the same time maintaining a consistent supply of sugarcane to the mills. In order for a successful mentorship programme to occur, mutual trust and respect between both the mentor and mentee must be established (Rivza *et al*, 2007) and both parties must be committed to the programme (Terblanchè, 2007). Mentorship programmes should not be established as a means of replacing the existing extension services. Rather, a complementary working relationship should be developed between mentors and extension officers because a mentor can provide practical experience, while the extension officer provides the background, reasons and principles for advice and recommendations given to the farmer (Street & Kleynhans, 1996).

7.5 Perceptions of Factors Affecting Variability in NFG Farm Earnings

The NFGs were asked to rank a number of factors that were identified as having a possible negative affect on their farm earnings on Likert-type scales ranging from one (extremely unimportant) to 10 (very important). Table 7.1 overleaf presents the mean NFG scores for these factors, and shows that the main factor perceived as negatively affecting the NFGs' farm earnings are input prices. At the time of the survey in 2008, sample NFGs were particularly concerned with the impact of input costs as some growers reported a 300% increase in fertilizer costs alone from the previous season. The sample NFGs perceived that interest rates have the second most significant negative impact on their farm earnings. This is expected as many of the sample NFGs are highly geared. Given that many of the sample NFGs rely on the services of contractors to perform land

preparation and harvesting, the citing of contractor rates as the third largest negative impact on their farm earnings is expected.

Table 7.1 Mean NFG Scores for Factors that Negatively Affect NFG Farm Earnings, KZN, 2008

Factor	Mean score out of 10 for each factor
Input prices	9.72
Interest rates	8.65
Contractor rates	6.35
Climate	4.65
RV prices	4.30
Labour availability	3.44
Labour productivity	3.22
Eldana	2.59
Contractor reliability	2.24
Contractor availability	2.02
Information shortages	1.34
Input availability	1.22

The factor ranked fourth in importance in affecting the variability in the NFGs' farm incomes was the prevailing climatic conditions, with many NFGs having experienced a drought year after purchasing their farms. The RV price was ranked as the fifth most important factor, followed by labour availability and productivity. Most of the sample NFGs had experienced increasing rates of absenteeism in recent years which they mainly attributed to the prevalence of HIV/AIDS within rural areas. The sample NFGs, on average, perceived that Eldana sugarcane borer, contractor reliability and availability, information shortages and input availability were less strong factors affecting their farm income variability.

Based on the NFGs' perceptions in this chapter, industry role players could possibly promote the future sustainability of the NFGs by encouraging and facilitating a land rental market for aspirant NFGs. This could allow NFGs to build-up collateral and funds for a larger down-payment on land purchase, increase their working capital, gain experience at managing their own businesses, and determine whether or not they could succeed at managing their own farms. Industry role players also need to consider ways to strengthen current mentorship programmes, as effective mentoring could potentially provide those NFGs who lack skills with fundamental business and technical skills required to operate viable farms. Industry role players could also consider the option of providing the NFGs with a co-ordinator to monitor and advise on their financial performance. The next section concludes the dissertation by discussing some of the management and policy implications of the analyses of NFG mortgage loan status and perceptions of the scheme.

Discussion and Conclusion

The main aim of this study was to identify the factors that affect the success of KZN-based NFGs, using a stratified random sample of 96 NFGs in 2008. Success was measured by the sample NFGs' mortgage loan repayment status as at 31 March 2008 being current (successful), in arrears (less successful) or in the process of legal action (unsuccessful). Some 75% (or 72) of the sample NFGs were successful, 13.5% (or 13) were classified as less successful, and 11.5% (or 11) had been handed over for legal action due to loan default (unsuccessful). Student t-tests indicated that successful sample NFGs, on average, had more experience in farming sugarcane, larger farm sizes (proxied by annual gross farm income), greater solvency and liquidity levels, and larger areas replanted annually to sugarcane than the less successful and unsuccessful NFGs. The successful NFGs also placed relatively more emphasis on computerized record keeping systems that can save time in conducting production and financial analyses to improve farm profitability. They also, on average, had some form of their own financial record keeping system in addition to the services they received from their bookkeepers. These NFGs seemed better suited to manage risk (income variability) as they used more risk management strategies than unsuccessful NFGs, in particular having off-farm investments and keeping cash and credit reserves.

Principal component analysis was first used to remedy multicollinearity amongst 15 hypothesized variables that could explain NFG mortgage loan repayment status. Five principal components (PCs) that accounted for 63.22% of the variation in these explanatory variables could be meaningfully interpreted, namely: Extension Contact (PC1), Farm Financial and Production Management Ability (PC2), Own Record Keeping and Cash Management (PC3), Production and Financial Risk Management Capacity (PC4), and the Link between Farming and Management Experience and Farm Size (PC5). These five PCs or dimensions of NFG farm management ability, practices, links and financial performance were then substituted for the 15 explanatory variables in the multinomial logit model of NFG mortgage loan repayment status. The estimated model showed that sample NFGs with relatively less extension contact, less production and

financial risk management capacity, less farm financial and production management ability, who are less likely to keep own farm records and cash reserves, and who have less sugarcane farming experience and smaller farm sizes are more likely to default rather than be current on their mortgage loan repayments.

These results suggest that the viability of future commercial farmland transfers to PDIs in the SA Sugar Industry could firstly be promoted if NFGs build business relationships by maintaining contact with technical extension, economic advisory and financier staff. Secondly, NFGs need to be encouraged to maintain solvency and liquidity levels and implement farm management practices (such as annual sugarcane area replanting and whole cycle soil sampling) in line with industry norms. Thirdly, since those NFGs with more farming experience may be better able to adapt to managing their own farms, this factor could be used as a future selection criterion for aspirant NFGs. Fourthly, given the role of farm size, policymakers need to consider facilitating the transfer of adequate size farms (expected annual gross farm income can meet annual loan repayments) to emerging commercial farmers. Highly-leveraged sample NFGs that manage smaller-sized farms are probably less able to benefit from spreading fixed annual management, information, interest and transaction costs over their units of farm output. New Freehold Growers could also be encouraged to keep up-to-date production and financial records to improve management decision making. This may identify a need for unsuccessful and new future NFGs to undergo financial management training to promote farm viability. A focus on adopting appropriate risk management strategies, in particular having off-farm investments and keeping cash and credit reserves, may also promote viability.

Based on the sample NFGs' recorded perceptions, most of the respondents (84%) can identify with, or have experienced the relatively low current returns (cash flow problems) usually associated with the early years after land purchase. Future NFGs, or the beneficiaries of other land reform initiatives, must be informed that an investment in land is usually characterized by low current returns relative to capital growth and that the annual profit from farming is low relative to the land value. Renting land before purchase could be considered as a means of managing the cash-flow problem associated

with land purchase. The option of first leasing land was preferred by about 60% of respondents in order to build-up collateral and funds for a larger down-payment, and to increase working capital, gain experience at managing their own businesses and determine whether or not they could succeed at managing their own farms.

Ninety-nine percent of the sample NFGs felt that it was important for new farmers to have a mentor. Effective mentoring could potentially provide NFGs, or other land reform beneficiaries, with fundamental business and technical skills required to successfully manage viable farming operations. The survey responses suggest that technical mentorship should focus on general sugarcane husbandry with emphasis on variety selection, fertilization, weed and pest control and harvesting management. Technical mentors could also help to identify areas where improvements can be made and help new farmers to develop soft skills such as labour management and negotiation skills, conflict management and decision making skills. The survey respondents felt that financial mentors could provide assistance with budgeting, debt management, VAT planning, cash flow management, developing an effective savings plan, introductions to financiers and how to reinvest capital in the farm.

Mentorship could be provided to the NFGs either by neighboring commercial farmers, CANEGROWERS economics advisory staff, SASRI extension officers, miller support staff or a combination of these sources. A complementary working relationship should however be developed between mentors and extension officers, because a mentor can provide practical experience, while the extension officer provides the background, reasons and principles for advice and recommendations given to the farmer (Street & Kleynhans, 1996). The relationship between the mentor and mentee must be clearly defined, with both parties understanding their roles in a partnership that both are willing to develop. It is, therefore, recommended that the NFGs help to select their mentors and that both the mentor and the NFG must be aware of their responsibilities. This raises questions about who should pay for mentoring, whether mentees are willing to pay for mentoring, and how much. These are critical empirical questions that could be analyzed in future research.

The option of providing the NFGs with a co-ordinator to monitor their financial performance, at least for the initial three to five years of operation, and to advise industry role players on how to improve this performance, could also be considered. Most (77%) of the sample NFGs who saw the need for a financial co-ordinator felt that this should be the responsibility of CANEGROWERS economics advisory staff who have the relevant experience and expertise. It is, therefore, suggested that CANEGROWERS support staff could fulfill this role as it would enable them to better monitor, and advise on, the NFGs' financial performance over time. This study found that, on average, the sample NFGs were relatively risk-averse, however no relationship was found between risk aversion and mortgage loan repayment status. As there is relatively little literature on this relationship, an area for future research would be to study the links between risk aversion, leverage and mortgage loan repayment status for emerging commercial farmers in South Africa. Another area for future research would be to investigate whether NFGs with smaller turnovers and smaller loan sizes could successfully repay their mortgage loans.

Summary

The SA government developed a three tiered land reform policy – land restitution, land tenure reform and land redistribution – in 1994 that aims to transfer 30% of agricultural land to PDIs by 2014. South African policymakers, commercial farmers, agribusinesses and researchers face the challenge of trying to find appropriate ways of implementing land reform that will promote economic and political stability. The SA Sugar Industry is committed to transformation in land ownership and supports the government land reform target through the use of the land market under the willing buyer/willing seller principle. An innovative financing scheme was introduced in 1996 by sugar miller-cum-planters that sold some of their farms to aspirant black farmers, who were referred to as medium-scale (emerging) commercial farmers.

Since 1996, the financial performance of these farmers (now called New Freehold Growers (NFGs)) has been below that of the large scale sugarcane farmers (LSGs). During 1997/98 - 2006/07, the NFGs had an average real (2007 = 100) gross income per hectare of R9 882 compared to R11 857 for LSGs. The NFGs have also experienced higher average real costs per hectare (R9 492) compared to the LSGs (R8 782). This has resulted in much lower average annual real returns per hectare for the NFGs than the LSGs (R390 versus R3 075 in 2007 Rand). This raises concerns about the long-term viability of current and future NFGs which is strategic in helping the SA Sugar Industry to achieve land ownership targets. The first aim of this study, therefore, was to identify factors contributing towards the successful performance of NFGs. Given that the NFG scheme cannot operate without external finance, success was measured by the mortgage loan repayment status of the NFGs. The second aim of this study was to document the NFGs' perceptions of the scheme and of industry role players. Information on these two aims could help to identify what grower characteristics or industry structures to target in order to improve the viability of current and future NFGs.

A survey questionnaire was used to collect data on the NFGs' farm operations and perceptions of the scheme. Personal interviews were conducted with 96 NFGs selected

using stratified random sampling, between July and November 2008. Three strata were used to classify the 291 NFGs in KZN by geographic region - North Coast, South Coast, and Midlands. Potential socioeconomic, farm specific and industry factors that may affect the NFGs' success were identified in the literature: these included grower characteristics (age, gender, level of formal education, relative experience in sugarcane farming and general management, and attitude towards risk), financial variables (family expenditure, off-farm income, asset turnover ratio, working capital: gross farm return ratio, debt : asset ratio, and the return on farm equity) and farm specific variables such as farm size, and the risk management strategies and financial and production record keeping systems used by the NFGs.

Information about the sample NFGs' mortgage loan repayment status was obtained from their financing institutions: 74 sample NFGs were financed by Ithala Bank, 11 by Land Bank, nine by FNB and two by ABSA Bank. Mortgage loan repayment status by the sample NFGs was monitored over time to avoid distortions in the delinquency measurement, and classified into three categories: (1) current (most installments over time were paid within 30 days of the cut-off date); (2) paid in arrears (most installments over time were paid within 31 to 90 days of the cut-off date); and (3) in default (due installments still unpaid beyond 90 days after the cut-off date). Based on these classifications, 75% (or 72) of the sample NFGs were successful (current), 13.5% (or 13) were less successful (in arrears) and 11.5% (or 11) had been handed over for legal action due to loan default (unsuccessful).

Student t-tests indicated that successful NFGs, on average, had more experience in farming sugarcane, larger farm sizes (proxied by annual gross farm income), greater solvency and liquidity levels, and larger areas replanted to sugarcane annually, than the less successful and unsuccessful NFGs. The successful NFGs also placed relatively more emphasis on computerized record keeping systems that can save time in conducting production and financial analyses to improve farm profitability. They also, on average, tended to make more use of their own financial record keeping system in addition to the

services of bookkeepers, and use more risk management strategies than unsuccessful NFGs, in particular having off-farm investments and keeping cash and credit reserves.

Principal component analysis was first used to remedy multicollinearity amongst 15 hypothesized variables that could explain NFG mortgage loan repayment status. Five principal components (PCs) that accounted for 63.22% of the variation in these explanatory variables could be meaningfully interpreted, namely: Extension Contact (PC1), Farm Production and Financial Management Ability (PC2), Own Record Keeping and Cash Management (PC3), Production and Financial Risk Management Capacity (PC4), and the Link between Farming and Management Experience and Farm Size (PC5). These five PCs were then used in place of the 15 explanatory variables in a multinomial logit model of NFG mortgage loan repayment status. The estimated model showed that sample NFGs with relatively less extension contact, less production and financial risk management capacity, less farm financial and production management ability, who are less likely to keep own farm records cash reserves, and who have less sugarcane farming experience and smaller farm sizes are more likely to default rather than be current on their mortgage loan repayments.

These results suggest that the viability of future commercial farmland transfers to PDIs in the SA Sugar Industry could firstly be promoted if NFGs build business relationships by maintaining contact with technical extension, economic advisory and financier staff. Secondly, NFGs need to be encouraged to maintain solvency and liquidity levels and implement farm management practices (such as annual sugarcane area replanting and whole cycle soil sampling) in line with industry norms. Thirdly, since those NFGs with more farming experience may be better able to adapt to managing their own farms, this factor could be used as a future selection criterion for aspirant NFGs. Fourthly, given the role of farm size, policymakers need to consider facilitating the transfer of adequate size farms (proxied by average annual gross income) to emerging commercial farmers. Highly-leveraged sample NFGs that manage smaller-sized farms are probably less able to benefit from spreading fixed annual management, information, interest and transaction costs over their units of output. New Freehold Grower's could also be encouraged to

keep up-to-date production and financial records to improve management decision making. This may identify a need for unsuccessful and new future NFGs to undergo financial management training to promote farm viability. A focus on adopting appropriate risk management strategies, in particular having off-farm investments and keeping cash and credit reserves, may also promote viability.

The main reason why 39% of the 96 NFG respondents purchased a sugarcane farm was to run their own business. Twenty-three percent of respondents cited owning land as the main reason for purchasing a farm. A further 17% of sample NFGs purchased a sugarcane farm because of their passion and knowledge about farming, another six percent due to retrenchment from a milling company, five percent were SSG's who wanted to expand their farming operations, and 4% inherited their farms. Most of the respondents (84%) can identify with, or have experienced the relatively low current returns (cash flow problems) usually associated with the early years after land purchase. Future NFGs, or the beneficiaries of other land reform initiatives, must be informed that an investment in land is usually characterized by low current returns relative to capital growth and that the annual profit from farming is low relative to the land value. Renting land before purchase could be considered as a means of managing the cash-flow problem associated with land purchase. The option of first leasing land was preferred by about 60% of respondents in order to build-up collateral and funds for a larger down-payment and to increase their working capital, gain experience at managing their own businesses, and determine whether or not they could successfully manage their own farms.

Ninety-nine percent of the sample NFGs felt that it was important for new farmers to have a mentor. Effective mentoring could potentially provide NFGs, or other land reform beneficiaries, with fundamental business and technical skills required to successfully manage viable farming operations. The survey responses suggest that technical mentorship should focus on general sugarcane husbandry with emphasis on variety selection, fertilization, weed and pest control and harvesting management. Technical mentors could also help to identify areas where improvements can be made and help new farmers to develop soft skills such as labour management and negotiation skills, conflict

management and decision making skills. The survey respondents felt that financial mentors could provide assistance with budgeting, debt management, VAT planning, cash flow management, developing an effective savings plan, introductions to financiers and how to reinvest capital in the farm.

Mentorship could be provided to the NFGs either by neighboring commercial farmers, CANEGROWERS economics advisory staff, SASRI extension officers, miller support staff or a combination of these sources. A complementary working relationship should however be developed between mentors and extension officers, because a mentor can provide practical experience, while the extension officer provides the background, reasons and principles for advice and recommendations given to the farmer. The relationship between the mentor and mentee must be clearly defined, with both parties understanding their roles in a partnership that both are willing to develop. It is, therefore, recommended that the NFGs help to select their mentors and that both the mentor and the NFG must be aware of their responsibilities.

The option of providing the NFGs with a co-ordinator to monitor their financial performance, at least for the initial three to five years of operation, and to advise industry role players on how to improve this performance, should also be considered. Most (77%) of the sample NFGs who saw the need for a financial co-ordinator felt that this should be the responsibility of CANEGROWERS economics advisory staff who have the relevant experience and expertise. It is, therefore, suggested that CANEGROWERS support staff could fulfill this role as it would enable them to better monitor the NFGs' financial performance.

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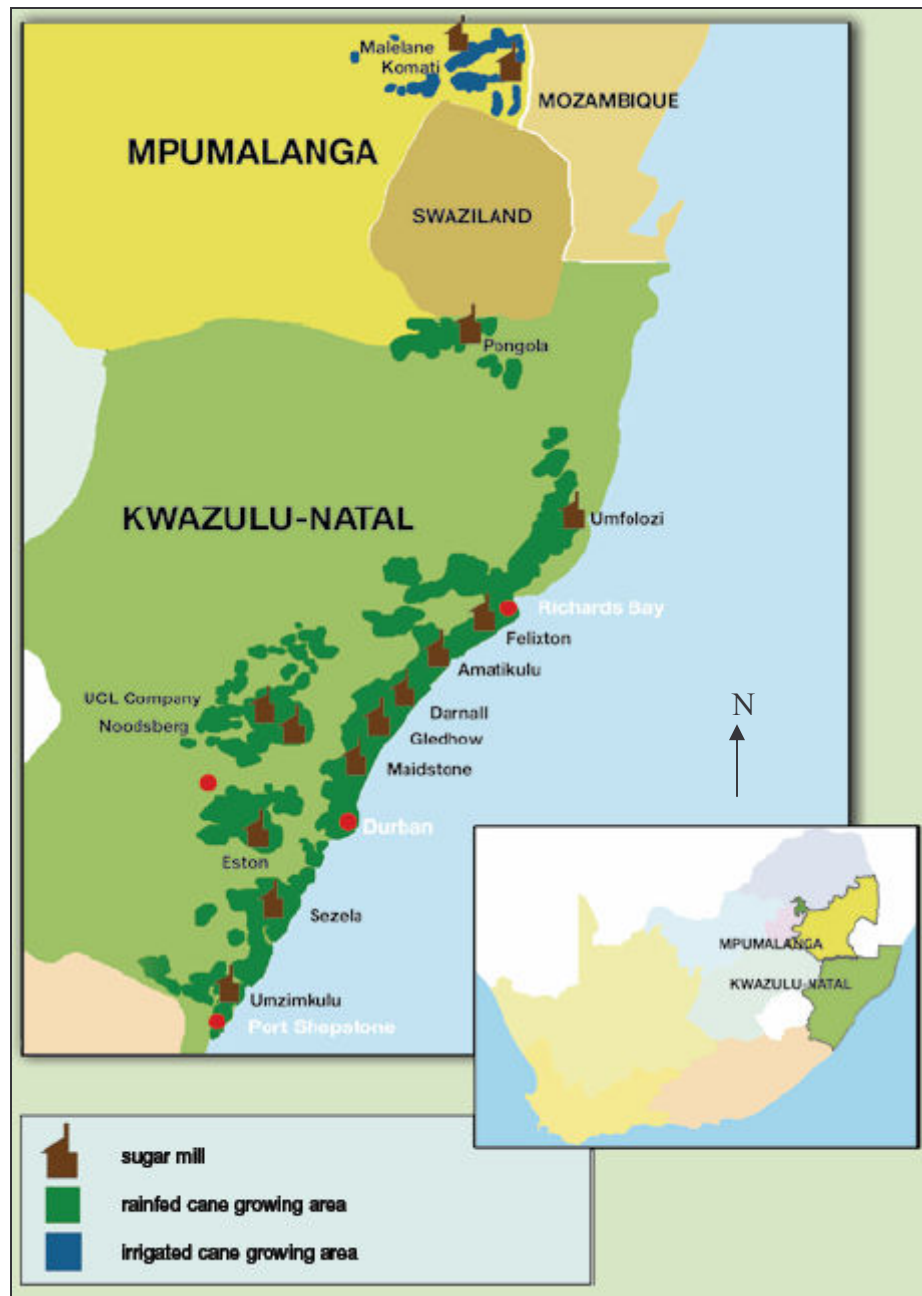
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APPENDICES

Appendix 1: South African Sugarcane Producing Areas and Sugar Mill Regions



Source: CANEGROWERS (2007).

Appendix 2: New Freehold Growers' Questionnaire



DISCIPLINE OF AGRICULTURAL ECONOMICS SCHOOL OF AGRICULTURAL SCIENCES AND AGRIBUSINESS UNIVERSITY OF KWAZULU-NATAL, PIETERMARITZBURG

Questionnaire on Factors Contributing Towards the Success of New Freehold Growers (NFGs) in the South African Sugar Industry

This study aims to analyse the socioeconomic and technical factors that affect the success of NFG farming operations. It is a **collaborative research project** between CANEGROWERS and the Discipline of Agricultural Economics, University of KwaZulu-Natal, Pietermaritzburg. We would like to obtain some personal and business data from you, and to document your perceptions about different aspects of the NFG scheme. Your input is **highly valued**, and the information that you provide will help CANEGROWERS to **improve their support services to NFGs** and **promote the sustainability of NFG farms**.

We request that the **principal** decision-maker in your farm business please answer the questions in the survey. Please answer all questions so that we can provide objective information to CANEGROWERS. All information provided by you in this questionnaire to the CANEGROWERS Regional Economic Advisor will be treated as **strictly confidential**, and no individual farmer or farm will be identified in the study results. Your **participation is voluntary** and you may **withdraw from the survey at any time without consequence**. The researchers will send you a **summary report** of the survey findings **if requested** in your responses. Your participation in this survey is highly appreciated. Thank you!

JULY 2008

Grower Number: _____ Home mill: _____

WHERE REQUIRED PLEASE TICK THE MOST APPROPRIATE ANSWER

REQUEST FOR COPY OF THE SUMMARY REPORT

Would you like a copy of the summary report of the survey results?

Yes	No
-----	----

SECTION A: FARMER AND FARM CHARACTERISTICS

1. What is your age (years)?

2. Gender

Male	Female
------	--------

3. Marital Status

Single	Married	Common Law Marriage	Divorced	Widow(er)
--------	---------	---------------------	----------	-----------

4. Number of dependents living in household?

5. What is the highest level of formal education you have received?

Level	Please tick
Std 5 (grade 7) and below	
Std 6 – 9 (grade 8 – 11)	
Matric (grade 12)	
Diploma	
Undergraduate degree (e.g. BSc)	
Postgraduate degree (e.g. MSc)	

6. Before you purchased this farm did you have any experience in these disciplines?

Discipline	Yes	No	Period (Years)
Agriculture			
Finance			
Management			

7. What were the most important reasons for you purchasing the farm?

- 1) _____
- 2) _____
- 3) _____

8. Would you have preferred to lease this farm first, for say 5 years, before buying?

Yes	No
-----	----

Why? _____

9. What is the arable area of your farm (hectares)?

What area is planted to sugarcane (hectares)?

10. How close is your farm to the nearest urban centre (km)?

11. Please respond to this statement: "Annual profit from sugarcane farming is low relative to land value".

Strongly agree	Agree	Uncertain	Disagree	Strongly Disagree
-----------------------	--------------	------------------	-----------------	--------------------------

12. Do you have a long-term sugarcane supply agreement with the sugar mill?

No	Yes	Period of Agreement (Years)	<input type="text"/>
-----------	------------	------------------------------------	----------------------

13. Please respond to this statement: "The long-term sugarcane supply agreement constrains you from diversifying into other farm enterprises".

Strongly agree	Agree	Uncertain	Disagree	Strongly Disagree
-----------------------	--------------	------------------	-----------------	--------------------------

14. How much time (hours) do you allocate on average to farming activities each day?

15. If 4 hours or less in (14), what is your source of off-farm income?

Own business	Contracting	Other (please specify)	<input type="text"/>
---------------------	--------------------	-------------------------------	----------------------

16. If you are a part time, or non-resident farmer, who manages the farm in your absence?

Farm Manager	Induna	Family Member	No one
---------------------	---------------	----------------------	---------------

17. Does the person (if any) in (16) have any experience in any of the following disciplines?

Discipline	Yes	No	Period (Years)
Agriculture	<input type="text"/>	<input type="text"/>	<input type="text"/>
Finance	<input type="text"/>	<input type="text"/>	<input type="text"/>
Management	<input type="text"/>	<input type="text"/>	<input type="text"/>

18. How many times a year do you meet with personnel from the following institutions?

Institution	Number of meetings
Financier	
CANEGROWERS	
Miller	
SASRI	

SECTION B: MENTORSHIP ISSUES

19. Who provides you with **financial** and **technical** advice? Please rank the **quality** of **financial** and/or **technical** advice provided on a scale from **1 = very poor** to **10 = excellent**:

Financial		Technical	
Source	Quality	Source	Quality

20. Do you feel it is important for NFG's to have a mentor?

Yes	No
-----	----

21. Who should provide **financial** mentorship and what should they focus on?

22. Who should provide **technical** mentorship and what should they focus on?

23. Please respond to this statement: "There is a need for a co-ordinator to monitor the financial performance of the New Freehold Growers, at least for the initial 3-5 years, and to advise industry role players on how such performance can be improved".

Strongly agree	Agree	Uncertain	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

If Strongly agree or Agree, who, or which organizations, should be a co-ordinator, and why?

Who? _____

Why? _____

SECTION C: FARM FINANCIAL, RISK AND PRODUCTION MANAGEMENT INFORMATION

24. Which financial institution financed the purchase of your farm? _____

25. Please rank the **quality of service** provided by this institution from **1 = very poor** to **10 = excellent**. _____

26. How can this institution improve their service? _____

27. What source provides you with production finance? _____

28. Please rank the **quality of service** provided by this source from **1 = very poor** to **10 = excellent**. _____

29. How can this source improve their service? _____

30. Your **own contribution** to buy the farm was raised through one or a combination of:

Source	Amount (R)
Savings	
Government grant (specify which grant)	
Sale of assets	
Sale of a business	
Pension	
Retrenchment package	
Personal borrowing from family members	
Loan against insurance policy as collateral	
Informal money lender	
Insurance policy	
LREF loan	
Other (please specify)	

31. What was the purchase price of your farm? R_____

32. Please indicate your average annual gross farm income (turnover) for the last 5 years.
R _____
What percent (%) of average annual turnover does sugarcane contribute?

33. Please provide the following financial data based on your **latest financial statements**:

Item	Total Value (R)
Total debt (installment balance + accounts payable + overdraft + mortgage bond + other long-term liabilities)	
Total farm current liabilities (debt repayments due within 12 months)	
Total farm assets (cash + bank + vehicles + machinery + equipment + land and buildings)	
Total farm current assets (assets that can be converted into cash in a 12 month cycle without disrupting farm operating performance)	

34. What is your **average household living expenses** (eg groceries, medical expenses, clothing, electricity, water, rates, school fees, etc) **each month**? R _____

35. Do you have off-farm income? ☐ Yes ☐ No

If Yes, what is the source of this off-farm income? _____

If Yes, what is your average annual gross **off-farm** income (Rands)?

1-25 000	25 001-50 000	50 001-100 000	100 001-150 000	>150 000
----------	---------------	----------------	-----------------	----------

36. Do any of your dependents (eg spouse or children) have off-farm income? ☐ Yes ☐ No

If Yes, what is the source of this off-farm income? _____

If Yes, what is the average annual **off-farm** income from your dependents (Rands)?

1-25 000	25 001-50 000	50 001-100 000	100 001-150 000	>150 000
----------	---------------	----------------	-----------------	----------

37. Indicate whether you have received any of these forms of post-farm transfer support and if so when you received them:

Source	Amount (R)	Year(s) received
CASP/Siyavuna grant		
Inputs from Department of Agriculture (fertilizer, chemicals)		
Deferred interest rate loan		

38. Risk management strategies that you commonly use are:

Strategy	Yes	No	Strategy	Yes	No
Enterprise diversification			Keep credit reserves		
Off-farm investment			Other (please specify)		
Crop insurance					
Fire insurance					
Keep cash reserves					

39. How do you schedule the fertilizer and weed control operations on your farm?

40. Do you take a **whole cycle (plant cane) soil sample** whenever you replant a field?

Yes	No
-----	----

41. Based on soil sample recommendations, do you apply the full recommended amount of fertilizer/lime to each field?

Yes	No
-----	----

If No, why? _____

42. How many hectares of replanting have you done annually in the last 5 years?

Season	Area replanted (ha)	Varieties	Did you use certified seedcane OR seedcane with a history of hot water treatment and disease inspections?	
			Yes	No
2002/03				
2003/04				
2004/05				
2005/06				
2006/07				

Why did you replant with these varieties? _____

43. Do you apply **long-term pre-emergent** herbicides?
If yes, what do you do as a follow up? _____

Yes	No
-----	----

44. How do you schedule your harvesting operations? _____

45. Who harvests your cane?

Self	Syndicate	Contractor	Other (please specify)
------	-----------	------------	------------------------

46. Is your cane burnt/trashed at harvest?

Yes	No
-----	----

47. How far (km) is the mill from your farm?

48. What is the **average** harvest to crush delay (hours) for cane harvested on your farm?

<24	24-36	37-48	49-60	>60	Unknown
-----	-------	-------	-------	-----	---------

49. Do you apply ripeners to your cane?

Yes	No
-----	----

If Yes, how do you decide which fields to spray and when? _____

50. How often do you check the quality of harvesting, specifically base cutting, topping height, and the level of extraneous matter?

Daily	Every second day	Leave it to the supervisor or contractor
-------	------------------	--

51. How many permanent staff do you have?

52. What percentage (%) of your permanent staff has attended a training course in their area of operation/responsibility?

53. Rank **each of** the following factors according to how they negatively **affect your farm earnings** on a scale from **1 = extremely unimportant** to **10 = extremely important**:

Factor	Score out of 10 for each factor	Factor	Score out of 10 for each factor
Contractor availability		RV prices	
Contractor reliability		Climate	
Contractor rates		Information shortages	
Labour availability		Interest rates	
Labour productivity		Eldana	
Input availability		Other (please specify)	
Input prices			

54. Would you sell your farm to reduce your losses in a financial and/or agronomic crisis?

Yes	No
-----	----

Why? _____

55. What would you do to cope with an **unanticipated** drop in annual gross farm income?

56. What type of **production record keeping** system do you use?

Type	Yes	No	Type	Yes	No
Own manual system			External consultant		
Own computerized system (e.g Excel)			No formal system		
Other specialized computerized system (eg CanePro, Plan-a-head, etc)			Other (please specify)		

57. What type of **financial record keeping** (bookkeeping) system do you use?

Type	Yes	No	Type	Yes	No
Own manual system			Other external consultant		
Own specialized computerized system (eg Pastel, Plan-a-head, etc)			No formal system		
CANEFARMS			Other (please specify)		

If you use CANEFARMS, would you kindly grant us access to this information
(**All information provided will be kept strictly confidential**)?

Yes	No
-----	----

Signature (principal decision-maker) and date: _____

SECTION D: NFGs ATTITUDES TOWARDS RISK

58. Please indicate your willingness to take risks relative to other farmers in your area.

Much less willing	Slightly less willing	Similar	Slightly more willing	Much more willing
--------------------------	------------------------------	----------------	------------------------------	--------------------------

59. The questions below relate to hypothetical situations. In each question you must decide between the option of taking a gamble or choosing a certain outcome. We aim to estimate that specific outcome where you are **indifferent between** the certain and uncertain amounts. The gamble (OPTION A) is based on the toss of an unbiased coin, with heads and tails having different outcomes. You are asked for various values of OPTION B, which option you prefer until a value is found where you are indifferent between the two options.

59.1 Faced with a gamble (OPTION A) or the option to receive a certain amount (OPTION B), which would you prefer?

OPTION A: A coin is tossed: Heads (50%): You win R5 000

Tails (50%): You lose nothing

OPTION B: You receive:

R500	R1 000	R1 500	R2 000	R2 500	R3 000	R3 500
------	--------	--------	--------	---------------	--------	--------

OPTION A: A coin is tossed: Heads (50%): You win R10 000
Tails (50%): You lose R2 000

R500	R1 000	R2 000	R3 000	R4000	R5 000	R6 000
------	--------	--------	--------	--------------	--------	--------

[illegible]

Yes	No
------------	-----------

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Appendix 3: Correlation Matrix for the Potential NFG Mortgage Loan Repayment Determinants

Variable	Loan status	AGE	EDU	EXPSF	FMEXP	MEXP
Loan status	1					
AGE	0.120	1				
EDU	-0.010	-0.220**	1			
EXPSF	-0.363***	0.252**	-0.220**	1		
FMEXP	-0.127	-0.024	0.045	0.331***	1	
MEXP	-0.106	0.141	-0.053	0.334***	0.452***	1
APRA	-0.013	0.236**	0.006	0.044	0.099	0.128
FMEET	-0.250**	-0.265**	0.140	-0.209	-0.076	-0.059
CMEET	-0.290***	-0.146	-0.116	0.153	0.091	0.233**
MMEET	-0.310***	-0.302***	-0.057	0.085	0.131	0.161
SMEET	-0.314***	-0.139	0.001	0.150	0.186	0.298***
FSIZE	-0.520***	-0.079	0.059	0.354***	0.445***	0.256**
OFI	-0.145	-0.171	0.133	0.039	0.244**	0.187
SOFI	-0.166	-0.053	0.155	-0.100	0.078	0.105
SOLV	0.746***	-0.013	-0.026	-0.251**	-0.065	-0.003
LIQUID	-0.468***	-0.005	-0.068	-0.005	-0.075	-0.143
FEFCY	-0.216**	-0.113	0.190	0.062	-0.022	0.002
REPLNT	-0.543***	-0.082	0.048	0.245**	0.117	0.087
SSAMP	-0.343***	-0.117	0.247**	0.068	0.141	0.113
HCDEL	0.128	0.185	0.002	-0.209**	-0.005	0.045
PRECSYS ₁	-0.048	0.035	-0.097	0.148	0.026	0.098
PRECSYS ₂	-0.117	-0.185	0.396***	0.003	0.241**	0.205**
PRECSYS ₃	-0.173	-0.226**	0.347***	-0.031	0.162	0.117
PRECSYS ₄ ^a						
PRECSYS ₅	-0.035	0.055	-0.004	-0.054	-0.071	-0.098
FRECSYS ₁	-0.226**	-0.075	0.142	0.028	0.087	0.224**
FRECSYS ₂	-0.112	-0.203**	0.291***	-0.186	-0.071	-0.069
FRECSYS ₃	0.161	-0.014	0.159	-0.065	0.105	0.166
FRECSYS ₄	-0.222**	-0.011	-0.093	0.086	-0.047	-0.123
FRECSYS ₅	0.096	-0.191	0.034	-0.115	-0.035	-0.048
RMS ₁	-0.033	-0.090	0.218**	-0.237**	-0.068	-0.028
RMS ₂	-0.331***	-0.044	0.049	0.087	0.221**	0.149
RMS ₃	-0.219**	-0.041	-0.066	0.265***	0.041	0.141
RMS ₄	-0.351***	-0.091	0.178	-0.062	-0.065	0.078
RMS ₅	-0.300***	-0.047	0.076	0.064	0.168	0.176

Note: ** and *** denote statistical significance at the 5% and 1% levels, respectively.

^a No sample NFGs reported an entry for PRECSYS₄.

Continued on next page ...

Variable	APRA	FMEET	CMEET	MMEET	SMEET	FSIZE
Loan status						
AGE						
EDU						
EXPSF						
FMEXP						
MEXP						
APRA	1	1	1	1	1	1
FMEET	-0.007					
CMEET	-0.124					
MMEET	0.005	0.392***	0.551***	1	1	
SMEET	-0.032	0.404***	0.626***	0.647***		
FSIZE	0.039	0.191	0.147	0.333***	0.384***	1
OFI	-0.153	0.036	0.092	0.068	0.136	0.115
SOFI	0.156	0.375***	0.026	0.178	0.232**	0.219**
SOLV	-0.001	-0.089	-0.177	-0.184	-0.235**	-0.440***
LIQUID	-0.024	0.335***	0.109	0.237**	0.108	0.199
FEFCY	0.106	0.262**	-0.006	0.105	0.101	0.135
REPLNT	0.009	0.241**	0.182	0.374***	0.222	0.473***
SSAMP	0.007	0.046	0.121	0.085	0.242**	0.257**
HCDL	0.203**	0.065	-0.125	-0.116	-0.058	-0.133
PRECSYS ₁	0.011	0.158	0.036	0.026	0.021	0.100
PRECSYS ₂	-0.076	0.099	0.144	0.179	0.096	0.211**
PRECSYS ₃	-0.130	0.150	0.243**	0.103	0.136	0.222**
PRECSYS ₄						
PRECSYS ₅	0.210**	-0.094	-0.185	-0.102	-0.093	-0.108
FRECSYS ₁	0.045	0.221**	0.155	0.280***	0.342***	0.129
FRECSYS ₂	-0.042	-0.014	0.131	0.050	0.068	0.069
FRECSYS ₃	-0.116	0.225**	0.163	0.053	0.011	0.016
FRECSYS ₄ ^a	0.060	-0.064	-0.077	0.055	0.069	0.066
FRECSYS ₅	-0.011	-0.066	-0.134	0.029	-0.145	-0.061
RMS ₁	0.243**	0.017	-0.093	-0.073	0.082	-0.045
RMS ₂	0.041	-0.002	0.397***	0.212**	0.345***	0.240**
RMS ₃	-0.020	-0.005	0.213**	0.185	0.228**	0.159
RMS ₄	-0.012	0.030	-0.014	-0.012	0.068	0.094
RMS ₅	-0.074	0.213	0.284***	0.193	0.403***	0.271***

Note: ** and *** denote statistical significance at the 5% and 1% levels, respectively.

^a No sample NFGs reported an entry for PRECSYS₄.

Continued on next page ...

Variable	OFI	SOFI	SOLV	LIQUID	FEFCY	REPLNT	SSAMP
Loan status	1	1	1	1	1	1	1
AGE							
EDU							
EXPSF							
FMEXP							
MEXP							
APRA							
FMEET							
CMEET							
MMEET							
SMEET							
FSIZE							
OFI							
SOFI	0.000	1	1	1	1	1	1
SOLV	-0.125	0.008					
LIQUID	-0.011	0.045					
FEFCY	0.041	0.236**					
REPLNT	0.211**	0.091					
SSAMP	0.102	-0.010					
HCDEL	-0.134	0.096					
PRECSYS ₁	-0.246**	0.108					
PRECSYS ₂	0.219**	-0.016					
PRECSYS ₃	0.331***	0.036					
PRECSYS ₄ ^a							
PRECSYS ₅	-0.035	0.025					
FRECSYS ₁	-0.023	0.254**					
FRECSYS ₂	-0.022	0.152					
FRECSYS ₃	0.117	-0.075					
FRECSYS ₄	-0.019	0.078					
FRECSYS ₅	-0.029	-0.063					
RMS ₁	-0.069	0.201	-0.045	-0.015	0.220**	0.068	-0.009
RMS ₂	0.231**	0.113	-0.286***	0.140	0.047	0.168	0.278***
RMS ₃	0.051	-0.019	-0.098	-0.029	-0.313***	0.042	0.246**
RMS ₄	0.138	0.027	-0.301***	0.109	0.165	0.320***	0.220**
RMS ₅	0.118	0.075	-0.307***	0.193	-0.085	0.262**	0.294***

Note: ** and *** denote statistical significance at the 5% and 1% levels, respectively.

^a No sample NFGs reported an entry for PRECSYS₄.

Continued on next page ...

Variable	HCDEL	PRECSYS ₁	PRECSYS ₂	PRECSYS ₃	PRECSYS ₄ ^a	PRECSYS ₅	FRECSYS ₁
Loan status	1	1	1	1	1	1	1
AGE							
EDU							
EXPSF							
FMEXP							
MEXP							
APRA							
FMEET							
CMEET							
MMEET							
SMEET							
FSIZE							
OFI							
SOFI							
SOLV							
LIQUID							
FEFCY							
REPLNT							
SSAMP							
HCDEL							
PRECSYS ₁	-0.055	1	1	1	1	1	1
PRECSYS ₂	-0.157	-0.102					
PRECSYS ₃	-0.081	-0.109	0.719***	1	1	1	1
PRECSYS ₄ ^a							
PRECSYS ₅	0.151	-0.580***	-0.093	-0.067		1	1
FRECSYS ₁	0.086	0.098	0.256**	0.098		-0.066	1
FRECSYS ₂	-0.036	-0.089	0.466***	0.469***		-0.043	0.252**
FRECSYS ₃	0.194	0.018	0.131	0.192		0.200	0.141
FRECSYS ₄	-0.223**	0.048	-0.075	-0.192		0.096	-0.183
FRECSYS ₅	0.129	0.037	-0.046	-0.033		-0.021	-0.085
RMS ₁	0.019	0.047	0.150	0.082		0.070	0.107
RMS ₂	-0.030	0.083	0.075	0.264***		-0.096	0.141
RMS ₃	-0.015	0.199	0.061	-0.007		-0.100	0.074
RMS ₄	0.150	0.031	0.130	0.069		0.033	0.208**
RMS ₅	0.116	0.110	0.060	0.217**		0.028	0.054

Note: ** and *** denote statistical significance at the 5% and 1% levels, respectively.

^a No sample NFGs reported an entry for PRECSYS₄.

Continued on next page ...

Variable	FRECSYS ₂	FRECSYS ₃	FRECSYS ₄	FRECSYS ₅	RMS ₁	RMS ₂	RMS ₃
Loan status							
AGE							
EDU							
EXPSF							
FMEXP							
MEXP							
APRA							
FMEET							
CMEET							
MMEET							
SMEET							
FSIZE							
OFI							
SOFI							
SOLV							
LIQUID							
FEFCY							
REPLNT							
SSAMP							
HCDEL							
PRECSYS ₁							
PRECSYS ₂							
PRECSYS ₃							
PRECSYS ₄							
PRECSYS ₅							
FRECSYS ₁							
FRECSYS ₂	1						
FRECSYS ₃	0.009	1					
FRECSYS ₄	-0.009	-0.833***	1				
FRECSYS ₅	-0.021	-0.098	-0.107	1			
RMS ₁	0.222**	-0.258**	0.197	-0.041	1		
RMS ₂	0.113	0.082	-0.040	-0.098	0.047	1	
RMS ₃	0.071	-0.082	0.151	0.035	-0.164	0.054	1
RMS ₄	0.033	0.038	-0.038	0.071	0.078	0.083	0.056
RMS ₅	0.028	0.107	-0.017	0.069	-0.127	0.152	0.138

Note: ** and *** denote statistical significance at the 5% and 1% levels, respectively.

Continued on next page ...

Variable	RMS ₄	RMS ₅
Loan status		
AGE		
EDU		
EXPSF		
FMEXP		
MEXP		
APRA		
FMEET		
CMEET		
MMEET		
SMEET		
FSIZE		
OFI		
SOFI		
SOLV		
LIQUID		
FEFCY		
REPLNT		
SSAMP		
HCDEL		
PRECSYS ₁		
PRECSYS ₂		
PRECSYS ₃		
PRECSYS ₄		
PRECSYS ₅		
FRECSYS ₁		
FRECSYS ₂		
FRECSYS ₃		
FRECSYS ₄		
FRECSYS ₅		
RMS ₁		
RMS ₂		
RMS ₃		
RMS ₄	1	
RMS ₅	0.063	1

Note: ** and *** denote statistical significance at the 5% and 1% levels, respectively.