The impact of social grants on rural households' incentives to farm, market participation and farm entrepreneurship: Evidence from KwaZulu-Natal, South Africa

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DEDICATION

This thesis is dedicated to my family.

DECLARATION 1: PLAGIARISM

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As the candidate's supervisors, we agree to the submission of this thesis:

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Dr M. Mudhara (Supervisor)

Signed _____ Date_____

Professor E.W. Zegeye (Co-supervisor)

DECLARATION 2: PUBLICATIONS

The following manuscripts (accepted or under review) form part of the research presented in this thesis.

Manuscript 1-Chapter 3

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Manuscript 2-Chapter 6

Sinyolo, S., Mudhara, M & Wale, E. The impact of social grant-dependency on agricultural entrepreneurship among rural households in KwaZulu-Natal, South Africa *(Accepted: Journal of Developing Areas).*

Manuscript 3-Chapter 4

Sinyolo, S., Mudhara, M & Wale, E. The impact of social grants on the adoption and intensity of chemical fertiliser use among smallholder farmers in KwaZulu-Natal, South Africa *(under review: Agrekon)*.

Manuscript 4-Chapter 5

Sinyolo, S., Mudhara, M & Wale, E. The impact of social grant-dependency on smallholder maize producers' market participation in KwaZulu-Natal, South Africa *(under review: SAJEMS).*

Author contributions

All the papers were conceived by Sinyolo, S. Data collection, analysis and writing up of the papers were also done by Sinyolo, S., while Mudhara, M. and Wale, E. contributed valuable supervision, guidance, insights and comments on every stage of producing the papers.

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ABSTRACT

While there is general consensus on the need to reduce poverty and food insecurity in Africa, considerable debate exists on the effectiveness of transfers, such as social grants, in attaining these goals. The concern is that transfers may affect people's social and economic behaviour negatively and entrench a culture of dependency and entitlement. This concern is echoed by policy-makers and academics in South Africa, where more than 16 million poor people were social grants beneficiaries in 2014. Even though a wide range of literature has explored many dimensions of the impact of social grants, limited in-depth research has explored the potential linkages between social grants and smallholder farming in South Africa. This is despite the importance of these two interventions, especially in the rural areas where poverty and household food insecurity are concentrated.

The objective of the study was to investigate the impact of social grants on: incentives to farm, chemical fertiliser adoption, market participation and farm entrepreneurship in the rural areas of the KwaZulu-Natal (KZN) province. Using a sample of 984 households randomly selected across four districts of the province, different econometric techniques (such as the logit transformation technique, Papke and Wooldridge model, propensity score matching, generalised propensity score method, double-hurdle model and the Bartlett factor score regression) were utilised to analyse the data. The social grants variable was captured in two ways: as a dummy showing whether a household has access to social grants and as a continuous variable indicating the level of household dependency on social grants.

The study results indicated that social grants have a wide coverage, benefiting most of the rural households that were interviewed. The study indicated high levels of unemployment among the household members in the rural areas in KZN, implying shortage of economic opportunities in these areas. While this underscores the importance of smallholder farming as a livelihood option, the results indicated low areas of land under cultivation, reduced participation by unemployed household members in smallholder farming activities and low levels of farm entrepreneurship. The question answered in this study pertains to whether these outcomes are a result of the households' access to, or dependency on, social grants.

The study results revealed that the disincentive effects of social grants are not just about access, but about the level of dependency on them. This implies that there is value in introducing the dummy and the continuous variable, as the influence of the two variables varied for some of

the different outcomes studied. The findings of the study were largely consistent with the disincentive hypothesis, indicating that access to social grants and the level of dependency on them generally had negative effects on individuals' incentives to take part in smallholder farming activities. However, this result did not apply on all the outcome variables. The econometric results indicated that access to, and level of dependency on, social grants did not influence, either positively or negatively, the proportion of land under cultivation. This result, which was robust across several econometric techniques, suggests that the declining land under cultivation among rural households is not due to social grants. Instead the study identified several other constraints that policy-makers should focus on to improve the proportion of cultivated land area in the rural areas.

In terms of the impact of social grants on household members' participation in farming activities, the results were in line with the disincentive hypothesis. The results indicated that both access to, and increasing levels of dependency on, social grants led to a significant reduction in the number of the household members that participate in smallholder farming activities. The implication of this result is that, although social grants are targeted to the vulnerable household members, they also reach the unintended household members, creating disincentive effects. The increase in household income due to access to social grants increases the reservation wage of the household members and lowers their motivation to participate in farming activities. The increase in the reservation wage means that household members would require smallholder farming to be more remunerative than currently for them to participate in it. The study identified other variables that affect participation in smallholder farming by household members, highlighting the importance of expectations of farming success as a key motivator.

Access to, and level of dependency on, social grants were found to have mixed impacts on chemical fertiliser adoption. While the results indicated that access to social grants was associated with higher levels of chemical fertiliser use, increasing levels of dependency on social grants was associated with decreasing intensity of chemical fertiliser use. This implies that, although social grants may relax the financial constraints facing rural farmers amidst imperfect credit markets, high levels of dependency on social grants results in disincentives to invest in farms. In order to promote self-sufficiency and independence among the rural poor, the study highlights the need to find strategies, such as introducing subsidies and focussed

training, to encourage rural households to invest part of their social grants in smallholder farming activities.

In terms of commercialisation incentives, the results found that higher social grant-dependency was associated with decreased probability of market participation. This suggests that the households who depend more on social grants are more likely to be subsistence-oriented as they rely on social grants for income. After the decision to enter the market is made, households with access to social grants sold lower maize volumes compared to those with no access to social grants. The study concluded that social grants had negative effects on the incentives of rural households to commercialise their farming activities. This has negative implications on the government's drive to increase commercialisation levels of smallholder farmers by helping them graduate from subsistence farming. The results identified a number of factors that significantly influenced household market participation, highlighting the importance of institutional support (e.g., extension, training and information) in reducing transaction costs and increasing market participation. The study results imply that policies aimed at reducing both fixed and variable transaction costs (such as improved road infrastructure and institutional support such as extension, training and organising farmers into groups) should be prioritised to increase both rates and levels of smallholder participation in the maize markets.

The study results indicated that the high levels of dependency on social grants inhibit farm entrepreneurship development. This implies that social grants, especially in households where they are more important, have created disincentives that have hindered the entrepreneurial attitudes of rural households. Given that the entrepreneurial competencies can be learned and changed, the study identified the policy variables to enhance farm entrepreneurship. The study recommends that government should prioritise the provision of support services such as training, extension and credit support, in order to establish entrepreneurial rural households. A greater emphasis should be on identifying the gaps in the farmers' entrepreneurship skills set and then training the farmers according to their needs.

To sum up, the study found that rural households who depended more on social grants had fewer of their members participating in smallholder farming; used less chemical fertiliser; were less entrepreneurial and less likely to be market-oriented. Although access to social grants had a positive effect on the level of chemical fertiliser use, it had negative effects on the proportion of household members that engage in smallholder farming activities and market participation levels. The findings imply that social grants are spilling over to unintended household

members, creating a dependency syndrome among recipient households. Since social grants are important in addressing extreme poverty, the study recommends that their provision should continue, but policy-makers should be particularly cognisant of their possible unintended and adverse consequences on smallholder farming. The study recommends that policy-makers should synchronise the objectives of social grants and smallholder farming so that the disincentive effects are reduced. The study presents policy options to address both the social grants side as well as the smallholder farming side, arguing that dealing with the social grants alone is not enough to ensure the viability and success of smallholder farming. Policy options include increasing smallholders' assets in order to grow their risk-bearing capacity, addressing imperfections in the rural credit markets, improving the expected profitability of smallholder farming as well as introducing focussed training to motivate rural households to invest part of their social grants in smallholder farming activities.

LIST OF ACRONYMS

ANC	African National Congress
AU	African Union
ATE	Average Treatment Effect
ATT	Average Treatment effect on the Treated
BIG	Basic Income Grant
CAADP	Comprehensive African Agricultural Development
CDG	Care Dependency Grant
CPI	Consumer Price Index
CSG	Child Support Grant
DAFF	Department of Agriculture, Forestry and Fisheries
DED	Department of Economic Development
DG	Disability Grant
DSD	Department of Social Development
EPWP	Expanded Public Works Programme
FCG	Foster Care Grant
FGT	Foster, Greer and Thorbecke
FSR	Factor Score Regression
GDP	Gross Domestic Product
GEM	Global Entrepreneurship Monitor
GIA	Grant-in-Aid
GPS	Generalised Propensity Score
IMR	Inverse Mills Ratio
KZN	KwaZulu-Natal
KZNDAE	KwaZulu-Natal Department of Agriculture and Environment
NDP	National Development Plan
NEPAD	New Partnership for Africa's Development
NPC	National Planning Commission
OAG	Old Age Grant
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
PCA	Principal Component Analysis
PSM	Propensity Score Matching
SSA	Sub-Saharan Africa
SASSA	South African Social Security Agency
SEM	Structural Equation Modeling
SPSS	Smallholder Producer Support Strategy
Stats SA	Statistics South Africa
TEA	Total Entrepreneurial Activity
WVG	War Veterans Grant

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CHAPTER 1 INTRODUCTION

1.1 Background to the study

While there is general consensus on the need to reduce poverty and food insecurity in Africa, there is also considerable debate on the effectiveness of transfers (such as food aid and social grants) in attaining these goals (Devereux, 2002; Samson *et al.*, 2004; Abdulai *et al.*, 2005; Barrett, 2006; Samson, 2009). The core of the controversy is related to the unintended consequences of such programmes on the behaviour of the beneficiaries. The concern is that these transfers may affect people's social and economic behaviour negatively and entrench a culture of dependency and entitlement (Devereux, 2001; Barrett and Maxwell, 2005; Barrett, 2006). Even though assisting individuals to meet basic needs, when they otherwise could not do so on their own, is desirable, the undesirable dependency culture occurs when assistance provision undermines the incentives of the poor to participate in economic activities such as farming (Lentz *et al.*, 2005; Barrett, 2006). This negative dependency results in loss of future independent capacity to sustain well-being (Lentz *et al.*, 2005).

Several studies (e.g., Abdulai *et al.*, 2005; Bezu and Holden, 2008; Mabuza *et al.*, 2009; Tadesse and Shively, 2009; Sharaunga and Wale, 2013) have investigated the potential disincentive impacts of food aid on farming activities in Africa. The results have been by-and-large mixed. Some studies (e.g., Tadesse and Shively, 2009; Sharaunga and Wale, 2013) have found evidence that food aid has created disincentive effects. Other studies (e.g., Abdulai *et al.*, 2005; Bezu and Holden, 2008; Mabuza *et al.*, 2009) found little evidence of the disincentive effects. While the connection between food aid and smallholder agriculture has been investigated extensively in Africa, there is a dearth of literature on the potential linkage between social grants and smallholder agricultural production, technology adoption and commercialisation at the household level. This is in spite of the growing interest in cash transfers among governments and donors in Africa, with many countries having piloted and/or introduced social grants since the mid-1990s (Vincent and Cull, 2009; Garcia and Moore, 2012; Handa *et al.*, 2012; Ulriksen, 2013; Zembe-Mkabile *et al.*, 2015). As noted by Handa *et al.* (2012), social cash transfers are gaining popularity as a tool for reducing inequality, social exclusion and chronic poverty in Africa.

Social grants are very important in South Africa, where they directly benefited an average of over 16 million poor people monthly in 2014 (SASSA, 2014). This represents more than 30% of the country's population and more than 50% of the households (Mabugu *et al.*, 2014). Despite being targeted to specific vulnerable groups (such as the young, old or chronically sick), the social grants generally benefit households as a whole (Klasen and Woolard, 2008; Abel, 2013). This implies that the impact of social grants extends further than the intended beneficiaries. While the spill-over effects of social grants to unintended household members has some positive impacts, in that they increase the reach of social grants in alleviating poverty, considerable uncertainty remains about some of the behavioural incentive effects (Samson, 2009; van der Berg *et al.*, 2010; Devereux, 2013). On top of the doubtful long-term financial sustainability of rising expenditure on the current social grants system in South Africa (Surender *et al.*, 2010; Brockerhoff, 2013; Midgley, 2013), what is of concern is that the incentive structure of social grants may have the effect of keeping recipients from taking steps that would help them escape poverty. In other words, households which could and should be self-reliant might choose free support from the state instead (Devereux, 2013).

This concern has been raised not only by academics, but also by politicians and the South African government. Surender *et al.* (2010) reported that, even though political debates with regards to social grants have been prominent since 1994, there has been a change in the discourse during the last decade. Whereas poverty alleviation and redistribution dominated the discourse in the first decade since 1994, the second decade has been increasingly characterised by the language of welfare dependency and concerns about rising expenditure on social assistance (Surender *et al.*, 2010; Potts, 2012). As highlighted in Surender *et al.* (2010), the ruling African National Congress (ANC) has raised concerns that social grants may be creating negative dependency on the state. Among its resolutions from the 2007 Polokwane conference, the ANC emphasised the need for the development of strategies that capacitate households and communities to empower themselves, so that they graduate out of dependency on social grants (Surender *et al.*, 2010).

The NPC (2012) highlighted in the National Development Plan (NDP) the apprehension in government that social grants may have weakened smallholder agriculture, micro-enterprises and artisanship. According to the NPC (2012), these activities should not be allowed to decline as they are shock-absorbers for extreme poverty, are platforms for self-employment, and have the potential to serve as stepping stones for economic advancement. Smallholder farming is

especially important in the rural areas of South Africa, where poverty and household food insecurity are more prevalent (Perret, 2002; Sishuta, 2005; Vink and van Rooyen, 2009).

Even though South Africa is considered an upper-middle income country, on the basis of *per capita* income, most of its socio-economic indicators are comparable to those of the world's poorest countries (Samson *et al.*, 2006; Whitworth and Wilkinson, 2013; Mabugu *et al.*, 2014). For example, the official unemployment rate has been over 26% in the past 10 years, its poverty incidence is over 50%, and it has a Gini coefficient that ranges between 0.63 and 0.70, one of the highest in the world (Samson *et al.*, 2006; Stats SA, 2012; Barrientos *et al.*, 2013; Herrington *et al.*, 2015). The country faces considerable challenges in addressing poverty, household food insecurity, hunger, inequality and unemployment, especially in the rural areas. It is against such a background that social grants and smallholder farming are key among rural households.

1.2 Research problem

According to the NPC (2012), South Africa has the potential and capacity to eliminate poverty and food insecurity at the household level, especially if it can harness the potential of smallholder farming. The government has identified increased smallholder production and commercialisation as part of the strategies of reducing rural poverty and stimulating rural economic development (DAFF, 2012; NPC, 2012). The importance of smallholder farming is underscored by the high unemployment rates and limited opportunities of employment growth in the non-farm sector (Eastwood *et al.*, 2006; Aliber and Hall, 2012). According to Eastwood *et al.* (2006), rural poverty cannot be adequately dealt with without considerable absorption of labour into smallholder agriculture.

However, several anecdotal and descriptive reports (e.g., White and Killick, 2001; Aliber and Hart, 2009; Aliber and Hall, 2012; Tshuma, 2012) have stated that the poor are turning away from smallholder agriculture due to their dependency on social grants. According to Tshuma (2012), the rural households have become reliant on social grants for their income, such that they cultivate small pieces of land just for subsistence. The result of this trend, the studies argue, has been the decline of agriculture, particularly smallholder agriculture, and that this is happening before other productive sectors have developed sufficiently to offer alternative employment-based livelihoods to sustain rural populations. Eastwood *et al.* (2006) and Neves

et al. (2009) termed this phenomenon 'premature deagriculturalisation' and 'deagrarianisation', respectively.

Whereas in most developing countries those unable to find employment in the urban or formal sectors engage in informal activities such as smallholder farming, the same is not true for South Africa (Stats SA, 2012; Burns *et al.*, 2013). According to Stats SA (2012), rural South African households have increasingly become net consumers rather than producers of food, despite the fact that, historically, they were able to produce most of their own food. Andrew *et al.* (2003) agreed with this assertion, reporting that large areas of land, even that previously cultivated, now lie abandoned in rural areas of South Africa, particularly in the Eastern Cape and KwaZulu-Natal. Abandoning farming is seldom considered as a viable solution to problems of low income in developing countries (World Bank, 2008; Hazell *et al.*, 2010; McElwee and Bosworth, 2010). Against the background that the South African government has prioritised the expansion of the smallholder sector as part of its broader job creation strategy (DED, 2011; Aliber and Hall, 2012; DAFF, 2012; NPC, 2012), the reported negative impact of social grants on smallholder farming is a cause for concern.

The connection between declining farming activity and social grants, however, has not been based on detailed econometric research, but limited descriptive statistics and anecdotal evidence. Therefore the purported decline in smallholder farming activity, as a result of social grant-dependency among rural farming households, should be taken with a pinch of salt. This is because the conceptual linkages, empirical evidence and impact pathways that link social grants and smallholder farming activities among rural households have not been adequately addressed. The reports of social grants causing declining farming activity might be due to the simultaneous existence of the two, rather than a demonstrable causality. Food aid studies, such as that of Abdulai *et al.* (2005), Barrett (2006) and Lentz *et al.* (2005), have highlighted the importance of in-depth econometric analysis before concluding that these transfers have resulted in negative dependency and declining agricultural production.

While in-depth studies focusing on the incentives of the social grants beneficiary households to engage in non-farm job opportunities are available (Bertrand *et al.*, 2003; Williams, 2007; Ardington *et al.*, 2009; Abel, 2013; Ardington *et al.*, 2013), the evidence has been inconclusive. On one hand, some studies (e.g., Posel *et al.*, 2006; Williams, 2007; Ardington *et al.*, 2009; Ardington *et al.*, 2013) have concluded that additional income from social grants has a positive impact on employment, by easing the constraints associated with the job search. On the other

hand, others (e.g., Bertrand *et al.*, 2003; Abel, 2013) have concluded that social grants reduce incentives to work, as the additional income from social grants causes household members to work less and take additional leisure. The contradictory results in the non-farm labour supply literature suggest the need for more studies which use different methods, focusing at specific groups or regions or sectors, to understand the potential disincentive effects of social grants.

The present study seeks to contribute to literature by investigating the incentives of rural households to engage in smallholder farming, invest in their farms, commercialise their smallholder farming activities as well as their entrepreneurship attitudes. Literature addressing these issues in South Africa is scarce. Given South Africa's high unemployment rate and the structural constraints of the non-farm labour market (Surender *et al.*, 2010; Aliber and Hall, 2012), the incentive impacts of social grants cannot be fully captured by just looking at the non-farm job sector and ignoring the farming sector. According to Surender *et al.* (2010), it is the structural conditions of the labour market that are reducing people's chances of finding employment, not the motivational characteristics of the unemployed. However, the question of whether the social grants have reduced the motivation of the unemployed rural household members to engage in smallholder farming activities has not been sufficiently examined. Moreover, previous studies have generally investigated the impact of mostly one of the social grants, in particular, the old age or child support grants, without looking at the total contribution of social grants to household income.

There are several government initiatives that have sought to intensify, modernise and commercialise smallholder agriculture (DAFF, 2011; DAFF, 2012; DAFF, 2013). For example, the New Growth Path set a target of establishing 300,000 additional market-oriented smallholder producers by 2020 (DED, 2011). In line with these targets, the national Department of Agriculture, Forestry and Fisheries (DAFF) has been implementing the Strategic Plan for Smallholder Support (SPSS), aimed at supporting smallholder farmers to improve production and/or productivity levels and help them graduate to commercial status (DAFF, 2013). However, despite the concerted government efforts in the past, the smallholder agriculture sector is characterised by declining proportion of cultivated land area, low uptake of improved farm inputs and weak links to markets (Andrew *et al.*, 2003; Senyolo *et al.*, 2009; Ortmann and King, 2010; Tshuma, 2012; van der Heijden and Vink, 2013; Hlongwane *et al.*, 2014; Maponya *et al.*, 2015; Raleting and Obi, 2015).

Among other reasons, liquidity constraints have been identified as a major factor limiting smallholder farmers' adoption of improved farm inputs in South Africa (Odhiambo and Magandini, 2008; Fanadzo *et al.*, 2010). This is exacerbated by the fact that these technologies, e.g., chemical fertilisers, are costly and have risky returns (Odhiambo and Magandini, 2008; Murovhi *et al.*, 2011). Given that the liquidity-constrained smallholder farmers operate under pervasive market imperfections that result in missing credit markets (Bezu and Holden, 2008), a relevant question to ask is the extent to which social grants encourage technology adoption by reducing the cash constraints of these households. Evidence from other countries, such as Bolivia (Martinez, 2004), indicate that cash transfers to the poor and liquidity-constrained households can result in households increasing their productive potential through investment in household-level economic activities such as smallholder farming. Is this the case in South Africa, or is the negative dependency syndrome more prevalent, leading to less interest in farming investments? To begin with, do smallholder farmers have any incentives to farm, or have they become dependent on social grants, as has been reported?

A range of constraints and barriers reducing the incentives for market participation among smallholder farmers have been identified, with most of the studies highlighting the role of transaction costs in this regard (Makhura, 2001; Biénabe and Vermeulen, 2011; Jari and Fraser, 2013; van der Heijden and Vink, 2013; Hlongwane *et al.*, 2014). While there are efforts to address the challenges related to transaction costs, the issue that is largely unknown is whether social grants have impacted on the incentives of smallholder farmers to commercialise their production activities. The commercialisation of smallholder agriculture requires that push factors (e.g., good transport and communication infrastructure and input subsidies) and pull factors (e.g., incentives and empowerment) be addressed. In other words, the success of government's rural poverty reduction strategy depends upon the extent to which the rural households have the incentives and motivation to adopt modern farming techniques and produce for markets. As highlighted in Alsos *et al.* (2003) and Kahan (2013), there is little future for rural households unless they become more entrepreneurial in the way they run their farms by developing a business mind-set. The question, therefore, pertains to the extent to which access to social grants inhibit or enhance farm entrepreneurship development among households. This study aimed to address some of these pertinent issues.

1.3 Research objectives

The main research objective of the study is to examine the impact of South Africa's social grants on rural households' incentives to farm, technology adoption, market participation and farm entrepreneurship. Specifically, the study seeks to achieve the following research objectives:

1) To assess the extent to which access to, and level of dependency on, social grants affect rural households' incentives to farm;
2) To investigate the impact of access to, and level of dependency on, social grants on smallholder farmers' investment in modern technologies;
3) To examine the effect of access to, and level of dependency on, social grants on the market participation levels of the farmers; and
4) To investigate the extent to which access to, and level of dependency on, social grants influence rural households' entrepreneurship levels.

1.4 Organisation of the thesis

The thesis is organised into seven chapters. This includes the introductory and concluding chapters, a brief literature review chapter and four empirical chapters. The introductory chapter has given the general study background, motivated the research problem and presented the objectives of the study. The second chapter provides a brief overview of the literature on smallholder farming and social grants in South Africa. After defining smallholder farming, the chapter discusses the history and current state of social grants in South Africa. A brief discussion of the empirical literature that has investigated the various dimensions of social grants impacts is presented in the same chapter. Chapter 2 also presents the site description, as well as the sampling and data collection tools. Since all the empirical chapters depend on the same data set that was collected in four districts in the KwaZulu-Natal province, the study area description was only presented in Chapter 2 and all the other empirical chapters refer to it. Chapters 3 to 6 comprise the four empirical chapters of the thesis. The detailed descriptive summary of the households was given in Chapter 3 while other chapters presented brief discussions. This was done to reduce repetition across the chapters. It must be noted, however, that, while efforts were made to minimise repetitions, the nature of the thesis presentation is such that repetition is inevitable.

Chapter 3 investigates the impact of social grants on the incentives to farm, using two proxies. The chapter discusses the agricultural household model as the theoretical basis of the analysis. Several econometric methods (such as the logit transformation technique, Papke and Wooldridge (1996) model and the propensity score matching method) used for robustness checks are presented in this chapter. The chapter then presents the results on the extent to which social grants affect the proportion of land area cultivated by the farmers and on the proportion of working age household members that participate in smallholder farming activities. The focus of Chapter 4 is on the extent to which social grants relieve liquidity constraints and improve chemical fertiliser use among smallholder farmers. Grounded on the random utility framework, the chapter analyses data using the double-hurdle model and presents the results and discussions.

Chapter 5 deals with the potential disincentives of social grants on smallholder commercialisation and is informed by the theory of farm household decision-making under imperfect markets. The last empirical chapter, Chapter 6, focuses on the question of whether or not social grants enhance or inhibit farm entrepreneurship development among rural households. The chapter adopts the competency approach and highlights the level and determinants of entrepreneurship in the rural areas. Chapter 7 concludes the thesis with a presentation of the main findings of the study, policy recommendations and implications for further research.

References

Abdulai, A., Barrett, C.B. and Hoddinot, J. 2005. Does food aid really have disincentive effects? New evidence from sub-Saharan Africa. *World Development* 33 (10):1689-1704.

Abel, M. 2013. Unintended labour supply effects of cash transfer programmes: Evidence from South Africa's old age pension. Cape Town: University of Cape Town.

Aliber, M. and Hall, R. 2012. Support for smallholder farmers in South Africa: Challenges of scale and strategy. *Development Southern Africa* 29 (4):548-562.

Aliber, M. and Hart, T.G.B. 2009. Should subsistence agriculture be supported as a strategy to address rural food insecurity? *Agrekon* 48 (4):434-458.

Alsos, G.A., Ljunggren, E. and Toril, P.L. 2003. Farm-based entrepreneurs: What triggers the start-up of new business activities? *Journal of Small Business and Enterprise Development* 10 (4):435-443.

Andrew, M., Ainslie, A. and Shackleton, C. 2003. Evaluating land and agrarian reform in South Africa: Land use and livelihoods. Cape Town: Programme for Land and Agrarian Studies (PLAAS), University of the Western Cape.

Ardington, C., Bärnighausen, T., Case, A. and Menendez, A. 2013. Social protection and labour market outcomes of youth in South Africa. Cape Town: University of Cape Town.

Ardington, C., Case, A. and Hosegood, V. 2009. Labour supply responses to large social transfers: Longitudinal evidence from South Africa. *American Economic Journal: Applied Economics* 1 (1):22-24.

Barrett, C.B. 2006. Food aid's intended and unintended consequences. Background paper for FAO State of Food and Agriculture 2006. Ithaca, NY: Cornell University.

Barrett, C.B. and Maxwell, D.G. 2005. *Food aid after fifty years: Recasting its role.* New York: Routledge.

Barrientos, A., Møller, V., Saboia, J., Lloyd-Sherlock, P. and Mase, J. 2013. 'Growing' social protection in developing countries: Lessons from Brazil and South Africa. *Development Southern Africa* 30 (1):54-68.

Bertrand, M., Mullainathan, S. and Miller, D. 2003. Public policy and extended families: Evidence from pensions in South Africa. *World Bank Economic Review* 17 (1):27-50.

Bezu, S. and Holden, S. 2008. Can food-for-work encourage agricultural production? *Food Policy* 33 (6):541-549.

Biénabe, E. and Vermeulen, H. 2011. Improving smallholders' market participation: Insights from a business scheme for maize in Limpopo Province, South Africa. *Development Southern Africa* 28 (4):493-507.

Brockerhoff, S. 2013. Monitoring the progressive realisation of socio-economic rights: A review of the development of social security policy in South Africa. Johannesburg: Studies in Poverty and Inequality Institute (SPII).

Burns, J., Edwards, L. and Pauw, K. 2013. Revisiting wage subsidies: How pro-poor is a South African wage subsidy likely to be? *Development Southern Africa* 30 (2):186-210.

DAFF. 2011. South African agricultural production strategy. Pretoria: DAFF (Department of Agriculture, Forestry and Fisheries).

DAFF. 2012. A framework for the development of smallholder farmers through cooperatives development. Pretoria: DAFF (Department of Agriculture, Forestry and Fisheries).

DAFF. 2013. Strategic Plan for Smallholder Support (SPSS). Pretoria: Department of Agriculture, Forestry and Fisheries (DAFF).

DED. 2011. *The New Growth Path: Framework*. Pretoria: DED (Department of Economic Development). Available at: http://www.economic.gov.za/communications/publications/new-growth-path-series [Accessed 25 August 2015].

Devereux, S. 2001. Social pensions in Namibia and South Africa. IDS Discussion Paper 379. Brighton: Institute of Development Studies.

Devereux, S. 2002. Can social safety nets reduce chronic poverty? *Development Policy Review* 20 (5):657-675.

Devereux, S. 2013. Trajectories of social protection in Africa. *Development Southern Africa* 30 (1):13-23.

Eastwood, R., Kirsten, J. and Lipton, M. 2006. Premature deagriculturalisation? Land inequality and rural dependency in Limpopo province, South Africa. *The Journal of Development Studies* 42 (8):1325-1349.

Fanadzo, M., Chiduza, C. and Mnkeni, P.N.S. 2010. Overview of smallholder irrigation schemes in South Africa: Relationship between farmer crop management practices and performance. *African Journal of Agricultural Research* 5 (25):3514-3523.

Garcia, M. and Moore, C.M.T. 2012. The cash dividend: The rise of cash transfer programs in Sub-Saharan Africa. Washington DC: The World Bank.

Handa, S., Davis, B. and Stewart, S. 2012. Can Africa afford child support grants? Simulation analyses from 4 countries. Maputo: IESE.

Hazell, P., Poulton, C., Wiggins, S. and Dorward, A. 2010. The future of small farms: Trajectories and policy priorities. *World Development* 38 (10):1349-1361.

Herrington, M., Kew, J. and Kew, P. 2015. *GEM (Global Entrepreneurship Monitor) South Africa Report 2014. South Africa: The crossroads – a goldmine or a time bomb?* Available at: http://www.gemconsortium.org/country-profile/108 [Accessed 1 December 2015].

Hlongwane, J.J., Ledwaba, L.J. and Belete, A. 2014. Analyzing the factors affecting market participation of maize farmers: A case study of small-scale farmers in greater Giyani local municipality of the Mopani district, Limpopo province. *African Journal of Agricultural Research* 9 (10):895-899.

Jari, B. and Fraser, G.C.G. 2013. An analysis of institutional and technical factors influencing agricultural marketing amongst smallholder farmers in the Kat River Valley, Eastern Cape Province, South Africa. *African Journal of Agricultural Marketing* 1 (1):16-23.

Kahan, D. 2013. Farm management extension guide: Entrepreneurship in farming. Rome: Food and Agriculture Organization of the United Nations (FAO).

Klasen, S. and Woolard, I. 2008. Surviving unemployment without state support: Unemployment and household formation in South Africa. *Journal of African Economies* 18 (1):1-51.

Lentz, E., Barrett, C.B. and Hoddinott, J. 2005. Food aid and dependency: Implications for emergency food security assessments. IFPRI Discussion Paper No. 12-2. Washington, DC: IFPRI.

Mabugu, R., Chitiga, M., Fofana, I., Abidoye, B. and Mbanda, V. 2014. Assessing the general equilibrium effects of social grants in South Africa. *Paper presented at the 17th Annual Conference on Global Economic Analysis "New Challenges in Food Policy, Trade and Economic Vulnerability"*, Dakar, Senegal, 18-20 June 2014.

Mabuza, M.L., Hendriks, S.L., Ortmann, G.F. and Sithole, M.M. 2009. The impact of food aid on maize prices and production in Swaziland. *Agrekon* 48 (1):85-105.

Makhura, M.T. 2001. *Overcoming transactions costs barriers to market participation of smallholder farmers in the Northern Province of South Africa.* PhD thesis, University of Pretoria.

Maponya, P., L.Venter, S., Modise, D., Van Den Heever, E., Kekana, V., Ngqandu, A., Ntanjana, N. and Pefile, A. 2015. Determinants of agricultural market participation in the Sarah Baartman District, Eastern Cape of South Africa. *Journal of Human Ecology* 50 (1):1-9.

Martinez, S. 2004. *Pensions, poverty and household investments in Bolivia*. California: Berkeley University of California. Available at: http://eml.berkeley.edu/~webfac/bardhan/e271_f04/martinez.pdf [Accessed 20 June 2015].

McElwee, G. and Bosworth, G. 2010. Exploring the strategic skills of farmers across a typology of farm diversification approaches. *Journal of Farm Management* 13 (12):819-838.

Midgley, J. 2013. Social development and social protection: New opportunities and challenges. *Development Southern Africa* 30 (1):2-12.

Murovhi, N.R., Materechera, S.A. and Mkhabela, T.S. 2011. Socio-economic determinants of small-scale farmers' fruit trees leaf litter utilization for soil fertility management in a sub-tropical environment: The case of Mpumalanga, South Africa. *African Journal of Agricultural Research* 6 (32):6674-6683.

Neves, D., Samson, M., van Niekerk, I., Hlatshwayo, S. and du Toit, A. 2009. The use and effectiveness of social grants in South Africa. Cape Town: Institute for Poverty, Land and Agrarian Studies (PLAAS) and Economic Policy Research Institute (EPRI).

NPC. 2012. *Our future-make it work: National Development Plan 2030*. Pretoria: NPC (National Planning Commission). Available at: http://www.info.gov.za/issues/national-development-plan [Accessed 9 October 2013].

Odhiambo, J.J.O. and Magandini, V.N. 2008. An assessment of the use of mineral and organic fertilizers by smallholder farmers in Vhembe district, Limpopo province, South Africa. *African Journal of Agricultural Research* 3 (5):357-362.

Ortmann, G.F. and King, R.P. 2010. Research on agri-food supply chains in Southern Africa involving small-scale farmers: Current status and future possibilities. *Agrekon* 49 (4):397-417.

Perret, S. 2002. Water policies and smallholding irrigation schemes in South Africa: A history and new institutional challenges. *Water Policy* 4 (3):283-300.

Posel, D., Fairburn, J.A. and Lund, F. 2006. Labour migration and households: A reconsideration of the effects of the social pension on labour supply in South Africa. *Economic Modelling* 23 (5):836-853.

Potts, R. 2012. Social welfare in South Africa: Curing or causing poverty? *Pennsylvania State University Journal of International Affairs* 1 (2):74-92.

Raleting, P.M. and Obi, A. 2015. An analysis of institutional factors influencing vegetable production amongst small-scale farmers in six vegetable projects of the Nkonkobe Local Municipality. *Journal of Agricultural Science* 7 (6):184-196.

Samson, M. 2009. Social cash transfers and employment: A note on empirical linkages in developing countries. Paris: The Organisation for Economic Co-operation and Development (OECD).

Samson, M., Lee, U., Ndlebe, A., Quene, K.M., van Niekerk, I., Gandhi, V., Harigaya, T. and Abrahams, C. 2004. The social and economic impact of South Africa's social security system. Summary Report. Cape Town: Economic Policy Research Institute.

Samson, M., MacQuene, K. and van Niekerk, I. 2006. Social grants, South Africa. Inter-Regional Inequality Facility. London: Overseas Development Institute.

SASSA. 2014. *Fact sheet: Issue no 12 of 2014. A statistical summary of social grants in South Africa*. Pretoria: South Africa Social Security Agency (SASSA). Available at: http://www.sassa.gov.za/index.php/statistical-reports [Accessed 28 June 2015].

Senyolo, G.M., Chaminuka, P., Makhura, M.N. and Belete, A. 2009. Patterns of access and utilization of output markets by emerging farmers in South Africa: A Factor Analysis Approach. *African Journal of Agricultural Research* 4 (3):208-214.

Sharaunga, S. and Wale, E. 2013. The dis-incentive effects of food aid and agricultural policies on local land allocation in developing countries: The case of Malawi. *Development Southern Africa* 30 (4-5):491-507.

Sishuta, B. 2005. Small-scale irrigation development for sustainable rural development: A case study of the Tyhefu irrigation scheme. *African Sociological Review* 9 (2):184-206.

Stats SA. 2012. GHS Series, volume IV, Food security and agriculture, 2002–2011: In-depth analysis of the General Household Survey data. Pretoria: Statistics South Africa.

Surender, R., Noble, M., Wright, G. and Ntshongwana, P. 2010. Social assistance and dependency in South Africa: An analysis of attitudes to paid work and social grants. *Journal of Social Policy* 39 (2):203-221.

Tadesse, G. and Shively, G. 2009. Food aid, food prices and producer disincentives in Ethiopia. *American Journal of Agricultural Economics* 3:123-145.

Tshuma, M.C. 2012. A review of the poverty and food security issues in South Africa: Is agriculture the solution? *African Journal of Agricultural Research* 7 (28):4010-4020.

Ulriksen, M. 2013. The politics of social protection expenditure and financing in southern Africa. *Development Southern Africa* 30 (1):39-53.

van der Berg, S., Siebrits, K. and Lekezwa, B. 2010. Efficiency and equity effects of social grants in South Africa. Cape Town: University of Stellenbosch.

van der Heijden, T. and Vink, N. 2013. Good for whom? Supermarkets and small farmers in South Africa: A critical review of current approaches to increasing access to modern markets. *Agrekon* 52 (1):68-86.

Vincent, K. and Cull, T. 2009. Impacts of social cash transfers: Case study evidence from across southern Africa. *Paper presented at the II Conferencia do IESE "Dinamicas da Pobreza e Padrões de Acumulação em Moçambique"*, Maputo, 22-23 April 2009.

Vink, N. and van Rooyen, J. 2009. The economic performance of agriculture in South Africa since 1994: Implications for food security. Working Paper Series No 17. Midrand, Pretoria: Development Bank of Southern Africa (DBSA).

White, H. and Killick, T. 2001. African poverty at the millennium, causes, complexities and challenges. Strategic Partnership with Africa. Washington D.C: World Bank.

Whitworth, A. and Wilkinson, K. 2013. Tackling child poverty in South Africa: Implications of ubuntu for the system of social grants. *Development Southern Africa* 30 (1):121-134.

Williams, M.J. 2007. The social and economic impacts of South Africa's Child Support Grant. Cape Town: Economic Policy Research Institute.

World Bank. 2008. World Bank Report 2008: Agriculture for development. Washington D.C: The World Bank.

Zembe-Mkabile, W., Surender, R., Sanders, D., Jackson, D. and Doherty, T. 2015. The experience of cash transfers in alleviating childhood poverty in South Africa: Mothers' experiences of the Child Support Grant. *Global Public Health* 10 (7):834-851.

CHAPTER 2 AN OVERVIEW OF SMALLHOLDER FARMING AND SOCIAL GRANTS IN SOUTH AFRICA

2.1 Introduction

This chapter presents a literature review on the empirical link between smallholder farming and social grants. The chapter begins by outlining the characteristics of smallholder farming in South Africa. It presents a definition of social protection and gives an overview of social protection globally, but with a focus on Sub-Saharan African (SSA). The review indicates that there is a growing interest in social grants in SSA and that South Africa has the biggest cash transfer-based social security system in the region. After presenting the historical background and current state of social grants in South Africa, the chapter presents empirical studies that have linked social grants to different outcomes (e.g., poverty, nutrition and schooling). While there is general consensus that social grants play a significant role in poverty reduction, the review demonstrates that there is no such agreement on whether social grants have created negative incentives on people's economic behaviour in South Africa. In general, the review presented in this chapter indicates that the potential linkages between social grants and smallholder farming activities have not been adequately addressed. The chapter also presents the study area description as well as the sampling and data collection tools.

2.2 The nature of smallholder farming in South Africa

The agricultural sector in South Africa consists of three distinct groups: the large-scale commercial, the emerging and the smallholder farmers (Stats SA, 2012c). The large-scale commercial farming sector is well-developed and connected to markets and farmers in the sector often have large land holdings, human capital, finance and modern technology (Aliber and Hart, 2009). At the other extreme, the smallholder farming sector is predominantly subsistence-based, characterised by lack of productive assets, poor access to markets and use of out-of-date technology (Senyolo *et al.*, 2009; Ortmann and King, 2010; DAFF, 2012; van der Heijden and Vink, 2013; Thamaga-Chitja and Morojele, 2014; Aliber and Mdoda, 2015). Terms used to describe smallholder farmers in South Africa include small-scale farmers, resource-poor farmers, peasant farmers, food deficit farmers and household food security farmers (Machethe *et al.*, 2004; Aliber and Hall, 2012; DAFF, 2012; Aliber and Mdoda, 2015).

The emerging farming sector is sandwiched between the commercial farming and smallholder farming sectors, is slightly more advanced than the smallholder farmer and holds more production assets (Stats SA, 2012c). This group, which is made up of mostly black land reform beneficiaries, struggles to scale up production and has difficulty in getting connected to markets (van Schalkwyk *et al.*, 2012). The emerging farming category is generally referred to as a sub-category of smallholder farmers (Machethe *et al.*, 2004; Aliber and Hall, 2012; Aliber and Mdoda, 2015). In South Africa, the criteria to classify farmers into different categories are not only based on land size, purpose of production (subsistence or commercial) and income level (whether poor or rich), but also on the racial group of the farmer (Fanadzo, 2012). For example, black farmers remain known as emerging, even though they might have reached commercial level status (Aliber and Hall, 2012; Aliber and Mdoda, 2015).

It is generally accepted that the divide between large-scale commercial farms and smallholder farms in South Africa is a legacy of the racially discriminatory policies of the past (van Averbeke, 2008; Vink and van Rooyen, 2009). The policies during the apartheid era were biased towards the white-dominated large-scale farms, while inhibiting agricultural growth and development among the black-dominated smallholder farms (Vink and van Rooyen, 2009). Smallholder agriculture, involving both crop and livestock production, forms the basis of rural people's livelihood and plays a significant role in the welfare of the poor. Smallholder farmers generally produce crops such as maize, beans, cabbages, potatoes, tomatoes, onions, beetroot, spinach and butternut and sell very little of their produce. Post-harvest losses are relatively great. Most of the crops are grown under dryland conditions, while other farmers are members of smallholder irrigation schemes scattered around the country's provinces.

The fact that the market-oriented part is dominated by white farmers and the subsistence part by black farmers is a cause for concern from a political perspective (Backeberg, 2006). There is a political desire to improve the productivity, profitability, commercialisation and sustainability of smallholder agriculture in South Africa (Backeberg, 2006; Denison and Manona, 2007; DAFF, 2013). However, the success of government support depends upon whether the farmers respond positively to the stimuli from policy interventions. Social protection measures, such as social grants, may reduce the motivation of the farmers. The next section defines social protection and provides a brief discussion of it in the SSA region.

2.3 Overview of social protection programmes in Sub-Saharan Africa

Social protection may be described broadly as initiatives, public or private, that provide income or consumption support to the poor, protect the vulnerable against livelihood risks and enhance the social status and rights of the marginalised (Ellis *et al.*, 2009; Ulriksen, 2012). In other words, social protection involves targeted transfers aimed at fulfilling the basic needs of the poor, vulnerable and marginalised, as well as empowering them (Ulriksen, 2012). There are three forms of social protection that are usually implemented. These are social insurance, social grants and informal insurance (van der Berg *et al.*, 2010). Social insurance describes the contributory funds that are organised by the state and funded by contributions by employers and employees. Social grants, or assistance, on the other hand, are non-contributory transfers that are usually targeted to the most needy. Informal insurance refers to the cash or in-kind assistance from social networks such as extended families or friends.

Spending on social protection programmes is larger, in both absolute and relative terms, in the developed countries compared to developing countries (World Bank, 2006). According to the World Bank (2006), industrialised countries redistribute a large share of their Gross Domestic Product (GDP) through social protection programmes (about 19% of GDP in the European Union, and 9% of GDP in the United States). Social insurance is the most dominant form of social security in the developed countries. The World Bank (2006) reported that 85% of total social security expenditure among industrialised countries is social insurance, with the remaining 15% being social grants. To discourage dependency on social grants, the industrialised countries have not only reduced the amounts and duration of benefits from social grants, but have also introduced stringent requirements on the beneficiaries (for example, beneficiaries should seek work actively to qualify for the support) (van der Berg *et al.*, 2010). In the developing countries, in general, and Sub-Saharan Africa, in particular, the issue of social protection is now firmly on the development agenda. Several countries having introduced or extended social protection policies since the mid-1990s (Handa *et al.*, 2012; Patel *et al.*, 2013b; Ulriksen, 2013). These developing countries have introduced or extended social assistance programmes, be they safety nets, poverty targeted transfers or categorical provisions such as social pensions (Ulriksen, 2013).

As highlighted in Hidrobo *et al.* (2012), several design questions should be answered when planning social transfer interventions, e.g., Who should receive benefits? How much should be given and with what frequency? How should targeting mechanisms be designed and enforced

to make sure that unintended beneficiaries are excluded? How long benefits should be provided? What form of assistance should be provided? What conditions should be attached? What are the cost effectiveness of different design options? The form of social assistance, i.e., whether to provide assistance in the form of cash transfers or deliver physical quantities of food or other in-kind services, has been subject to debate in literature (Devereux, 2006; Devereux and Sabates-Wheeler, 2007; Grosh *et al.*, 2008; Hidrobo *et al.*, 2012). The use of cash transfers, conditional or unconditional, is gaining popularity as an effective intervention among the developing countries to reduce inequality, social exclusion and chronic poverty as well as to enhance the poor's participation in economic development (Garcia and Moore, 2012; Handa *et al.*, 2012).

According to Garcia and Moore (2012), over 30 countries in the developing world have implemented cash transfer schemes as the cornerstone of poverty reduction and social protection efforts. The cash transfers are preferred to in-kind (food) transfers not only because they generate the largest welfare gains because they allow beneficiaries to use these transfers as they see fit but because they are also less costly to administer (Devereux, 2006; Hidrobo *et al.*, 2012). Moreover, in-kind (food) transfers may distort the market adversely for smallholder farmers. For example, the increased supply of food may result in decreased local prices, dis-incentivising the smallholder farmers to produce. On the other hand, the cash transfers may have a positive effect when food markets are not integrated because the injection of cash may cause food prices to rise. It should be noted that these arguments would be reversed if one is talking about non-beneficiary consumers who benefit when local food prices are low and lose when prices are high. However, targeting is easier when providing in-kind transfers than when cash is used. According to Hidrobo *et al.* (2012), whereas it is difficult or very costly to identify beneficiaries, in-kind transfers are advantageous because only those truly in need will take up these in-kind benefits.

Popular examples of conditional cash transfers include Mexico's *Oportunidades* (formerly PROGRESSA), and Brazil's *Bolsa Escola*. Both of these programmes allocate monthly transfers to poor families with children, conditional on household health-related behaviour (Case *et al.*, 2005). The random roll-out of these transfers has made them very popular among academic analysts, as they have afforded them purposefully randomised treatment and control groups (Case *et al.*, 2005; Garcia and Moore, 2012). For example, *Progresa* was implemented by randomly selecting rural areas to receive the cash transfer treatment, making it possible to

use solid study methodology and rigorous analysis (Agüero *et al.*, 2007; Garcia and Moore, 2012). However, use of the experimental or randomised designs is not applicable when studying social grants in South Africa because the social grants are not randomly distributed but are a targeted intervention (Patel *et al.*, 2013a). The social grants in South Africa are targeted to households with assets and income values below a certain threshold (Patel *et al.*, 2013a). The assignment of social grants to households reflects the purposive placement due to the administrative requirements as well as the choices made by those eligible, such that assuming that they are random is untenable (Ravallion, 2008; Patel *et al.*, 2013a).

There has been a growing body of quality evaluations of the randomised programs in Latin America (de Janvry and Sadoulet, 2005; de Janvry *et al.*, 2006; de Janvry and Sadoulet, 2006; de Brauw and Hoddinott, 2011). This literature demonstrates the outcomes and identifies challenges in implementation and documenting the need for linking programmes to other safety nets (Garcia and Moore, 2012). The impact of these conditional social cash transfer programmes on different outcomes, such as school attendance, nutrition and health, has been found to be very positive (de Janvry and Sadoulet, 2005; de Janvry *et al.*, 2006; de Janvry and Sadoulet, 2006; de Brauw and Hoddinott, 2011). Consequently, a number of the studies (e.g., de Janvry and Sadoulet, 2006; de Brauw and Hoddinott, 2011) have suggested that conditional cash transfer programmes are more effective than unconditional transfers.

According to de Janvry and Sadoulet (2005), a number of other countries, especially in Africa, are considering adoption of the conditional transfer approach due to the reported successes. However, the choice of the approach should be informed by the objective of the transfer programme (de Janvry and Sadoulet, 2005). According to the study by de Janvry and Sadoulet (2005), unconditional transfers should be implemented if the main objective is reducing immediate poverty, while conditional transfers should be introduced for long-term outcomes. In South Africa, Woolard and Leibbrandt (2010) argued against imposing behavioural conditions to social grants, stressing that these would be too costly to monitor and enforce.

There is a growing interest in cash transfers among governments and donors in SSA. Many countries in SSA have piloted and/or introduced social cash transfers (Vincent and Cull, 2009; Ulriksen, 2013). A review by Garcia and Moore (2012) identified more than 120 cash transfer programmes that were implemented between 2000 and mid-2009 in SSA. These programmes vary significantly in terms of their objectives, targeting, scale, conditions and technologies (Garcia and Moore, 2012). Swaziland and Lesotho introduced a non-contributory, universal

and government-funded old age pension in 2005, despite both countries having limited social protection legislations (Vincent and Cull, 2009; Ulriksen, 2013).

Namibia has the child maintenance grant, disability grant and old age pensions, which have been expanded significantly in the past decade. For example, the child maintenance grant has increased 10-fold since 2003 in Namibia (Ulriksen, 2013). Botswana has an old age pension which benefits the elderly (Ulriksen, 2012). South Africa has the most comprehensive state-led system of cash transfer-based social protection in SSA, followed by Ethiopia's Productive Safety Net Programme (Devereux, 2001; Zibagwe *et al.*, 2013). In fact, Brazil and South Africa have the largest non-contributory pension programmes in the world (Barrientos, 2003). Countries such as Malawi, Zambia and Zimbabwe have donor-driven social assistance, while other countries fund their social grant systems using government revenue from natural resources or taxes (Garcia and Moore, 2012; Ulriksen, 2013).

A characteristic of the social assistance system in SSA is that it is generally aimed at vulnerable individuals such as the old, young or chronically sick. Mauritius is the only SSA country that caters for the working age with a government-funded and strictly targeted unemployment benefit (Ulriksen, 2013). The cash transfers in the SSA region generally benefit a few people, with the exception of South Africa and Namibia. For example, social transfers are of little relevance to most people in Botswana, as the old age pension is insufficient to cover monthly costs, such that even the elderly must find additional resources to survive (Ulriksen, 2012). The next section discusses the historical background, types and coverage of social grants in South Africa.

2.4 The historical background, nature and coverage of social grants in South Africa

The social security system in South Africa is made up of two pillars: (1) a state revenue-funded social assistance programme (social grants) and (2) a contributory social insurance (Brockerhoff, 2013). This study focuses on the non-contributory social grants system, as the contributory social insurance pillar of social security benefits only those who are formally employed (Woolard and Leibbrandt, 2010; Brockerhoff, 2013). The following subsections discuss the historical background, objectives, types and coverage of the social grants in South Africa.

2.4.1 Historical background of social grants in South Africa

Social grants were introduced in the early 1900s in South Africa. These social grants were racially differentiated, and were meant to meet only the needs of the white minority (van der Berg, 1997; Bertrand *et al.*, 2003; Triegaardt, 2005; Brockerhoff, 2013). The Old Age Pensions Act of 1928, for instance, introduced to provide social security for the elderly, explicitly excluded blacks. Similarly, grants for the blind (1936), grants for the disabled (1937), pensions for war veterans (1941) and family allowances for large poor families (1947) were largely implemented on the basis of race (van der Berg *et al.*, 2010). When social grants were extended to include blacks from the 1940s, the blacks were awarded very smaller amounts compared to whites (Barrientos, 2003).

The desire by the apartheid government to give credibility to their highly discredited separate development policies resulted in social assistance moving towards equality in the 1980s (van der Berg *et al.*, 2010). The apartheid government was making efforts to legitimise the homeland system and the three-chamber parliament (which consisted of white, coloured and Indian chambers) (van der Berg, 1997; van der Berg *et al.*, 2010). To close the gap, the benefits of the whites were decreased, while those of blacks were increased, especially with regards to the old age pension. As a result, the size of the old age state pension was almost equal among racial groups by 1993, a year before democratic elections (Bertrand *et al.*, 2003; Case *et al.*, 2005). Policy reforms to eliminate discrimination in eligibility and benefit levels, completed in 1996 with the introduction of non-discriminatory regulations, resulted in a gradual move towards parity in benefits (Barrientos, 2003; Barrientos *et al.*, 2013).

The advent of the democratically elected government in 1994 came with the challenge to address the mandate of the new constitution. The constitution explicitly stated that everyone had the right to have access to social security, including, if they are unable to support themselves and their dependents, appropriate social assistance (Armstrong and Burger, 2009). The challenge in meeting the constitutional mandate was that the benefit levels previously given to the white minority were high and universalising them was not fiscally sustainable (Brockerhoff, 2013). Therefore the current social grants system is a result of several stages of adaptation and reforms of the apartheid era programmes inherited by the democratic government. The apartheid-era roots of South Africa's social security system, where the objective was to protect only the white minority, has led to a comprehensive social assistance system, which is huge, even by middle-income standards (Armstrong and Burger, 2009; van der Berg *et al.*, 2010).

South Africa's social security system is well-developed, and compares very well with the those of developed countries (Armstrong and Burger, 2009). However, it must be highlighted that, despite being comprehensive, the current system of social grants does not meet the constitutional obligation to provide social assistance to those who are unable to help themselves and their dependents. The constitutional obligation requires progressive realisation or movement towards universal coverage (Brockerhoff, 2013).

2.4.2 Objectives of the social grants programme

The government's White Paper for Social Welfare of 1997 (RSA, 1997) outlines the main objectives of the social grants system in South Africa. The main objective of social grants is to reduce poverty among vulnerable groups, such as the elderly, those with disabilities and children (RSA, 1997; Woolard and Leibbrandt, 2010). These groups are not expected to participate fully in the labour market and are thus vulnerable to low income. The other stated objective of social security is to increase investment in health, education and nutrition, to increase economic growth and development (RSA, 1997; Samson *et al.*, 2006). Social grants are also seen as a viable mechanism for active redistribution. In fact, according to the White Paper, poverty and inequality reduction are the key agenda for the social welfare policies and programmes in South Africa (RSA, 1997).

The White Paper emphasised the importance of creating human capacities and the concept of developmental social welfare. The main feature of developmental social welfare is that social development and economic development are interdependent and mutually reinforcing (Brockerhoff, 2013). This development approach is not just concerned with the transfer of resources from the productive economy to the welfare services, but also prioritises the contribution of social policy to development (RSA, 1997; Brockerhoff, 2013). It is against this background that studies such as those of Devereux (2002) and Mabugu *et al.* (2013) have reported that social grants are no longer considered as just livelihood protection interventions, but as livelihood promotion measures. The expectation is that social grants would promote livelihoods and enhance economic activities by easing the financial constraints facing the poor -the so-called 'irrigation function' of social security (Lund, 2002; Woolard, 2003). This enables a longer-term and more sustainable improvement in living standards (Woolard, 2003; Mabugu *et al.*, 2013). The next sub-section presents the current social grant types and the extent of their coverage.

2.4.3 Types and coverage of social grants in South Africa

The social assistance programme in South Africa currently comprises seven different grants: the Old Age Grant (OAG), Child Support Grant (CSG), Disability Grant (DG), War Veterans' Grant (WVG), Foster Care Grant (FCG), Care Dependency Grant (CDG), and Grant-in-Aid (GIA) (RSA, 2004b). The OAG provides support to old people who are over the age of 60, while the DG provides support to adults with disabilities. The CSG provides support to households with children under the age of 18, and the FCG provides support to households taking care of foster children. The CDG provides additional support to families with disabled children who are below the age of 18. The WVG supports people who are disabled or older than 60 who served in the Second World War or the Korean War. The GIA is for people receiving the OAG, DG or WVG who require full-time care because of physical or mental disability.

There are no explicit behaviour conditionalities associated with these social grants, unlike the conditional cash transfer programmes in other developing countries, such as Mexico and Brazil (Samson *et al.*, 2006). Not only do the transfers come with no strings attached, but they are also without any in-kind transfers (Agüero *et al.*, 2007). The unconditional cash transfer programmes are premised on the ideal that people know best how to spend resources to

maximise their welfare and that setting conditionalities results in increased administrative, monitoring and enforcement costs (Abel, 2013; Zembe-Mkabile *et al.*, 2015). The social grants in South Africa are financed through general tax revenues, collected on a national basis. Eligibility for social grants is currently dependent on an income and asset-based means test, which varies according to the grant, the marital status of the beneficiary and other characteristics (Zembe-Mkabile *et al.*, 2015). However, in practice, only the income criterion is used in the means test, due to difficulties with the evaluation of assets (Abel, 2013). While the benefit entitlements are means tested on the income of the individual beneficiary, and his/her partner if married, the income of other household members is not considered.

These social grants are paid to each qualifying individual, meaning that some beneficiary households may receive several grants, while others receive only one. Since there are differences in the number of people in households across the population, the absolute and relative magnitude of the social grants income varies substantially across households (Samson *et al.*, 2008). The social grants are delivered each month in cash at specific pay point locations or via electronic deposit if the recipient has a bank account. There were over 16.4 million beneficiaries of these different grants by the end of 2014 (SASSA, 2014). Table 2.1 shows the total number of beneficiaries by grant type as of 31 December 2014. The amounts paid to individual beneficiaries per month are also presented in the table.

Table 2.1: Total number of social grant beneficiaries and amounts paid per individual beneficiary by grant type, as at 31 December 2014

Grant type	Number of beneficiaries	Amount paid per beneficiary per month (Rands)
OAG	3 053 440	1 350*
CSG	11 574 493	320
DG	1 127 867	1 350
WVG	353	1 370
FCG	455 946	830
CDG	126 010	1 350
GIA	105 087	320
Total	**16 443 196**	**-**

Notes: * Beneficiaries older than 75 received R1,370 per month

Source: SASSA (2014)

Table 2.1 shows that at the end of 2014, the CSG was the largest social assistance programme in South Africa in terms of the number of beneficiaries. However, the CSG paid the least amount to individual beneficiaries, paying an amount of R320 per month to the main caregiver

of a child who is 18 or younger. To qualify, the caregiver needed to earn less than R38 400 (if single) or R76 800 (combined income if married) per year. The CSG has expanded markedly in recent years. While it was only available to children aged 0 to 14 years in 2009, the age of eligibility was increased to include children up to the age of 18 years from 2010 (Tiberti *et al.*, 2013). Table 2.1 indicates that the second largest social grant in terms of number of beneficiaries was the OAG. The OAG paid an amount of R1 350 per month for people over 60, and R1 370 per month for beneficiaries older than 75. In order to access the grant, a recipient was required not to individually earn more than R61 800 a year or not to have a combined household income of R123 600 a year if married.

Despite these income-based means tests, more than 90% of black South Africans are eligible to receive the grant once they turn 60 years old (Abel, 2013). According to Abel (2013), the OAG is as good as an universal, unconditional cash transfer programme targeted at seniors. Table 2.1 also shows a significant number of DG beneficiaries. The DG has the same means test as the OAG. However, DG recipients must also pass the medical eligibility criteria. There are no means tests for FCG and GIA, as the means tests were removed in 2012 (Brockerhoff, 2013). The means tests for WVG and CDG vary slightly from those of the OAG. Table 2.1 shows that most of the social grants are generous in terms of amounts, even by international standards (Case *et al.*, 2005; Abel, 2013). Even though the social grant amounts are modest when compared to the white's average incomes, they are significant when measured against black incomes (Case *et al.*, 2005). For example, the amount for the OAG is almost twice the median per capita income for Africans (Abel, 2013).

The social grants are implemented and administered by a separate national government agency, the South African Social Security Agency (SASSA). Initially, provincial governments were responsible for the implementation and administration of social grants. However, a government review identified a number of problems associated with provincial administration, including fraudulent grants, delays in approving grant applications and difficulties in accessing payment (DSD *et al.*, 2012). As a result, SASSA was established in 2004 to implement and administer social grants (RSA, 2004a). The SASSA is monitored and evaluated by the national Department for Social Development (DSD).

Several studies (e.g., Woolard, 2003; Armstrong and Burger, 2009; van der Berg *et al.*, 2010) have reported that government spending on social grants in South Africa is well-targeted. For example, Woolard (2003) reported that about 70% of the total income of the poorest 20% of

the South African population was social grants, while less than 1% of the income of the richest 20% of the population was social grant income. In terms of coverage, the increase in the number of social grants beneficiaries over the past decade has been remarkable. The number of recipients increased from 2.4 million in April 1998 to approximately 16.4 million in 2014, a percentage increase of over 580% in 16 years (van der Berg *et al.*, 2010; SASSA, 2014). The child support grant has been driving this increase, as the age group was increased from 0-7 years in 1998 to the current 0-18 years (Tiberti *et al.*, 2013).

The level of social assistance spending in South Africa at present is high. In 2014, social assistance spending in South Africa amounted to about 3.5% of GDP (National Treasury, 2015). This is a large proportion, even when compared to that of Western European countries in the 1980s, during the height of the welfare state (Armstrong and Burger, 2009). According to Midgley (2013), the costs of social cash transfers will increase in the near future. The wisdom of this consumption expenditure will be severely questioned, very soon (Midgley, 2013). Given the government's constitutional obligation of ensuring that every citizen has social security, some discussions (Samson *et al.*, 2006; Noble *et al.*, 2008) have focused on the possibility of introducing a universal income grant for working-age adults in South Africa.

Introducing a basic income grant (BIG), as a means of providing social security to all and alleviating poverty, was one of the key proposals of the Taylor Committee (Taylor, 2002). The Taylor Committee recommended that the BIG should benefit everyone in the country, rich and poor. The idea was that the BIG would function as a mechanism to include the unemployed and those working in the informal economy in the social security system (Brockerhoff, 2013). Since the means test would have been removed, it was argued that the BIG would reduce the administrative resources as well as eliminate the economic costs arising from the distortionary nature of the means test (Taylor, 2002; Samson *et al.*, 2006).

The BIG would reduce the current pressure on social grants and would result in these social grants benefitting the specific groups they were designed for (Zembe-Mkabile *et al.*, 2015). It has been reported that people are moving into households in which grants are received (Klasen and Woolard, 2008; Armstrong and Burger, 2009), resulting in increased pressure on social grants in alleviating poverty. This spill-over of social grants to unintended members is a cause for concern, because cash transfers influence the behaviour of recipients and potential recipients in a variety of ways, not all of which are necessarily good (Neves *et al.*, 2009; Handa *et al.*, 2012). The government rejected the BIG on the grounds that it would be too costly to

the fiscus and that they feared it would create a dependency culture (Makino, 2004; Brockerhoff, 2013). The next sub-section presents evidence from literature of the impacts of social grants.

2.5 The impacts of social grants in South Africa: Evidence from the literature

The impact of social grants, some intended and some unintended, on different outcomes have been investigated extensively in South Africa. A wide range of literature has assessed many dimensions of the impact of social grants, such as their intended direct impacts on poverty and income inequality (Barrientos, 2003; Maitra and Ray, 2003; Woolard, 2003; Samson *et al.*, 2004; Armstrong and Burger, 2009; Woolard and Leibbrandt, 2010; Potts, 2012; Ulriksen, 2012); and development outcomes for children such as school attendance (Case *et al.*, 2005; Yamauchi, 2005; Edmonds, 2006; Williams, 2007; Samson *et al.*, 2008; DSD *et al.*, 2012) and nutrition or anthropometric status (Duflo, 2003; Yamauchi, 2005; Agüero *et al.*, 2007; Leroy *et al.*, 2009).

The literature has also investigated the unintended impacts of social grants on outcomes such as non-farm labour supply (Bertrand *et al.*, 2003; Williams, 2007; Ardington *et al.*, 2009; Surender *et al.*, 2010; Abel, 2013; Ardington *et al.*, 2013); attitude towards work (Noble and Ntshongwana, 2008; Noble *et al.*, 2008; Surender *et al.*, 2010); household formation (Posel *et al.*, 2006; Klasen and Woolard, 2008; Whitworth and Wilkinson, 2013); gender and dignity issues (Goldblatt, 2005; Holmes and Jones, 2010; Patel *et al.*, 2012; Patel *et al.*, 2013a; Wright *et al.*, 2015); and teenage pregnancy (Makiwane and Udjo, 2007; Mokoma, 2008; Makiwane, 2010).

2.5.1 The intended impacts of social grants

Armstrong and Burger (2009) investigated the impact of social grants on poverty and inequality in South Africa. They found that social grants had a considerable impact on poverty. However, Armstrong and Burger (2009) found that social grants had a negligible impact on income inequality. This, according to Armstrong and Burger (2009), is because inequality is largely driven by the upper end of the income distribution, a group that does not receive social grants. Even though Armstrong and Burger (2009) found that social grants were effective in pushing poor people closer to the poverty line, they warned that social grants were unable to guarantee

sustainable access to higher levels of income. Therefore, Armstrong and Burger (2009) highlighted the need for alternative strategies in order to achieve a long-term reduction in poverty and inequality in South Africa.

Woolard and Leibbrandt (2010) agreed that social grants had a positive impact on poverty reduction. They found that the reduction in poverty over the post-apartheid period in South Africa was strongly associated with the expansion of social grants. Similarly, Barrientos (2003), after investigating the impact of old age grants on poverty in South Africa and Brazil, concluded that they had a positive impact on poverty reduction in both countries. Maitra and Ray (2003) found that old age grant recipient households had higher expenditure shares, not only on food, but also on education. Maitra and Ray (2003) reported that the old age grant beneficiaries had lower expenditure shares on alcohol, tobacco and entertainment than other households, implying that social grants had not increased expenditure on these adult goods.

With regards to children's outcomes, Agüero *et al.* (2007) estimated the impact of the child support grant (CSG) on child nutrition (measured by child height-for-age). Agüero *et al.* (2007) showed that social grants payments had strengthened early childhood nutrition, as signalled by child height-for-age. They used the continuous treatment method (Hirano and Imbens, 2004), arguing that binary treatment overlooks the fact that the extent of CSG treatment varies significantly across the treated population. Case *et al.* (2005) examined the impact of the child support grant on children's school enrolment. Based on parents' characteristics and household assets, they reported that the grant was reaching those children living in the poorer households.

Case *et al.* (2005) found a positive and significant association between grant receipt and school enrolment. The children who received the grant were significantly more likely to be enrolled in school in the years following grant receipt than are equally poor children of the same age. According to Case *et al.* (2005), this result suggests that the grant may help to overcome the impact of poverty on school enrolment. Edmonds (2006) analysed the impact of the old age grant on schooling decisions, as well as on child labour, and found that access to the grant significantly reduced child labour and increased schooling.

2.5.2 The unintended impacts of social grants

Wright *et al.* (2015) explored women's accounts of how the CSG serves to protect dignity among women and the study results were mixed. The CSG was found to protect dignity in certain important respects. However, other aspects, such as the application process, the low amount of the grant and negative discourses associated with the status of being a CSG recipient were viewed as erosive of dignity. The studies on the impact of the CSG on teenage pregnancy (Makiwane and Udjo, 2007; Mokoma, 2008; Makiwane, 2010) have not found any significant positive association between the grant and teenage pregnancy. The studies have argued that, despite the widespread public perception based on moral and cultural concerns which argues that teenage fertility has increased as a result of the introduction of the CSG, there is no empirical evidence supporting this perceived association.

Whitworth and Wilkinson (2013) and Klasen and Woolard (2008), found that social grants income influenced household formation, with poor people joining social grants recipient households. This suggests that for the poor, household formation may, at least in part, be an active response to economic need in the context of high unemployment and a partial system of social grants (Whitworth and Wilkinson, 2013). While there is consensus that social grants have potential spill-over effects between household members, due to the prevalence of multi-generational households in South Africa (Klasen and Woolard, 2008; Abel, 2013; Whitworth and Wilkinson, 2013), there is no agreement on the impact of social grants on household labour supply.

Some studies (e.g., Posel *et al.*, 2006; Williams, 2007; Ardington *et al.*, 2009; Ardington *et al.*, 2013) have concluded that additional income from social grants has a positive impact on employment by easing the constraints associated with job search. Other studies (e.g., Bertrand *et al.*, 2003; Abel, 2013) concluded that social grants reduce incentives to work, as the additional income from social grants causes household members to work less and take additional leisure. In general, most of these labour supply studies have focused on the impact of the old age grant due to its relatively high amount and wide coverage.

For example, Abel (2013) analysed the impact of the old age grant on labour supply in South Africa, using a nationally representative panel data set. Abel (2013) found that old age grant recipient households were less likely to supply labour. According to Abel (2013), the old age grant operates through an income mechanism, resulting in the prime-aged adults withdrawing

from the labour force and increasing their reservation wage if a household gains an eligible grant beneficiary. The employment effect of the old age grant was found to be robust to a range of sensitivity tests. Bertrand *et al.* (2003) found that the prime-aged members, especially men, in households eligible for the old age grant, were less likely to participate in the labour market. Bertrand *et al.* (2003) concluded that at least some of the pension income that is, in theory, targeted towards the elderly ends up being redistributed towards or captured by the working-age members of the household. The income and/or incentive effects associated with this intra-family redistribution resulted in a significant reduction in the number of working-age members that are employed in the households that receive old age grant income (Bertrand *et al.*, 2003).

In contrast, Ardington *et al.* (2013) found that young men were significantly more likely to supply more labour when someone in their household became age-eligible for the old-age grant. This study by Ardington *et al.* (2013), which focused on the question of whether the state old age grant enhances the ability of young men in rural areas to seek better work opportunities elsewhere, also reported that the old age grant impact was most pronounced among those who had successfully completed high school. This evidence suggests that binding credit constraints limit young men from poorer households from seeking more lucrative work elsewhere, such that access to social grants relaxes this financial constraint (Ardington *et al.*, 2013). Similarly, Ardington *et al.* (2009) and Posel *et al.* (2006) found that social grants had positive employment effects. According to these studies, this is because social grants facilitate labour migration by alleviating financial and child care constraints.

Studies (e.g., Noble and Ntshongwana, 2008; Noble *et al.*, 2008; Surender *et al.*, 2010) that have sought to investigate the attitudes of social grant beneficiaries towards work have found that unemployed South Africans and social grant recipients have a positive attitude towards work. These studies have shown that there is no evidence that social grants have created a dependency syndrome, as the attitudes of the poor and those receiving grants were not different from the non-recipients, all of whom demonstrated a strong commitment to work. According to these studies, it is not access to social grants or the motivational characteristics of the unemployed that are mainly reducing people's employment chances, but the structural conditions of the labour market and the wider economy. However, these studies have not explored the attitudes of these unemployed poor people to engage in smallholder farming activities.

2.5.3 The impact of social grants on smallholder farming activities: Theoretical framework and empirical evidence

The linkages between social grants and smallholder farming outcomes can be explored using several theoretical frameworks, such as the unitary agricultural household model, the random utility framework and the theory of farm household decision-making under imperfect markets. According to the agricultural household model, semi-subsistent agricultural households seek to maximise household utility, and do not necessarily aim to maximise profit (Singh *et al.*, 1986). The unitary model of households postulates that households operate as a single utility-maximising entity. The implication of this theory is that social grants, although targeted to individuals, benefit households as a whole, not just the specific individual.

According to micro-economic theory, changes in unearned income (such as social grants income) affect household behaviour though their effect on total household income (shifting of the household budget line). If, for example, unearned income increases, the budget line shifts to the right. Assuming normal goods, the parallel shift in the budget line results in an increase in consumption goods and leisure. The increase in recipients' welfare as a result of the income effect generated by transfers discourages recipients from working (Binger and Hoffman, 1998; Barrett, 2006). In other words, increases in social grant income can potentially reduce farming households' incentives to put more land under cultivation, supply more labour to farming activities, commercialise or adopt modern farming technologies as they can maintain their utility level through the unearned income, *ceteris paribus*. The theoretical rationale is that, as household income rises, the additional benefit to the household from working for further income falls and work incentives are dampened (Binger and Hoffman, 1998).

While micro-economic theory predicts a negative relationship between unearned income and smallholder farming outcomes, the theory of farm household decision-making under imperfect markets predicts a positive relationship. The imperfect or missing credit markets in the rural areas are such that the income from social grants may relieve the liquidity constraints of farm households, enabling them to purchase more inputs or bear the transaction costs. Moreover, the predictable and guaranteed monthly income from social grants enables rural households to take more risks in their farming businesses. In other words, access to social grants may increase the entrepreneurial appetite of the farmers, resulting in increased market participation and modern technology adoption.

Even though literature has investigated varied dimensions of the impact of social grants in South Africa, there has been generally less focus on the potential linkages between social grants and smallholder farming. Only anecdotal or descriptive evidence is available (e.g., White and Killick, 2001; Samson *et al.*, 2008; Aliber and Hart, 2009; Aliber and Hall, 2012; Tshuma, 2012). For instance, while their primary focus was to investigate the impact of the CSG on child hunger and school attendance, Samson *et al.* (2008) highlighted anecdotally that households receiving the CSG were significantly more likely to continue farming activities. Samson *et al.* (2008) reported that the proportion of CSG recipient households that had stopped farming activities between 2002 and 2004 was lower than that of non-recipients. Most of the descriptive studies (e.g., White and Killick, 2001; Aliber and Hart, 2009; Aliber and Hall, 2012; Tshuma, 2012) have sought to infer causality based on observations that smallholder farming activity is declining while social grants are increasing without controlling for confounding factors.

The paucity of literature linking social grants and smallholder farming is international. While studies linking cash transfers and different outcomes, such as school attendance, nutrition and health, are extensive (e.g., de Janvry and Sadoulet, 2005; de Janvry *et al.*, 2006; de Janvry and Sadoulet, 2006; de Brauw and Hoddinott, 2011), only a few (e.g., Martinez, 2004; Bezu and Holden, 2008) have linked cash transfers to smallholder farming activities. Martinez (2004) found that cash transfers were being invested in smallholder agriculture in Bolivia. According to Martinez (2004), the impact of the investment was an increase in food consumption by twice the amount of the transfer received. The cash transfers were found to also reduce detrimental risk coping strategies, such as the selling of productive assets, as they enhance the ability of recipients to save and invest.

Bezu and Holden (2008) found that food-for-work positively influenced the decision to adopt fertilisers and that there was no evidence of disincentive effect in Ethiopia. According to Bezu and Holden (2008), social transfers can help improve agricultural production by relieving liquidity constraints and thereby improving input use in agriculture. This is in agreement with views held by some studies in Africa (e.g., Diao *et al.*, 2012; Proctor, 2014) which have argued that social transfers and smallholder agriculture have potential for complementarity as options for rural livelihoods.

Several studies (e.g., Isham, 2002; Croppenstedt *et al.*, 2003; Freeman and Omiti, 2003; Asfaw and Admassie, 2004; Chianu and Tsujii, 2004; Abdoulaye and Sanders, 2005; Chirwa, 2005;

Waithaka *et al.*, 2007; Alene *et al.*, 2008; Bezu and Holden, 2008; Thuo *et al.*, 2010; Zhou *et al.*, 2010; Akpan *et al.*, 2012; Mapila *et al.*, 2012; Yirga and Hassan, 2013; Lambrecht *et al.*, 2014; Martey *et al.*, 2014; Ogada *et al.*, 2014; Thuo *et al.*, 2014; Diiro *et al.*, 2015) have investigated the factors affecting chemical fertiliser adoption among smallholder farmers in the developing countries. With the exception of Bezu and Holden (2008), these studies have not investigated the potential impact of social transfers on chemical fertiliser adoption, arguably missing an important variable. Similarly, the literature on smallholder market participation or commercialisation (e.g., Key *et al.*, 2000; Poulton *et al.*, 2005; Alene *et al.*, 2008; Mendoza and Thelen, 2008; Markelova *et al.*, 2009; Hazell *et al.*, 2010; Jagwe *et al.*, 2010; Mmbando *et al.*, 2015) has not focussed on the possible effects of social grants on the incentives of the farmers to commercialise their farming activities.

Moreover, the vast and growing literature on rural or farm entrepreneurship (e.g., McElwee, 2005; Meccheri and Pelloni, 2006; de Wolf and Schoorlemmer, 2007; McElwee, 2008; Vesala, 2008; Clark, 2009; Ghiasy *et al.*, 2009; Hosseini *et al.*, 2009; McElwee and Bosworth, 2010; Nafukho and Muyia, 2010; Onyebinama and Onyebinama, 2010; Vesala and Vesala, 2010; Rajaei *et al.*, 2011; Baumgartner *et al.*, 2012; Díaz-Pichardo *et al.*, 2012; Rijkers and Costa, 2012; Pyysiäinen and Vesala, 2013; Rijkers and Söderbom, 2013) has not directly addressed the conceptual and empirical linkages between social grants and farm entrepreneurship among rural households. Consequently, an unambiguous answer to how social grants affect rural farming households' incentives to farm, input use, and commercialisation of their farming activities as well as their entrepreneurial attitudes is absent. This study seeks to contribute to the pertinent questions by investigating rural farming households in the KwaZulu-Natal (KZN) province. The next sub-section presents a brief description of the study area.

2.6 Study area description

The study was conducted in four districts of the KwaZulu-Natal (KZN) province of South Africa. In terms of land size, KZN is the third-smallest province of the nine provinces in SA, with a total land size of about 94 400 km^2, about 7.6% of South Africa (Stats SA, 2012a). Despite being the third-smallest in terms of land size, KZN has the second largest population after Gauteng, housing about 10.6 million people, about 19.8% of SA's population (Stats SA, 2012a; Stats SA, 2014). This translates to a population density of 113 people per km^2. The province is characterised by high poverty levels and a lack of economic opportunities,

particularly in the rural areas (KZNPPC, 2011). KZN has a high unemployment rate (33%), and the youths are the worst affected, with 42% of them unemployed (Stats SA, 2012b).

Social grants and smallholder farming play important roles in the livelihoods of rural dwellers. KZN has the largest number of households benefitting from social grants (SASSA, 2014), and social grants are the second largest source of income after salaries/wages in the province (Stats SA, 2015). Farming is not a large source of income in KZN, as it is the sixth important source after salaries/wages, social grants, remittances, non-farm businesses and pensions. However, most of the rural people in the province are employed or self-employed in smallholder agriculture, producing mainly for subsistence purposes. Over 796 000 (28%) of the 2 802 000 households in KZN are directly involved in agriculture (Stats SA, 2012b). Stats SA (2012b) reported that, while wage employment is the preferred option for many people, household members who fail to secure employment in urban areas go back to the rural areas and engage in informal activities such as smallholder farming.

KZN is generally characterised by good, reliable rainfall (more than 1 000 mm a year) and fertile soils, making agriculture central to its economy (KZNDAE, 2012). Even though the economy of KZN has a huge potential in agriculture, current production is below the province's agricultural potential (KZNDAE, 2012). According to the KZNDAE (2012), conservative estimates suggest that agricultural output could be increased significantly if the natural resources were optimally managed for agriculture. In particular, there is much uncultivated land in the rural areas of KZN (KZNPPC, 2011; Tshuma, 2012), though shortage of other economic options still makes smallholder agriculture more important in these areas.

2.7 Sampling and data collection tools

The data were collected between June and November 2014, using a pre-tested structured questionnaire administered by trained and experienced enumerators. These enumerators had good knowledge of the rural farming systems and could speak the local IsiZulu language. Key informant interviews and focus group discussions with knowledgeable audiences were done to supplement data from questionnaires. Questionnaire pre-testing, involving 15 rural households, was done before the main survey. The survey was conducted using a multistage sampling technique. First, four districts were chosen out of the 11 districts in KZN. Figure 2.1 shows the

location of the four districts (Umzinyathi, Uthukela, Umkhanyakude and Harry Gwala[1] districts) that were selected for this study. The districts that were selected have a significant number of rural communities engaged in farming activities.

Secondly, a total of 984 households were randomly selected from the four district municipalities. In Harry Gwala and Umkhanyakude districts, lists of farmers were obtained from the extension offices. The extension officers also helped direct the enumerators to the farmers' households. In Uthukela district, the enumerators were assisted by the local farmer association chairpersons. There was no complete list for the Umzinyathi district. While the list of irrigators was sourced from the extension office in Msinga, no list was found for non-irrigators. The snowballing method was thus used to select non-irrigators in Umzinyathi. The study did not consider 'backyard' farmers, i.e., those small farmers who plant a few rows of maize or vegetables for own consumption in their back gardens and have no access to arable allotments. This is because these farmers have limited access to land, such that their incentives or disincentives cannot be adequately captured.

Out of the total sample, 239 households were from Umzinyathi, 191 from Uthukela, 143 from Umkhanyakude and 411 from Harry Gwala districts. The questionnaire, attached as Appendix A, included several modules, which include information on basic household head characteristics, such as sex, age, marital status and education level, measures of household wealth endowment (such as household assets, livestock and land); agricultural production activities; household income amounts and sources. Institutional and organisation support issues such as farmer associations, market access, credit and extension support were relevant. The questionnaire also captured how household members allocate their labour, the use of chemical fertilisers as well as the crop marketing behaviour of the households. Lastly, the questionnaire sought to capture the farmers' self-assessments of their entrepreneurship skills or competencies. While some modules such as basic household characteristics are relevant to all the empirical chapters, some modules are only relevant to specific chapters. This will be indicated in the individual empirical chapters.

[1] Formerly known as Sisonke district.

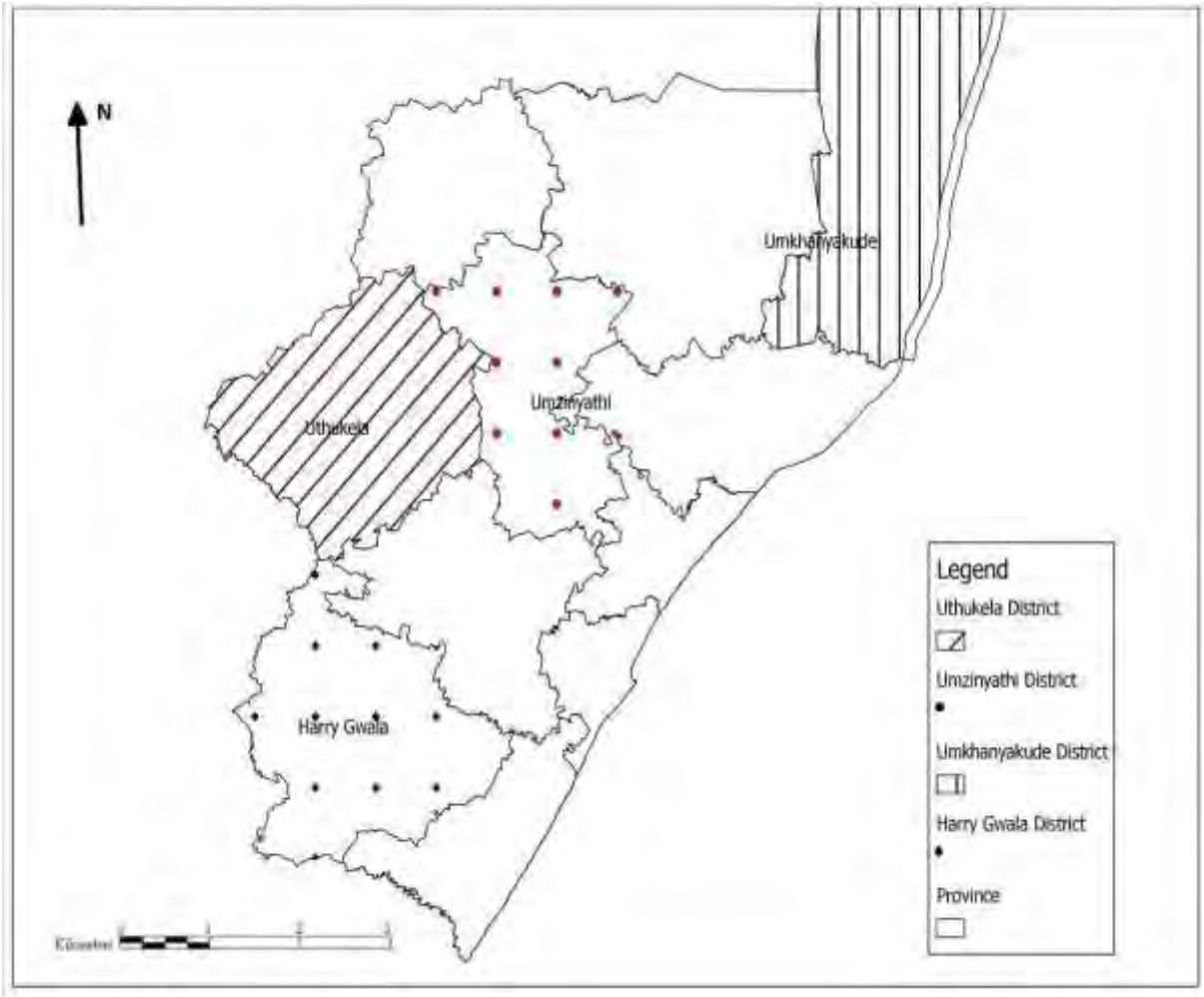


Figure 2.1: Map of the KwaZulu-Natal province showing the four districts selected

2.8 Summary

The empirical literature, using different methods and data sets, has widely agreed that social grants have a positive impact on outcomes such as poverty reduction, school attendance and nutrition outcomes. However, the evidence on the labour supply impact of social grants in South Africa has been mixed. The literature is inconclusive in terms of both the theoretical arguments and empirical evidence on the work incentives impacts of social grants. The review presented in this chapter has revealed that that the potential linkages between social grants and smallholder farming activities have not been adequately addressed. The next four empirical chapters seek to fill this gap by investigating the potential impact of social grants on the rural

households' incentives to farm, adopt improved modern technology and commercialise as well as their entrepreneurial attitudes.

To achieve the study objectives, a total of 984 households were randomly selected in four districts of the KwaZulu-Natal (KZN) province of South Africa. The KZN province is characterised by high poverty levels, high unemployment rates and a lack of economic opportunities, especially in the rural areas. Social grants and smallholder farming play important roles in the livelihoods of rural dwellers. However, though the shortage of other economic options makes smallholder agriculture more important in these areas, the province has experienced declining smallholder farming activity in recent years. This, coupled with the fact that KZN has the largest number of households benefitting from social grants, makes it a suitable study area to for this study.

References

Abdoulaye, T. and Sanders, J.H. 2005. Stages and determinants of fertilizer use in semiarid African agriculture: The Niger experience. *Agricultural Economics* 32 (2):167-179.

Abel, M. 2013. Unintended labour supply effects of cash transfer programmes: Evidence from South Africa's old age pension. Cape Town: University of Cape Town.

Agüero, J., Michael, C. and Ingrid, W. 2007. The impact of unconditional cash transfers on nutrition: The South African Child Support Grant. Brasilia, Brazil: International Poverty Centre.

Akpan, S.B., Udoh, E.J. and Nkanta, V.S. 2012. Factors influencing fertilizer use intensity among smallholder crop farmers in Abak agricultural zone in Akwa Ibom State, Nigeria. *Journal of Biology, Agriculture and Healthcare* 2 (1):54-65.

Alene, A.D., Manyong, V.M., Omanya, G., Mignouna, H.D., Bokanga, M. and Odhiambo, G. 2008. Smallholder market participation under transactions costs: Maize supply and fertilizer demand in Kenya. *Food Policy* 33 (4):318-328.

Aliber, M. and Hall, R. 2012. Support for smallholder farmers in South Africa: Challenges of scale and strategy. *Development Southern Africa* 29 (4):548-562.

Aliber, M. and Hart, T.G.B. 2009. Should subsistence agriculture be supported as a strategy to address rural food insecurity? *Agrekon* 48 (4):434-458.

Aliber, M. and Mdoda, L. 2015. The direct and indirect economic contribution of small-scale black agriculture in South Africa. *Agrekon* 54 (2):18-37.

Ardington, C., Bärnighausen, T., Case, A. and Menendez, A. 2013. Social protection and labour market outcomes of youth in South Africa. Cape Town: University of Cape Town.

Ardington, C., Case, A. and Hosegood, V. 2009. Labour supply responses to large social transfers: Longitudinal evidence from South Africa. *American Economic Journal: Applied Economics* 1 (1):22-24.

Armstrong, P. and Burger, C. 2009. Poverty, inequality and the role of social grants: An analysis using decomposition techniques. Stellenbosch Economic Working Papers15/09. Cape Town: University of Stellenbosch.

Asfaw, A. and Admassie, A. 2004. The role of education on the adoption of chemical fertiliser under different socioeconomic environments in Ethiopia. *Agricultural Economics* 30 (3):215-228.

Backeberg, G.R. 2006. Reform of user charges, market pricing and management of water: Problem or opportunity for irrigated agriculture? *Irrigation and Drainage* 55:1-12.

Barrett, C.B. 2006. Food aid's intended and unintended consequences. Background paper for FAO State of Food and Agriculture 2006. Ithaca, NY: Cornell University.

Barrientos, A. 2003. What is the impact of non-contributory pensions on poverty? Estimates from Brazil and South Africa. Manchester: Institute for Development Policy and Management, University of Manchester.

Barrientos, A., Møller, V., Saboia, J., Lloyd-Sherlock, P. and Mase, J. 2013. 'Growing' social protection in developing countries: Lessons from Brazil and South Africa. *Development Southern Africa* 30 (1):54-68.

Baumgartner, D., Schulz, T. and Seidl, I. 2012. Quantifying entrepreneurship and its impact on local economic performance: A spatial assessment in rural Switzerland. *Entrepreneurship & Regional Development* 25 (3-4):222-250.

Bertrand, M., Mullainathan, S. and Miller, D. 2003. Public policy and extended families: Evidence from pensions in South Africa. *World Bank Economic Review* 17 (1):27-50.

Bezu, S. and Holden, S. 2008. Can food-for-work encourage agricultural production? *Food Policy* 33 (6):541-549.

Binger, B.R. and Hoffman, E. 1998. *Microeconomics with calculus*. Second edition. Massachusetts: Addison-Wesley Publsihers Inc.

Brockerhoff, S. 2013. Monitoring the progressive realisation of socio-economic rights: A review of the development of social security policy in South Africa. Johannesburg: Studies in Poverty and Inequality Institute (SPII).

Case, A., Hosegood, V. and Lund, F. 2005. The reach and impact of Child Support Grants: evidence from KwaZulu-Natal. *Development Southern Africa* 22 (4):467-482.

Chianu, J.N. and Tsujii, H. 2004. Determinants of farmers' decision to adopt or not adopt inorganic fertilizer in the savannas of northern Nigeria. *Nutrient Cycling in Agroecosystems* 70:293-301.

Chirwa, E.W. 2005. Adoption of fertiliser and hybrid seeds by smallholder maize farmers in southern Malawi. *Development Southern Africa* 22 (1):1-12.

Clark, J. 2009. Entrepreneurship and diversification on English farms: Identifying business enterprise characteristics and change processes. *Entrepreneurship & Regional Development* 21 (2):213-236.

Croppenstedt, A., Demeke, M. and Meschi, M.M. 2003. Technology adoption in the presence of constraints: The case of fertiliser demand in Ethiopia. *Review of Development Economics* 7 (1):58-70.

DAFF. 2012. A framework for the development of smallholder farmers through cooperatives development. Pretoria: DAFF (Department of Agriculture, Forestry and Fisheries).

DAFF. 2013. Strategic Plan for Smallholder Support (SPSS). Pretoria: Department of Agriculture, Forestry and Fisheries (DAFF).

de Brauw, A. and Hoddinott, J. 2011. Must conditional cash transfer programs be conditioned to be effective? The impact of conditioning transfers on school enrollment in Mexico. *Journal of Development Economics* 96 (2):359-370.

de Janvry, A., Finan, F., Sadoulet, E. and Vakis, R. 2006. Can conditional cash transfer programs serve as safety nets in keeping children at school and from working when exposed to shocks? *Journal of Development Economics* 79 (2):349-373.

de Janvry, A. and Sadoulet, E. 2005. Conditional cash transfer programs for child human capital development: Lessons derived from experience in Mexico and Brazil. *Paper presented at the GRADE 25th Anniversary Conference, "Investigación, Politicas y Desarrollo"*, Lima, 15-17 November 2005.

de Janvry, A. and Sadoulet, E. 2006. Making conditional cash transfers more efficient: Designing for the maximum effect of the conditionality. *World Bank Economic Review* 20 (1):1-29.

de Wolf, P. and Schoorlemmer, H. (eds.). 2007. *Exploring the significance of entrepreneurship in agriculture.* Frick, Switzerland: Research Institute of Organic Agriculture.

Denison, J. and Manona, S. 2007. Principles, approaches and guidelines for the participatory revitalisation of smallholder irrigation scheme. Volume 2: Concepts and cases. WRC Report TT 308/07. Pretoria, South Africa: Water Research Commission.

Devereux, S. 2001. Social pensions in Namibia and South Africa. IDS Discussion Paper 379. Brighton: Institute of Development Studies.

Devereux, S. 2002. Can social safety nets reduce chronic poverty? *Development Policy Review* 20 (5):657-675.

Devereux, S. 2006. Cash transfers and social protection. *Paper presented at the regional workshop on "Cash transfer activities in southern Africa" co-hosted by the Southern African Regional Poverty Network (SARPN), Regional Hunger and Vulnerability Programme(RHVP) and Oxfam GB*, Johannesburg, South Africa, 9-10 October 2006.

Devereux, S. and Sabates-Wheeler, R. 2007. Debating social protection. *IDS Bulletin* 38 (3):1-120.

Diao, X., Thurlow, J., Benin, S. and Fan, S. (eds.). 2012. *Strategies and priorities for African agriculture: economy wide perspectives from country studies.* Washington DC: International Food Policy Research Institute.

Díaz-Pichardo, R., Cantú-González, C., López-Hernández, P. and McElwee, G. 2012. From farmers to entrepreneurs: The importance of collaborative behaviour. *The Journal of Entrepreneurship* 21 (1):91-116.

Diiro, G.M., Ker, A.P. and Sam, A.G. 2015. The role of gender in fertiliser adoption in Uganda. *African Journal of Agricultural and Resource Economics* 10 (2):117-130.

DSD, SASSA and UNICEF. 2012. The South African Child Support Grant impact assessment: Evidence from a survey of children, adolescents and their households. Pretoria: UNICEF South Africa.

Duflo, E. 2003. Grandmothers and granddaughters: Old-age pensions and intrahousehold allocation in South Africa. *World Bank Economic Review* 17 (1):1-25.

Edmonds, E.V. 2006. Child labor and schooling responses to anticipated income in South Africa. *Journal of Development Economics* 81 (2):386-414.

Ellis, F., Devereux, S. and White, P. 2009. *Social protection in Africa.* Cheltenham: Edward Elgar.

Fanadzo, M. 2012. Revitalisation of smallholder irrigation schemes for poverty alleviation and household food security in South Africa: A review. *African Journal of Agricultural Research* 7 (13):1956-1969.

Freeman, H.A. and Omiti, J.M. 2003. Fertilizer use in semi-arid area of Kenya: Analysis of smallholder farmers' adoption behavior under liberalized markets. *Nutrient Cycling in Agroecosystems* 66 (23-31).

Garcia, M. and Moore, C.M.T. 2012. The cash dividend: The rise of cash transfer programs in Sub-Saharan Africa. Washington DC: The World Bank.

Ghiasy, F.G., Hosseini, S.J.F., Malekmohammadi, I. and Hosseini, S.M. 2009. Factors influencing the entrepreneurship in Iran's agricultural cooperatives. *Australian Journal of Basic and Applied Sciences* 3 (2):1170-1176.

Goldblatt, B. 2005. Gender and social assistance in the first decade of democracy: A case study of South Africa's Child Support Grant. *Politikon* 32 (2):239-257.

Grosh, M., Del Ninno, C., Tesliuc, E. and Ouerghi, A. 2008. For protection and promotion: The design and implementation of effective safety nets. Washington, DC: World Bank.

Handa, S., Davis, B. and Stewart, S. 2012. Can Africa afford child support grants? Simulation analyses from 4 countries. Maputo: IESE.

Hazell, P., Poulton, C., Wiggins, S. and Dorward, A. 2010. The future of small farms: Trajectories and policy priorities. *World Development* 38 (10):1349-1361.

Hidrobo, M., Hoddinott, J., Peterman, A., Margolies, A. and Moreira, V. 2012. Cash, food, or vouchers? Evidence from a randomized experiment in Northern Ecuador. Washington, DC: International Food Policy Research Institute (IFPRI).

Hirano, K. and Imbens, G.W. 2004. The propensity score with continuous treatments. *In:* Gelman, A. and Meng, X.-L. (eds.) *Applied Bayesian modeling and causal inference fromiIncomplete data perspectives.* New York: Wiley.

Holmes, R. and Jones, N. 2010. Rethinking social protection using a gender lens: Synthesis paper. Working Paper 320. London: Overseas Development Institute.

Hosseini, S.J.F., Mirdamadi, S.M. and Nejad, G.R.H.H. 2009. Extension and education factors influencing the success of entrepreneurship among rural women in northern Iran. *Research Journal of Biological Sciences* 4 (9):967-973.

Isham, J. 2002. The effect of social capital on fertiliser adoption: Evidence from rural Tanzania. *Journal of African Economies* 11 (1):39-60.

Jagwe, J., Machethe, C. and Ouma, E. 2010. Transaction costs and smallholder farmers' participation in banana markets in the Great Lakes Region of Burundi, Rwanda and the Democratic Republic of Congo. *African Journal of Agricultural and Resource Economics* 6 (1):302-317.

Key, N., Sadoulet, E. and de Janvry, A. 2000. Transactions costs and agricultural household supply response. *American Journal of Agricultural Economics* 82 (2):245-259.

Klasen, S. and Woolard, I. 2008. Surviving unemployment without state support: Unemployment and household formation in South Africa. *Journal of African Economies* 18 (1):1-51.

KZNDAE. 2012. Annual performance plan 2012/13. Pietermaritzburg: KwaZulu-Natal Department of Agriculture and Environmental Affairs (KZNDAE).

KZNPPC. 2011. KwaZulu-Natal Provincial Growth and Development Strategy (PGDS). Pietermaritzburg: KZNPPC (KwaZulu-Natal Provincial Planning Commission)

Lambrecht, I., Vanlauwe, B., Merckx, R. and Maertens, M. 2014. Understanding the process of agricultural technology adoption: Mineral fertilizer in Eastern DR Congo. *World Development* 59:132-146.

Leroy, J.L., Ruel, M. and Verhofstadt, E. 2009. The impact of conditional cash transfer programmes on child nutrition: A review of evidence using a programme theory framework. *Journal of Development Effectiveness* 1 (2):103-129.

Lund, F. 2002. 'Crowding in' care, security, and micro-enterprise formation: Revisiting the role of the state in poverty reduction and development. *Journal of International Development* 14:681-694.

Mabugu, R., Tiberti, L., Maisonnave, H., Chitiga, M., Hoareau, S., Robichaud, V. and Ngandu, S. 2013. Quantitative analysis of impact of social grants in South Africa. Midrand, South Africa: Financial and Fiscal Commission.

Machethe, C.L., Mollel, N.M., Ayisi, K., Mashatola, M.B., Anim, F.D.K. and Vanasche, F. 2004. Smallholder irrigation and agricultural development in the Olifants river basin of Limpopo Province: Management transfer, productivity, profitability and food security issues. WRC Report No 1050/1/04. Pretoria, South Africa: Water Research Commission.

Maitra, P. and Ray, R. 2003. The effect of transfers on household expenditure patterns and poverty in South Africa. *Journal of Development Economics* 71 (1):23-49.

Makino, K. 2004. Social security policy reform in post-apartheid South Africa: A focus on the Basic Income Grant. Durban: Centre for Civil Society.

Makiwane, M. 2010. The Child Support Grant and teenage childbearing in South Africa. *Development Southern Africa* 27 (2):193-204.

Makiwane, M. and Udjo, E. 2007. Is the child support grant associated with an increase in teenage fertility in South Africa? Evidence from national surveys and administrative data. Human Sciences Research Council Report. Pretoria: Human Sciences Research Council.

Mapila, M.A.T.J., Njuki, J., Delve, R.J., Zingore, S. and Matibini, J. 2012. Determinants of fertiliser use by smallholder maize farmers in the Chinyanja Triangle in Malawi, Mozambique and Zambia. *Agrekon* 51 (1):21-41.

Markelova, H., Meinzen-Dick, R., Hellin, J. and Dohrn, S. 2009. Collective action for smallholder market access. *Food Policy* 34:1-7.

Martey, E., Wiredu, A.N., Etwire, P.M., Fosu, M., Buah, S.S.J., Bidzakin, J., Ahiabor, B.D.K. and Kusi, F. 2014. Fertilizer adoption and use intensity among smallholder farmers in northern Ghana: A case study of the AGRA soil health project. *Sustainable Agriculture Research* 3 (1):24-36.

Martinez, S. 2004. *Pensions, poverty and household investments in Bolivia*. California: Berkeley University of California. Available at: http://eml.berkeley.edu/~webfac/bardhan/e271_f04/martinez.pdf [Accessed 20 June 2015].

McElwee, G. 2005. *Developing entrepreneurial skills of farmers: A Literature review of entrepreneurship in agriculture*. Brussels: European Union-Entrepreneurial Skills of Farmers (EU-ESoF). Available at: http://www.esofarmers.org/fileadmin/documents-esofarmers/ESoFliteraturereview_000.pdf [Accessed 17 April 2014].

McElwee, G. 2008. A taxonomy of entrepreneurial farmers. *International Journal of Entrepreneurship and Small Business* 6 (3):465-478.

McElwee, G. and Bosworth, G. 2010. Exploring the strategic skills of farmers across a typology of farm diversification approaches. *Journal of Farm Management* 13 (12):819-838.

Meccheri, N. and Pelloni, G. 2006. Rural entrepreneurs and institutional assistance: An empirical study from mountainous Italy. *Entrepreneurship & Regional Development* 18 (5):371-392.

Mendoza, R.U. and Thelen, N. 2008. Innovations to make markets more inclusive for the poor. *Development Policy Review* 26 (4):427-458.

Midgley, J. 2013. Social development and social protection: New opportunities and challenges. *Development Southern Africa* 30 (1):2-12.

Mmbando, F.E., Wale, E.Z. and Baiyegunhi, L.J.S. 2015. Determinants of smallholder farmers' participation in maize and pigeonpea markets in Tanzania. *Agrekon* 54 (1):96-119.

Mokoma, T. 2008. *An analysis of the impact of the child support grant on teenage fertility rates in South Africa.* Master of Philosophy Disertation, Stellenbosch University.

Nafukho, F.M. and Muyia, M.A.H. 2010. Entrepreneurship and socioeconomic development in Africa: A reality or myth? *Journal of European Industrial Training* 34 (2):96-109.

National Treasury. 2015. Budget Review 2015. Pretoria: National Treasury.

Neves, D., Samson, M., van Niekerk, I., Hlatshwayo, S. and du Toit, A. 2009. The use and effectiveness of social grants in South Africa. Cape Town: Institute for Poverty, Land and Agrarian Studies (PLAAS) and Economic Policy Research Institute (EPRI).

Noble, M. and Ntshongwana, P. 2008. No sign of a dependency culture in South Africa. HSRC Policy Brief. Pretoria: The Human Sciences Research Council (HSRC).

Noble, M., Ntshongwana, P. and Surender, R. 2008. Attitudes to work and social security in South Africa. Pretoria: Human Sciences Research Council.

Ogada, M., Mwabu, G. and Muchai, D. 2014. Farm technology adoption in Kenya: A simultaneous estimation of inorganic fertilizer and improved maize variety adoption decisions. *Agricultural and Food Economics* 2 (1):1-18.

Onyebinama, U.A.U. and Onyebinama, I.C. 2010. Extension education and entrepreneurship development in Nigerian agriculture. *Agricultural Journal* 5 (2):63-69.

Ortmann, G.F. and King, R.P. 2010. Research on agri-food supply chains in Southern Africa involving small-scale farmers: Current status and future possibilities. *Agrekon* 49 (4):397-417.

Patel, L., Hochfeld, T. and Moodley, J. 2013a. Gender and child sensitive social protection in South Africa. *Development Southern Africa* 30 (1):69-83.

Patel, L., Hochfeld, T., Moodley, J. and Mutwali, R. 2012. The gender dynamics and impact of the child support grant in Doornkop. Soweto CSDA Research Report. Johannesburg: Centre for Social Development in Africa, University of Johannesburg.

Patel, L., Midgley, J. and Ulriksen, M. 2013b. Editorial. *Development Southern Africa* 30 (1):1-1.

Posel, D., Fairburn, J.A. and Lund, F. 2006. Labour migration and households: A reconsideration of the effects of the social pension on labour supply in South Africa. *Economic Modelling* 23 (5):836-853.

Potts, R. 2012. Social welfare in South Africa: Curing or causing poverty? *Pennsylvania State University Journal of International Affairs* 1 (2):74-92.

Poulton, C., Dorward, A. and Kydd, J. 2005. The future of small farms: New directions for services, institutions and intermediation. *Paper presented at the The Future of Small Farms Workshop*, Imperial College, Wye, UK, 26-29 June 2005.

Proctor, F.J. 2014. Rural economic diversification in sub-Saharan Africa. IIED Working Paper. London: IIED.

Pyysiäinen, J. and Vesala, K.M. 2013. Activating farmers: Uses of entrepreneurship discourse in the rhetoric of policy implementers. *Discourse and Communication* 7 (1):55-73.

Rajaei, Y., Yaghoubi, J. and Donyaei, H. 2011. Assessing effective factors in development of entrepreneurship in agricultural cooperatives of Zanjan province. *Procedia - Social and Behavioral Sciences* 15:1521-1525.

Ravallion, M. 2008. Evaluating anti-poverty programs. *In:* Evenson, R.E. and Schultz, T.P. (eds.) *Handbook of Agricultural Economics.* Amsterdam, North-Holland.

Rijkers, B. and Costa, R. 2012. Gender and rural non-farm entrepreneurship. *World Development* 40 (12):2411-2426.

Rijkers, B. and Söderbom, M. 2013. The effects of risk and shocks on non-farm enterprise development in rural Ethiopia. *World Development* 45:119-136.

RSA. 1997. *White Paper for Social Welfare*. Pretoria: Republic of South Africa (RSA). Available at: http://www.gov.za/sites/www.gov.za/files/White_Paper_on_Social_Welfare_0.pdf [Accessed 8 June 2015].

RSA. 2004a. *Act No. 9 of 2004: South African Social Security Agency Act, 2004*. Cape Town: Republic of South Africa (RSA). Available at: http://www.sassa.gov.za/index.php/about-us/sassa-legislation?...sassa-act-2004 [Accessed 8 July 2015].

RSA. 2004b. *Act No. 13 of 2004: Social Assistance Act, 2004*. Cape Town: Republic of South Africa (RSA). Available at: http://www.gov.za/sites/www.gov.za/files/a13-04_0.pdf [Accessed 8 July 2015].

Samson, M., Heinrich, C., Williams, M., Kaniki, S., Muzondo, T., Quene, K.M. and van Niekerk, I. 2008. Quantitative analysis of the impact of the Child Support Grant. New York: United Nations Children‘s Fund.

Samson, M., Lee, U., Ndlebe, A., Quene, K.M., van Niekerk, I., Gandhi, V., Harigaya, T. and Abrahams, C. 2004. The social and economic impact of South Africa's social security system. Summary Report. Cape Town: Economic Policy Research Institute.

Samson, M., MacQuene, K. and van Niekerk, I. 2006. Social grants, South Africa. Inter-Regional Inequality Facility. London: Overseas Development Institute.

SASSA. 2014. *Fact sheet: Issue no 12 of 2014. A statistical summary of social grants in South Africa*. Pretoria: South Africa Social Security Agency (SASSA). Available at: http://www.sassa.gov.za/index.php/statistical-reports [Accessed 28 June 2015].

Senyolo, G.M., Chaminuka, P., Makhura, M.N. and Belete, A. 2009. Patterns of access and utilization of output markets by emerging farmers in South Africa: A Factor Analysis Approach. *African Journal of Agricultural Research* 4 (3):208-214.

Singh, I., Squire, L. and Strauss, J. 1986. A survey of agricultural household models: Recent findings and policy implications. *The World Bank Economic Review* 1 (1):149-179.

Stats SA. 2012a. *Census 2011 Municipal fact sheet*. Pretoria: Statistics South Africa. Available at: http://www.statssa.gov.za/Census2011/Products/Census_2011_Municipal_fact_sheet.pdf [Accessed 20 July 2013].

Stats SA. 2012b. *Census 2011 Municipal report – KwaZulu-Natal*. Pretoria: Statistics South Africa. Available at: http://www.statssa.gov.za/Census2011/Products/KZN_Municipal_Report.pdf [Accessed 9 March 2015].

Stats SA. 2012c. GHS Series, volume IV, Food security and agriculture, 2002–2011: In-depth analysis of the General Household Survey data. Pretoria: Statistics South Africa.

Stats SA. 2014. *Mid-year population estimates 2014*. Pretoria: Statistics South Africa. Available at: http://www.statssa.gov.za/publications/P0302/P03022014.pdf [Accessed 12 July 2015].

Stats SA. 2015. General Household Survey 2014. Pretoria: Stats SA (Statistics South Africa).

Surender, R., Noble, M., Wright, G. and Ntshongwana, P. 2010. Social assistance and dependency in South Africa: An analysis of attitudes to paid work and social grants. *Journal of Social Policy* 39 (2):203-221.

Taylor, V. (ed.) 2002. *Report of the Committee of Inquiry into a Comprehensive System of Social Security for South Africa.*

Thamaga-Chitja, J. and Morojele, P. 2014. The context of smallholder farming in South Africa: Towards a livelihood asset building framework. *Journal of Human Ecology* 45 (2):147-155.

Thuo, M., Bravo-Ureta, B.E., Hathie, I. and Obeng-Asiedu, P. 2010. Adoption of chemical fertilizer by smallholder farmers in the peanut basin of Senegal. *African Journal of Agricultural and Resource Economics* 6 (1):1-17.

Thuo, M.W., Bravo-Ureta, B.E., Obeng-Asiedu, K. and Hathie, I. 2014. The adoption of agricultural inputs by smallholder farmers:The case of an improved groundnut seed and chemical fertilizer in the Senegalese Groundnut Basin. *The Journal of Developing Areas* 48 (1):61-82.

Tiberti, L., Maisonnave, H., Chitiga, M., Mabugu, R., Robichaud, V. and Ngandu, S. 2013. The economy-wide impacts of the South African child support grant: A micro-simulation-computable general equilibrium analysis. Canada: CIRPÉE.

Triegaardt, J.D. 2005. The Child Support Grant in South Africa: A social policy for poverty alleviation? *International Journal of Social Welfare* 14 (4):249-255.

Tshuma, M.C. 2012. A review of the poverty and food security issues in South Africa: Is agriculture the solution? *African Journal of Agricultural Research* 7 (28):4010-4020.

Ulriksen, M. 2013. The politics of social protection expenditure and financing in southern Africa. *Development Southern Africa* 30 (1):39-53.

Ulriksen, M.S. 2012. How social security policies and economic transformation affect poverty and inequality: Lessons for South Africa. *Development Southern Africa* 29 (1):3-18.

van Averbeke, W. 2008. Best management practices for small-scale subsistence farming on selected irrigation schemes and surrounding areas through participatory adaptive research in Limpopo Province. Draft Final Report of WRC Project K5/1464//4. Pretoria: Centre for Organic and Smallholder Agriculture (COSA), Department of Crop Sciences, Tshwane University of Technology.

van der Berg, S. 1997. South African social security under apartheid and beyond. *Development South Africa* 14 (4):481-503.

van der Berg, S., Siebrits, K. and Lekezwa, B. 2010. Efficiency and equity effects of social grants in South Africa. Cape Town: University of Stellenbosch.

van der Heijden, T. and Vink, N. 2013. Good for whom? Supermarkets and small farmers in South Africa: A critical review of current approaches to increasing access to modern markets. *Agrekon* 52 (1):68-86.

van Schalkwyk, H.D., Groenewald, J.A., Fraser, G.C.G., Obi, A. and van Tilburg, A. (eds.). 2012. *Unlocking markets to smallholders: Lessons from South Africa.* Wageningen: Wageningen Academic Publishers.

Vesala, H.T. and Vesala, K.M. 2010. Entrepreneurs and producers: Identities of Finnish farmers in 2001 and 2006. *Journal of Rural Studies* 26 (1):21-30.

Vesala, K.M. 2008. A theoretical and methodological approach to the study of the assessment and development of entrepreneurial skills in the farm context. *In:* Vesala, K.M. and Pyysiäinen, J. (eds.) *Understanding entrepreneurial skills in the farm context.* Frick, CH: Research Institute of Organic Agriculture FiBL.

Vincent, K. and Cull, T. 2009. Impacts of social cash transfers: Case study evidence from across southern Africa. *Paper presented at the II Conferencia do IESE "Dinamicas da Pobreza e Padrões de Acumulação em Moçambique"*, Maputo, 22-23 April 2009.

Vink, N. and van Rooyen, J. 2009. The economic performance of agriculture in South Africa since 1994: Implications for food security. Working Paper Series No 17. Midrand, Pretoria: Development Bank of Southern Africa (DBSA).

Waithaka, M.M., Thornton, P.K., Shepherd, K.D. and Ndiwa, N.N. 2007. Factors affecting the use of fertilizers and manure by smallholders: The case of Vihiga, western Kenya. *Nutrient Cycling in Agroecosystems* 78:211-224.

White, H. and Killick, T. 2001. African poverty at the millennium, causes, complexities and challenges. Strategic Partnership with Africa. Washington D.C: World Bank.

Whitworth, A. and Wilkinson, K. 2013. Tackling child poverty in South Africa: Implications of ubuntu for the system of social grants. *Development Southern Africa* 30 (1):121-134.

Williams, M.J. 2007. The social and economic impacts of South Africa's Child Support Grant. Cape Town: Economic Policy Research Institute.

Woolard, I. 2003. Social assistance grants, poverty and economic growth in South Africa. *Paper presented at the TIPS/DPRU Forum 2003: The Challenge of Growth and Poverty: The South African Economy Since Democracy*, Johannesburg, 8-10 September 2003.

Woolard, I. and Leibbrandt, M. 2010. The evolution and impact of unconditional cash transfers in South Africa. Working Paper Number 51. Cape Town: SALDRU, University of Cape Town.

World Bank. 2006. Social safety nets in OECD countries. Washington, DC: World Bank.

Wright, G., Neves, D., Ntshongwana, P. and Noble, M. 2015. Social assistance and dignity: South African women's experiences of the child support grant. *Development Southern Africa* 32 (4):443-457.

Yamauchi, F. 2005. Early childhood nutrition, schooling and within-sibling inequality in a dynamic context: Evidence from South Africa. FCND Discussion Paper No. 203. Washington, D.C: International Food Policy Research Institute.

Yirga, C. and Hassan, R.M. 2013. Determinants of inorganic fertiliser use in the mixed crop-livestock farming systems of central highliands of Ethiopia. *African Crop Science Journal* 21 (3):669-681.

Zembe-Mkabile, W., Surender, R., Sanders, D., Jackson, D. and Doherty, T. 2015. The experience of cash transfers in alleviating childhood poverty in South Africa: Mothers' experiences of the Child Support Grant. *Global Public Health* 10 (7):834-851.

Zhou, Y., Yang, H., Mosler, H.-J. and Abbaspour, K.C. 2010. Factors affecting farmers' decisions on fertilizer use: A case study for the Chaobai watershed in Northern China. *Consilience: The Journal of Sustainable Development* 4 (1):80-102.

Zibagwe, S., Nduna, T. and Dafuleya, G. 2013. Are social protection programmes child-sensitive? *Development Southern Africa* 30 (1):111-120.

CHAPTER 3 THE IMPACT OF SOCIAL GRANTS ON RURAL HOUSEHOLDS' INCENTIVES TO FARM: EVIDENCE FROM KWAZULU-NATAL

3.0 Abstract

This chapter aimed to investigate the impact of social grants on rural households' incentives to farm. The incentives to farm were captured by two variables: (1) the proportion of land area cultivated by the farmers; and (2) the proportion of prime-aged, able-bodied household members that participate in smallholder farming activities. Using a sample of 984 rural households selected across four districts of KwaZulu-Natal, data were analysed using the logit transformation procedure, the Papke and Wooldridge (1996) model and the propensity score matching method. The econometric results indicated that access to, and dependency on, social grants did not influence, either positively or negatively, the proportion of land under cultivation. This result suggests that the declining land under cultivation among rural households is not due to social grants. Instead, the study identified several other constraints that policy-makers should focus on to improve the proportion of cultivated land in rural areas. In terms of the household members' participation in farming activities, the results were in line with the disincentive hypothesis. The empirical results indicated that access to, and increasing levels of dependency on, social grants led to a significant reduction of the number of the household members that participate in smallholder farming activities. The implication of this result is that, although social grants are aimed at the vulnerable groups, they also reach the unintended household members, creating disincentive effects. Since social grants are important in addressing rural household poverty, the study recommends that they should continue, but policy-makers should be particularly cognisant of their possible adverse consequences on smallholder farming. The study also identified other variables that affect land area cultivated and participation by household members in smallholder farming, highlighting the importance of expectations of farming success as a key motivator. Policy options are presented for making agriculture more viable and become attractive to those who are opting out of agriculture and relying on social grants.

Keywords: Social grant-dependency, incentives to farm, rural areas, logit transformation, Papke and Wooldridge model

3.1 Introduction

There has been considerable debate in South Africa on the potential unintended incentive effects of social grants on people's economic behaviour. Despite being targeted at specific vulnerable groups, the prevalent multi-generational households in South Africa mean that there is potential for spill-over effects among household members (Klasen and Woolard, 2008; Abel, 2013; Devereux, 2013). According to Devereux (2013), the spill-over effects results in many unemployed or underpaid adults depending on these grants, i.e., becoming dependent on social grants beneficiaries. Since social grants add significant resources into the hands of the poor households, this intra-household redistribution raises a concern that social grant receipt may have negative effects on the working-age individuals' incentives to work (Williams, 2007; Mabugu *et al.*, 2014).

As highlighted in the previous chapters, the debate on the impact of social grants impact on non-farm labour supply has been inconclusive. Some studies (e.g., Posel *et al.*, 2006; Williams, 2007; Ardington *et al.*, 2009; Ardington *et al.*, 2013) have found that social grants have a positive impact on economic activities by easing the household's financial constraints. In contrast, several other studies (e.g., Bertrand *et al.*, 2003; Samson *et al.*, 2004; Abel, 2013) have reported that social grants reduce households' economic activities and that social grants reduce incentives to work. The small difference between the social grant amounts and available labour-market wages offers little incentive for the poor to seek or take up paid work, especially casual and temporary jobs (Johannsmeier, 2007; Mabugu *et al.*, 2014). For example, the average minimum monthly wage across sectors in South Africa was about R2 000 in 2014 (Department of Labour, 2014), compared to the R1 350 per month for the old age grant (OAG) or disability grant (DG).

According to Klasen and Woolard (2008), not only are many of those households with unemployed members located in rural areas, but some people are leaving urban areas to depend on social grants in the rural areas. This has the adverse effect that it may attract the prime-aged household members away from job markets to rural areas, where employment opportunities are scarce (Klasen and Woolard, 2008). However, the social grants are inadequate and the sharing of social grants income with unintended members pulls many households supporting them into poverty (Klasen and Woolard, 2008; Armstrong and Burger, 2009; Mabugu *et al.*, 2013). It is against this background that smallholder farming remains key in the reduction of rural poverty and household food insecurity (Eastwood *et al.*, 2006; Aliber and Hall, 2012).

Despite its importance, several authors (e.g., White and Killick, 2001; Aliber and Hart, 2009; Aliber and Hall, 2012; Tshuma, 2012) have reported a decline in smallholder farming activity in the rural areas of South Africa. This decline has been largely attributed to dependency on social grants (Neves *et al.*, 2009; Tshuma, 2012). Given that smallholder agriculture has been put forward as a viable option for the absorption of labour in the rural areas, the reported large areas of previously cultivated land that now lie abandoned is a cause for concern for both academics and policy-makers (Andrew *et al.*, 2003; Eastwood *et al.*, 2006; DED, 2011; Aliber and Hall, 2012). However, the studies linking declining farming activity and social grants have been based on limited descriptive statistics and anecdotal evidence. As explained in the previous chapters, these inferences should be regarded with caution, as the authors have not controlled for other relevant factors.

This chapter, therefore, aimed to contribute to literature on impacts of social grants, by investigating the extent to which social grants affect rural households' incentives to farm in KwaZulu-Natal, using advanced econometric techniques. As previously noted, literature on the potential disincentive effects of the social grants have mainly focused on non-farm labour supply. However, the farming sector should also be considered, so as to enrich the social grants impact literature. Moreover, the literature has found contradictory results, which necessitates the need for more studies using different data sets and methods focusing on specific sectors. The incentives to farm in this study were captured using two variables: (1) the proportion of land area cultivated by the farmers; (2) the proportion of prime-aged, able-bodied household members that participate in smallholder farming activities. To the best of the author's knowledge, there are few studies, if any, that have linked social grants and these variables to capture households' incentives to farm.

The chapter's other novel contribution is in the way the influence of social grants was handled. Two variables were used to capture the influence of social grants: (1) a dummy variable showing whether or not a household has a member who receives any of the social grants was created; (2) while other studies have simply focussed on the impact of, mostly, one or a few of the social grants, the proportion of income from all the social grants to household income was used. The proportion variable was introduced to capture the importance of all the social grants to household income.

The remainder of this chapter is divided into three sections. The following section presents the research methodology adopted, where the study area, sampling approach and empirical models

are discussed. The results are presented and discussed in the subsequent section, while the final section of the chapter presents conclusions and policy implications of the chapter.

3.2 Research methodology

3.2.1 Data

The data for this chapter includes all the 984 households that were randomly selected from the four district municipalities of the KZN province, as described in Chapter 2. The relevant questionnaire modules for this chapter include information on basic household head characteristics, such as sex, age, marital status and education level. Also relevant were measures of household wealth endowment (such as household assets, livestock and land); agricultural production activities; household income amounts and sources. Institutional and organisation support issues such as farmer associations, market access, credit and extension support were relevant. The questionnaire also captured how household members allocate their labour, asking questions on the household size, the number of prime-aged, able-bodied members as well as the number of dependants (below 15 years; over 65 years and the permanently sick). Of the prime-aged, able-bodied members, the questionnaire included questions on how many were employed off-farm, how many were unemployed and reside at home and how many members participated in farming activities.

3.2.2 Conceptual framework

This chapter is based on the unitary agricultural household model and micro-economic theory. The agricultural household model postulates that, while semi-subsistent agricultural households are rational, they do not necessarily aim to maximize profit, but they seek to maximise household utility (Singh *et al.*, 1986). The unitary model of households views the household as a single utility-maximising entity. According to the unitary model, the household finds ways to act together as an entity, despite comprising members with individual and heterogeneous preferences (Samuelson, 1956). The implication here is that social grants, although targeted to individuals, benefit households as a whole, not just the specific individual. As in consumer theory, the household acts as a utility-maximising individual, whose

indifference curves and utility are homothetic and identical for all members of the household (Binger and Hoffman, 1998).

The agricultural household model assumes that households control a bundle of assets or endowments such as land, labour, livestock and financial capital, which they allocate across a number of livelihood activities (e.g., farming, wage employment and other non-farm activities) (Vance and Geoghegan, 2004; Barrett, 2006). A summary of the model, as adapted from Singh *et al.* (1986) for use in this study, assumes that the household seeks to maximise utility subject to the budget, production and time constraints, as presented below:

$$
\begin{aligned}
&\text{Max } U = U(X_a, X_m, X_l) && \textit{utility maximisation}, \text{ s. t.}\\
&P_m X_m \leq p_a(Q_a - X_a) - p_l(L - F) - p_v V + Y_g && \textit{cash income constraint},\\
&Q_a = Q(L, V, A, K) && \textit{production constraint},\\
&X_l + F \leq T && \textit{time constraint},\\
&X_a, X_m, Q \geq 0 && \textit{non-negativity constraints} \qquad (3.1)
\end{aligned}
$$

The model indicates that rural households, as rational agents, aim to maximise household utility, which is a function of consumption of agricultural goods (X_a) and consumption of market-purchased goods (X_m) and leisure (X_l). Utility is maximised subject to a cash income constraint, in which the cost of market purchased goods, determined by price P_m, is less than or equal to household income. Total household income comprises earned household income ($p_a(Q_a - X_a) - p_l(L - F) - p_v V$) and unearned household income Y_g. Earned household income includes profits from agricultural and non-agricultural activities, while unearned income is from sources such as social grants and remittances. P_a are the prices of the agricultural goods; Q_a is the household's production of the agricultural goods, meaning that $Q_a - X_a$ is its marketed surplus.

Moreover, p_l is the market wage; L is total labour input and F is family labour input, meaning that L - F, if positive, is hired labour and, if negative, is off-farm labour. V in the cash income constraint equation is a variable input (for example, fertiliser) and p_v is the variable input's market price. The household also faces a production constraint that depicts the relationship between inputs and farm output. A is the fixed quantity of land and K the fixed stock of capital. Household choices are further restricted by a time constraint, which implies that a household cannot allocate more time to leisure, on-farm production, or off-farm employment than the total time available to the household. T is the total stock of household time. Finally, it is assumed that X_a, X_m and Q are non-negative values. Further assumptions are that only one crop is

produced, family and hired labour are perfect substitutes, production is riskless and that households are price takers.

The production and time constraints can be substituted into the cash income constraint to produce the following single constraint:

$$p_mX_m + p_aX_a + p_lX_l = p_lT + [p_aQ_a\ (L, V, A, K) - p_lT - pvV] + Y_g \qquad (3.2)$$

The left-hand side shows total household expenditure on the market-purchased commodity (p_mX_m), the household's "purchase" of its own output (p_aX_a), and the household's "purchase" of its own time in the form of leisure (p_lX_l). The right-hand side is the household's full income, which includes the value of the stock of time (p_lT), farm profits ($p_aQ_a\ (L, V, A, K) - p_lT - pvV$) and unearned income ($Y_g$).

Maximisation of household utility subject to the single constraint yields the following first-order conditions:

$$\frac{\delta Q_a}{\delta L} = \frac{p_l}{p_a} \qquad (3.3a) \qquad \frac{\delta Q_a}{\delta V} = \frac{p_v}{p_a} \qquad (3.3b)$$

$$\frac{\delta U}{\delta X_a} \Big/ \frac{\delta U}{\delta X_m} = \frac{p_a}{p_m} \qquad (3.4a) \qquad \frac{\delta U}{\delta X_l} \Big/ \frac{\delta U}{\delta X_m} = \frac{p_l}{p_m} \qquad (3.4b)$$

Equations 3.3a and 3.3b indicates that households equate the marginal revenue products for labour and variable inputs to their respective market prices. The maximised value of profits can be substituted into equation 2 to yield:

$$p_mX_m + p_aX_a + p_lX_l = Y^* \qquad (3.5)$$

Where: Y* is the value of full income associated with profit-maximising behaviour. Equations 3.4a, 3.4b, and 3.5 can be thought of as the first-order conditions of a second maximisation. That is, having first maximised profits (Equations 3.3a and 3.3b), the household then maximises utility subject to its (maximised) value of full income.

The objective of this chapter is to investigate the effect of social grants (unearned income) on the proportion of land area cultivated and proportion of household labour involved in farming activities. Land area cultivated and household labour are studied as the main determinants of agricultural production, represented by the variable Q_a. A change in unearned income (Y_g)

changes total household income, shifting the budget line. If, for example, unearned income increases, the budget line shifts to the right. Assuming normal goods, the parallel shift in the budget line results in an increase in consumption goods and leisure. According to the micro-economic theory, the increase in recipients' welfare as a result of the income effect generated by transfers discourages recipients from working (Binger and Hoffman, 1998; Barrett, 2006).

In other words, increases in social grant income can potentially reduce farming households' incentives to put more land under cultivation, or supply more labour to farming activities, as they can maintain their utility level through the unearned income, *ceteris paribus*. The theoretical rationale is that, as household income rises, the additional benefit to the household from working for further income falls and work incentives are dampened (Binger and Hoffman, 1998). The recipients reduce work effort simply because even hard-working people prefer more leisure to less (Barrett, 2006; Sharaunga and Wale, 2013). Therefore, it is expected *a priori* that there is a negative relationship between social grants and proportion of land area under cultivation or proportion of household labour involved in farming activities.

3.2.3 Dependent and independent variables

The incentive to farm in this chapter was captured by the proportion of land cultivated by a household in the previous season, before the survey, and the proportion of the proportion of unemployed family labour (able-bodied adult household members) who participated in farming activities on a regular basis last season. The proportion of cultivated land, instead of total crop production, was preferred, since it is the decision that better reflects farmers' incentives or disincentives (Sharaunga and Wale, 2013). This is because agricultural production is affected by other technical inputs, as well as by natural factors than can be controlled for in a model. Attributing lower agricultural production to disincentive effects of social grants would be inaccurate, to the extent that other technical inputs are the constraints and natural factors are random (Sharaunga and Wale, 2013). Since smallholder farmers rarely use hired labour, but rely on family labour (Gollin, 2014), their incentives to farm can also be captured by the extent to which family members engage in agricultural activities.

To generate the proportion of land area cultivated, the land that was cultivated in the previous season was divided by the total farm land that the household has access to, either through

allocation, inheriting or leasing. The variable excluded land that was not cultivated for rational agronomic and/or economic reasons, such as fallowing. Since this variable focuses on incentives for crop farming, livestock farming was controlled for by including livestock size as one of the explanatory variables in the model. The proportion of unemployed family labour (able-bodied adult household members) who participated in farming was generated by dividing the number of unemployed able-bodied adult household members who participated in farming by the total prime-aged, able-bodied unemployed household members. The prime-aged, able-bodied household members were defined as those who are aged between 16 and 64. Those who are invalids or too sick to work were excluded.

This study used a dummy variable, showing whether or not a household has access to grants or not, and the proportion of household income from social grants. The weakness of the dummy is that it would classify all social grants recipient households in the same way, regardless of the level of social grant support (Agüero *et al.*, 2007). The proportion variable, on the other hand, captures the variation in the social grants' contribution to household income, accounting for the relative importance of social grants. Treating a household that receives just 10% of its income from social grants the same as a household that receives more than 50% of its income from grants seems likely to understate the potential effect of social grants. Total household income included the incomes that the household received from different sources, which included employment, remittances, social grants, farming, micro-businesses and arts and culture. To capture the amount of social grants income, the household were asked the social grant types that any member of the household received and when each member had begun receiving the grant.

The econometric models included other variables that were hypothesised to influence households' decision-making processes and incentives to farm. These included household head demographics (captured by age, gender and marital status), wealth endowment (captured by farm size, asset values and livestock size), human capital (captured by education level and farming experience) and social capital (captured by farmer association membership). The model included labour endowment (captured using the number of able-bodied adult household members) as well as farmer support services (captured by access to extension, agricultural training, credit, markets and tillage). Off-farm and non-farm commitments were included, captured as off-farm employment and non-farm business ownership. The perceptions of rainfall, soil quality and tenure were also included, as these are important motivators for

households to farm. District dummies were introduced to capture the political, social and agro-climatic variations in these areas that may impact on farming incentives, but were not captured in the model. The Harry Gwala district was chosen as the base category because it has the largest number of farming households. Moreover, smallholder farming plays a major role in the Harry Gwala district compared to what it does in other districts. The next subsection presents the empirical models that were used to achieve the objectives of this chapter.

3.2.4 Empirical methods

To assess the potential disincentive effects of social grants on farming, the logit transformation procedure, Papke and Wooldridge (1996) model and propensity score matching methods were used. These different econometric techniques were used together for robustness checks. These models, as well as the estimation issues such as testing and/or correcting for endogeneity, are described in the following sub-sections.

3.2.4.1 Logit transformation

Since the dependent variables are proportion responses, ordinary least squares (OLS) is inappropriate, as the predicted values from the regression can never be guaranteed to lie in the unit interval (Papke and Wooldridge, 1996). The logit transformation procedure is commonly used to handle proportion response outcomes (Baum, 2008; Wale, 2010; Sharaunga and Wale, 2013). Therefore the logit transformation procedure was adopted in this study to transform the proportion response variable (Y) as follows:

$$Y^{*} = \log\left(\frac{Y}{1-Y}\right) \qquad (3.6)$$

Where: Y is the proportion response before transformation, and Y* is the transformed response variable.

This procedure, however, is only directly appropriate when the values of the response variables are strictly within the unit interval, i.e., it cannot be directly used if Y takes on the boundary values of zero and one (Papke and Wooldridge, 1996; Baum, 2008). Since a large number of households, for example, either did not cultivate their land at all (88 households) or cultivated all their land (298) in this study, the boundary values were substituted with close

approximations, following Wale (2010). OLS is appropriate to model the transformed variable, Y*.

3.2.4.2 The Papke and Wooldridge model

The logit transformation approach described above has two main drawbacks. Firstly, it would not be straightforward to recover regression function for the proportional variable, meaning that it is not easy to interpret the coefficient estimates (Ramalho *et al.*, 2011). Secondly, the transformed dependent variable is not well-defined for the boundary values zero and one of Y, requiring *ad hoc* adjustments, as was done in this study. Therefore, for robustness checks, the Papke and Wooldridge (1996) model, hereafter the PW model, was also estimated.

The PW model makes use of simple quasi-likelihood estimation methods and, compared with the logit transformation procedure, there is no difficulty in recovering the regression function for the proportion variable, and there is no need to use *ad hoc* transformations to handle data at the extreme values of zero and one (Papke and Wooldridge, 1996). For detailed discussions of this model, interested readers may consult studies such as those of Papke and Wooldridge (1996), Hoff (2007) or Ramalho *et al.* (2011). The PW model was estimated in Stata, as suggested by Baum (2008).

3.2.4.3 Estimation and selection bias issues

Evaluating the impact of social grants on the incentives to farm involved estimation of the following equation:

$$Y^*_i = \beta x_i + \delta_1 G_i + \delta_2 GD_i + \varepsilon_i \qquad (3.7)$$

Where: Y^*_i is the proportion response variable after logit transformation; G_i is a dummy variable showing whether or not a household has access to social grants; GD_i is the proportion of household income from social grants; x_i is a vector of household characteristics, β's and δ are parameters to be estimated and ε_i is the residual term.

Estimating the parameter δ_1 using OLS offers an unbiased estimate of the impact of access to social grants on the transformed proportion variable, provided that it is uncorrelated with ε_i (Maddala, 1991; Greene, 2003). This would be true, for example, if social grants were randomly distributed, or if only observed characteristics are believed to affect selection (Khandker *et al.*, 2010). However, assuming that social grants are random is untenable, since

they are targeted at households with assets and income values below a certain threshold (Patel *et al.*, 2013). If selection was only based on observed characteristics, then introducing them all in the model would remedy the selection bias problem. However, assuming that selection on a national voluntary programme such as social grants is unrelated to unobserved factors that, themselves affect the outcomes is hard to sustain (Agüero *et al.*, 2007).

The present study corrected for selection on unobservables through the Heckman's two-step procedure (Heckman, 1979). This procedure involved: (1) generating the inverse Mills ratio (IMR) using access to social grants as the dependent variable in the selection equation; (2) adding IMR to Eq. 3.7 and estimating the equation using OLS. In order to estimate the selection equation, assume that access to social grants (G_i) is a linear function of the exogenous covariates (z_i) and the residual error u_i.

Specifically, assume that access to social grants is modelled as follows:

$$G^*_i = \gamma z_i + u_i \,,$$
$$G_i = 1 \text{ if } G^*_i > 0, \text{ and } 0=\text{Otherwise.} \qquad (3.8)$$

Where: G^*_i is the latent endogenous variable, such that G_i takes a value of 1 when G^*_i is greater than zero; z_i is a vector of household characteristics that influence a household's access to grants; γ are the coefficients to be estimated; and u_i is the residual term.

A binary probit model was used to estimate the selection equation. Using the selection equation (Eq. 3.8), the IMR was constructed as follows:

$$\lambda_i = \phi(\gamma z_i) / \Phi(\gamma z_i) \qquad (3.9)$$

Where: λ_i is the inverse Mills ratio (IMR), ϕ is the density function of a standard normal variable, Φ is the cumulative distribution function of a standard normal distribution, z_i and γ are as defined above.

The IMR was added to Eq. 3.7, which was then estimated using OLS, as follows:

$$Y^*_i = \beta x_i + \delta_1 G_i + \delta_2 GD_i + \beta_\lambda \lambda_i + \varepsilon_i \qquad (3.10)$$

Where: Y^*_i is the proportion response variable after logit transformation; x_i is a vector of household characteristics; G_i is a dummy variable showing whether or not a household has access to social grants; GD_i is the proportion of household income from social grants; λ_i is the

IMR, β's and δ are parameters to be estimated and ε_i is the residual term. A non-significant coefficient of the IMR (as was the case in this chapter) indicates that there is no self-selection problem, while a significant coefficient term implies sample selection problem. Due to the inclusion of the selectivity term, the impact coefficient δ in Eq. 3.10 is unbiased.

The Hausman test (Hausman, 1978) was done to test for potential endogeneity of dependency on social grants (GD_i) in the models. For example, the proportion of land area under cultivation may, in fact, affect dependency on social grants, since increased land area under cultivation can potentially lead to increased output and farm income, *ceteris paribus*. The increased farm income would result in decreased dependency on social grants.

The Hausman test was implemented by firstly regressing social grants dependency (GD_i) on the exogenous explanatory variables, as follows:

$$GD_i = m\gamma + w_i \tag{3.11}$$

Where: GD_i means dependency on social grants, m is a vector of exogenous variables, γ are the estimated coefficients and w_i is the residual term.

The second step involved obtaining the residuals (w_i) and then adding these residuals in Eq. 3.7. A statistically significant estimated coefficient of the residuals would mean endogeneity problems, while a statistically insignificant estimate (as was the case in this study) means no evidence of the endogeneity problem.

3.2.4.4 Propensity score matching (PSM) method

The propensity score matching (PSM) method was used to provide further robustness checks on the estimated impact parameters. According to Hoff (2007), it is important to make comparisons among different models when estimating proportion response variables to check whether or not results are robust. PSM has been used by a number of studies (e.g., Samson *et al.*, 2008; Neves *et al.*, 2009; DSD *et al.*, 2012) to estimate the impact of social grants on different outcomes (e.g., nutrition, school attendance and hunger) in South Africa. However, unlike this study, these studies did not first test for selection bias due to unobservables. Use of PSM depends on the critical statistical assumption that treatment (receipt of social grants in this case) is unrelated to unobserved factors that themselves affect the outcomes (the

conditional independence or the unconfoundedness assumption) (Rosenbaum and Rubin, 1983; Khandker *et al.*, 2010).

PSM produces biased estimates if this assumption is violated (Khandker *et al.*, 2010). The PSM method would result in unbiased and robust impact estimates in this study because there was no evidence of selection bias due to unobservables (Table 3.6). The advantage of PSM is that it is does not depend on a specific functional form of the outcome (Baker, 2000; Blundell and Costa-Dias, 2000). It avoids the linearity imposition, multicollinearity and heteroscedasticity issues (Cuong, 2007; Peel, 2014). Whereas the regressions described above employ all observations in the treatment and control samples, PSM uses only matched sub-samples (Jalan and Ravallion, 2003a; Abebaw *et al.*, 2010). Compared to estimates based on full samples, the impact estimates based on matched samples are less biased and more reliable (Rubin and Thomas, 2000; Abebaw *et al.*, 2010).

To apply PSM in this study, assume that our dependent variable of interest is the proportion of land area cultivated. It should be noted that the same explanations apply for the other[2] dependent variable, the proportion of working age household members who participate in farming activities. Further assume that, for example, the proportion of land area cultivated by social grant beneficiary household *i* was Y_{1i}. The proportion of land area cultivated by a social grant non-beneficiary household is then assumed to be Y_{0i}. Also assume that G_i denotes access to social grants by household *i*; and that it can take two values; namely $G_i = 1$ if the household is a social grant beneficiary; and $G_i = 0$ if the household is a non-beneficiary. Therefore the Average Treatment Effect (ATE) on the whole sample would be estimated as follows:

$$\begin{aligned} ATE &= E[\Delta_i] \\ &= E[Y_{1i} - Y_{0i}] \\ &= E[Y_{1i} - Y_{0i} \mid G_i=1] \Pr(G_i=1) + E[Y_{1i} - Y_{0i} \mid G_i=1] \Pr(G_i=0) \end{aligned} \quad (3.12)$$

Where: $E[\Delta_i]$ is the expected impact on household *i*; Pr is the probability and other variables are as defined above. The ATE is the weighted average, which tells us what the expected effect of the access to social grants would be on the average proportion of land area cultivated for the entire population (Cobb-Clark and Crossley, 2003).

[2] It should also be noted that PSM was used in other chapters for other outcomes. The same explanations as given here apply, with the only variations being the dependent variable of interest.

The interest of this study, however, was to evaluate the impact of social grants on those households that are actually social grant beneficiaries. The focus was on estimating the Average Treatment effect on the Treated (ATT), the expected treatment effect over the sample of social grant beneficiaries, which is estimated as follows:

$$ATT = E[\Delta_i | G_i=1] = E[Y_{1i,t} | G_i=1] - E[Y_{0i,t} | G_i=1] \quad (3.13)$$

Where: $E[\Delta | G_i=1]$ is the expected treatment effect; $E[Y_{i1} | G_i=1]$ is the proportion of land area cultivated by the social grants beneficiary households and $E[Y_{i0} | G_i=1]$ is the proportion of land area that would have been cultivated by the social grants beneficiaries had they not been social grant beneficiaries. The ATT tells us what change in the proportion of land area cultivated (outcome) was realised by those households which are social grant beneficiaries subject to their access to social grants status.

The fundamental evaluation problem is that of missing data problem (Smith and Todd, 2005). This is because the proportion of land area cultivated for the social grant beneficiary households, had they not been social grant beneficiaries, cannot be observed. Similarly, the proportion of land area cultivated by the non-beneficiary households, had they been social grant beneficiaries, cannot be observed. In other words, the treatment indicator takes either one or zero, but not both. Therefore the propensity score matching procedure was used to generate the missing data (Baker, 2000; Blundell and Costa-Dias, 2000; Jalan and Ravallion, 2003b; Ravallion, 2008; Khandker *et al.*, 2010). PSM uses survey data to construct a comparison group by matching households with access to social grants to non-grant recipient households over a set of socio-economic variables. The main purpose of matching is to re-establish the conditions of an experiment when no such data are available (Rosenbaum and Rubin, 1983; Blundell and Costa-Dias, 2000).

PSM is able to estimate the causal social grant impact, for example, as the difference between the proportions of land area cultivated for the beneficiaries and what would have been the case if this group had not received the social grants. Estimating the propensity score, which is simply the probability that a household is a social grant beneficiary, is a crucial step in using matching as an evaluation strategy. The probit model, as specified in Eq. 3.8, was used to generate the propensity scores. According to Becker and Ichino (2002), an estimate of the propensity score is not enough to estimate the average treatment effect on the treated (ATT), since the probability of observing two units with exactly the same value of the propensity score is, in

principle, zero. Various matching algorithms have been proposed in the literature to determine the region of common support. The most widely used are the nearest neighbour matching, radius matching, Kernel matching and stratification matching (Heckman *et al.*, 1997; Becker and Ichino, 2002; Dehejia and Wahba, 2002; Smith and Todd, 2005).

A matching estimator is considered good if, on the one hand, it does not eliminate too many of the original observations from the final analysis, while, on the other hand, it yields statistically equal covariate means for households in the treatment and control groups (Caliendo and Kopeinig, 2005; Abebaw and Haile, 2013). The nearest neighbour matching and Kernel matching were reported in this study. The nearest neighbour was chosen because it is generally used in practice due to its ease of implementation, while Kernel matching is a recently developed technique that is gaining popularity in non-experimental literature (Smith and Todd, 2005; Dillon, 2011). The balancing property was selected in estimating the propensity scores. The use of the balancing property ensures that a comparison group is constructed with observable characteristics distributed equivalently across quintiles in both the treatment and comparison groups (Smith and Todd, 2005).

In constructing the matching estimates, the common support was imposed. The treatment observations with weak common support were dropped, since inferences can be made about causality only in the area of common support (Heckman *et al.*, 1997). All the standard errors were bootstrapped with 1000 repetitions, as suggested by Smith and Todd (2005). The sensitivity of the estimated average welfare effects to hidden bias was tested, using the Rosenbaum (2002) bounds test. This test indicates how strongly an unobservable variable must influence the selection process to undermine or reverse the findings based on matching on observables (Rosenbaum, 1991; Rosenbaum, 2002; Rosenbaum, 2005). The test was implemented in Stata using an ado file (*rbounds*) provided by DiPrete and Gangl (2004). While the ado file by DiPrete and Gangl (2004) implements sensitivity test for continuous outcome variables, Becker and Caliendo (2007) have provided an ado file (*mhbounds*) which focuses on binary outcome variables.

To estimate the impact of the level of dependency on the outcomes of interest, two approaches were used. The first involved converting the level of dependency on social grants into two classes: the low and high social grant-dependency levels categories. The low social grant-dependency category comprised of those households with access to social grants, and social grants contributed less than 50% of total household income. The high social grant-dependency

category were those households where social grants contributed more than 50% of total household income. To apply PSM, as explained above, the low social grant-dependency category was assumed to be the control group, while the high social grant-dependency category was assumed to be the treatment group. The second approach used to estimate the impact of the level of social grants dependency on the outcomes was the continuous treatment method developed by Hirano and Imbens (2004). The next sub-section provides a brief description of this method.

3.2.4.5 The generalised propensity score (GPS) method

The generalised propensity score (GPS) method was used to estimate the impact of the level of social grant dependency on outcomes[3], such as the proportion of land area cultivated and proportion of the unemployed working age household members who participated in smallholder farming activities. The PSM approach described in the previous subsection only works when the treatment variable is binary. Essentially, the GPS method extends the PSM method described above to deal with a setting where the treatment is not binary but continuous. This GPS method was implemented using a Stata programme developed by Bia and Mattei (2008). In summary, the implementation of the GPS method consisted of three steps (Bia and Mattei, 2008). This study presents a brief summary of the three steps, and interested readers may consult studies such as those of Agüero *et al.* (2007); Bia and Mattei (2008); Bia and Mattei (2012); and Hirano and Imbens (2004), for detailed discussions of the GPS method.

In the first step, the score was estimated. To estimate the conditional distribution of the level of dependency on social grants, GD_i, given the covariates, it was assumed that that the level of dependency on social grants follows a normal distribution, conditional on the covariates:

$$g(GD_i)|m_i \sim N[h(\gamma, m_i), \sigma^2] \quad (3.14)$$

Where: $g(GD_i)$ is a suitable transformation of the level of dependency on social grants variable (the treatment variable), and $h(\gamma, m_i)$ is a function of covariates with linear and higher-order terms, which depends on a vector of parameters, γ. The higher-order terms were included in order to obtain an estimate of the GPS that satisfies the balancing property (Bia and Mattei,

[3] As was the case with PSM, GPS was also used in other chapters. The same explanations apply, with only the outcomes varying.

2008). The tests for normality and the balancing property were done to ensure that these assumptions were met before estimating the GPS.

The GPS was estimated as follows:

$$\hat{R}_i = \frac{1}{\sqrt{2\pi\hat{\sigma}^2}}\exp[-\frac{1}{2\hat{\sigma}^2}\, g(GD_i) - h(\hat{\gamma}, m_i)] \quad (3.15)$$

Where: $\hat{R}_i$ is the estimated score; and other variables and parameters are as defined before.

The second step involved estimating the conditional expectation of the outcome Y_i, say proportion of land area cultivated, given the level of dependency on social grants (GD_i) and the GPS (R_i). The conditional expectation of the outcome was estimated as a function of the two scalar variables, GD_i and R_i, as follows:

$$\varphi[E(Yi|GD_i, R_i)] = \psi(GD_i, R_i, \alpha) \quad (3.16)$$

Where: $\varphi(.)$ is a link function that relates the predictor, $\psi(GD_i, R_i, \alpha)$ to the conditional expectation; α are the parameters to be estimated using the polynomial approximations; and other variables are as defined before. Following Bia and Mattei (2008), the polynomial approximations of order higher than three were not used.

The final step involved estimating the dose-response function. The estimated regression function was averaged over the score function and evaluated at the desired level of the treatment. The average potential outcome (dose response function) for each level of dependency on social grants was estimated as follows:

$$E[\widehat{Y}(t)] = \frac{1}{N}\sum_{i=1}^{N}\hat{\beta}[gd, \hat{r}(gd, m_i)] = \frac{1}{N}\sum_{i=1}^{N}\varphi^{-1}[\hat{\psi}(gd, \hat{r}(gd, m_i), \hat{\alpha})] \quad (3.17)$$

Where: $\hat{\alpha}$ is the vector of the estimated parameters in the second stage and other variables and parameters are as described above. The outcomes investigated in this chapter were the proportion of land area cultivated and the proportion of the unemployed working age household members that participate in smallholder farming activities. However, it should be noted that the GPS approach was used in other chapters where different outcomes were investigated. The next section presents the chapter's empirical results and discussions.

3.3 Empirical results and discussions

3.3.1 Household demographics and socio-economic characteristics

Tables 3.1 and 3.2 present the demographics and socio-economic characteristics of the sampled 984 households. Table 3.1 presents the continuous variables and their means, while Table 3.2 presents the categorical variables and their proportions. Most of the figures presented in the two tables are comparable to those reported for the KZN province in the latest census (2011) by Stats SA (2012b). This suggests that the study data is somewhat representative of KZN, particularly the rural areas. Table 3.1 indicates that the average age of household heads (AGE) was above 50, implying that the rural farming households are headed by aged people. This is expected, since the much younger generation generally move to urban areas in search of more lucrative and higher paying ventures in non-farm sectors. The result is consistent with other studies in South Africa (e.g., Aliber and Hart, 2009; Sinyolo *et al.*, 2014a; Maponya *et al.*, 2015) which have reported this apparent disdain of the youth for agriculture. This has implications on the future of smallholder agriculture, as it suggests the lack of a clear succession plan.

Table 3.1 indicates that the heads of rural households interviewed attained low levels of education (EDUCAT), as indicated by a small average number of schooling years. In fact, as shown in Table 3.2, over 30% of the household heads had no formal schooling (SCHOOLNG) at all. This figure, which is higher than the 10% reported by Stats SA (2012a) for the KZN province, is representative of the older age groups residing in the rural areas. More people have no formal schooling in the rural areas compared to urban areas, as has been reported by studies such as that of Gardiner (2008). The rural households had bigger families (HHSIZE), bigger than the average sizes reported for the KZN province in the 2011 census by Stats SA (2012a). However, it is consistent with the figures reported by several studies (Aliber and Hart, 2009; DSD *et al.*, 2012; Sinyolo *et al.*, 2014a) for rural areas and social grant recipient households in KZN. The results in Table 3.1, even though showing big household sizes, indicate moderate levels of dependency (INVDEP), with an average of 0.59 active household members per non-active member. The inverse dependency ratio in this study was closely comparable to that reported by Stats SA (2012b) for the KZN province.

Table 3.1: Description and means of continuous variables

Variable code	Variable name and description	Mean	SD
AGE	Household head age (years)	56	13
AGESQ	Household head age square (years)	3325	1469
EDUCAT	Household head education level (years of schooling)	4.67	4.17
HHSIZE	Household size (numbers)	7.04	3.60
INVDEP	Inverse dependency ratio	0.51	0.37
GRANTBEN	No. of grant beneficiaries per household (hh)	3.18	1.81
CSG	No. of child support grant beneficiaries per hh	2.28	1.81
OAP	No. of old age pension beneficiaries per hh	0.67	0.70
DG	No. of disability grant beneficiaries per hh	0.15	0.41
FCG	No. of foster care grant beneficiaries per hh	0.08	0.43
CDG	No. of care dependency grant beneficiaries per hh	0.01	0.15
LANDSZE	Land size household has access to (ha)	1.90	4.47
LANDCULT	Land cultivated (ha)	0.91	1.35
LANDALOC	Land allocated (ha)	0.85	1.52
LANDINH	Land inherited (ha)	0.57	1.12
LANDRNT	Land leased or rented (ha)	0.21	0.78
LANDBOT	Land bought (ha)	0.27	0.67
CULTPROP	Proportion of total land area cultivated	0.59	0.36
TOTLAB	No. of able-bodied, prime-aged hh members	3.61	2.30
HMEMP	No. of working age hh members employed	0.97	1.32
HMEMPROP	Prop. of working age hh members employed	0.32	0.35
HMUNEMP	No. of working age hh members unemployed	2.64	2.46
FLAB	No. of working age hh members engaged in farming	1.43	0.88
FLABPROP	Prop. of unemployed working age hh members engaged in farming activities	0.51	0.31
TLU	Livestock size per household (TLUs)	3.53	17.40
ASSETS	Value of assets (R)	82105	38937
TOTINC	Total annual household income (R)	46757	32707
GRANTINC	Annual income from grants (R)	16916	15877
FARMINC	Annual income from farm activities (R)	6553	12438
OTHERINC	Annual income from other non-grant and non-farm economic activities (R)	23617	26374
NOGRNTINC	Total income from non-grant sources [farming and other economic activities (FARMINC + OTHERINC)]	30170	19406
TOTINC/CA	Total annual household income per capita (R)	8498	8344
NOGRNTINC/CA	Total annual household income from non-grant sources per capita (R)	4537	6508
GRANTPROP	Proportion of income from social grants	0.38	0.26
FARMPROP	Proportion of income from farming activities	0.13	0.14
GRANTUSE%	Prop. of social grant income spent on farming activities	0.30	0.24
ROADDIST	Distance to the nearest all-weather road (km)	17.75	39.93
FARMEXP	Household head farming experience (years)	18.70	13.28

Notes: *n=984*

Source: 2014 household survey

As shown in Table 3.2, the majority (84%) of the sampled households had access to social grants (GRANTS), showing the wide coverage of social grants among rural households. Table 3.1 shows that on average, each household had about three social grants beneficiaries (GRANTBEN), highlighting the important role of social grants among rural households, in view of a household size of seven. The results indicate that without social grants, the average household income per capita would be 47% less (TOTINC/CA and NOGRNTINC/CA), indicating the important role of social grants among the rural households.

In terms of the breakdown of social grants, Table 3.1 indicates that the child support grant (CSG) was the most common per household, followed by the old age grant (OAG). There were few foster care grant (FCG) and care dependence grant (CDG) beneficiaries per household. These figures are generally consistent with other studies (e.g., DSD *et al.*, 2012), and the pattern is generally consistent with national figures in South Africa (SASSA, 2014). There were no beneficiaries of the War Veterans Grant and Grant-in-Aid among the sampled households. The breakdown of social grants suggest that, on average, a household gets a predictable and guaranteed monthly income of about R2 000 per month from social grants. This is a generous amount, especially in comparison to the minimum wage (=R2000) and medium income among Africans (=R800) in South Africa. However, as explained by Ulriksen (2012), social grants beneficiary households remain poor and this implies the need for complementary economic activities for them to escape poverty.

In terms of land size (LANDSZE), the farmers reported that they have access to about 2 ha, on average. Table 3.1 shows that, on average, most of the land was allocated to the household by the traditional leader (LANDALOC). The second largest source of land to the household was inheritance (LANDINH). The results indicate that there is a sizable amount of land that households source through renting or leasing (LANDRNT) and buying (LANDBOT). This demonstrates that there is a small illegal land market that is growing in the rural areas, particularly in the irrigation schemes as reported by other studies (e.g., Mnkeni *et al.*, 2010; Sinyolo, 2013). Table 3.1 shows that a significant amount of land was not cultivated last season (LANDCULT), with the farmers only managing to put just over 50% of their land under cultivation. This supports other studies (Andrew *et al.*, 2003; Eastwood *et al.*, 2006; Tshuma, 2012), which have reported that there are large areas of arable land that is not cultivated by rural households in South Africa.

Table 3.1 highlights high levels of unemployment among the prime-aged, able-bodied (working age) household members (HMEMPPROP) in the rural areas. The results show that only 32% of the prime-aged, able-bodied household members were employed, indicating the lack of economic opportunities in the rural areas. Similarly, Table 3.2 shows that only 20% of the household heads had non-farm employment. This figure is comparable to that of Eastwood *et al.* (2006), who reported that 29% of the respondents from the Limpopo province were employed non-farm. The fact that few household members were employed underscores the importance of smallholder farming among the rural households. However, the results show that only 54% of the unemployed active members participated in farming activities (FLABPROP).

The results also show that the rural households own some moderate livestock (TLU) and assets (ASSETS). Table 3.1 also indicates that, on average, social grants contribute 38% to household income (GRANTPROP), which is almost three times the 13% contribution of farming (FARMPROP). This is in line with what has been reported by other studies (e.g., Eastwood *et al.*, 2006; Tshuma, 2012), that social grants have become one of the main sources of income for rural households, having overtaken smallholder agriculture's contribution. Table 3.1 indicates that rural households get most of their income from other economic activities (OTHERINC), such as wages, remittances and small businesses. The low average non-social grant income and asset values indicate that most of the sampled rural households generally qualify for the social grants. While the threshold amounts differed for individual social grant types in 2014, beneficiaries needed to have incomes of less than R40 000 per year to qualify for social grants.

Discussions with the farmers indicated that income from social grants is used to settle a range of short-term expenses, from purchasing groceries and food to contributing to health and education. The majority of the households (78%), as shown in Table 3.2 (GRANTUSE), reported that they had used social grant money on agricultural activities the previous season. Table 3.1 shows that the households indicated that they spend about 30% of their social grant money on agricultural activities (GRANTUSE%). Several other studies (e.g., Samson *et al.*, 2008; Midgley, 2013) have also reported that money from social grants is used to fund agricultural activities and other microbusinesses in the rural areas. The fact that some income from social grants is spent on farming activities suggests that access to social grants can potentially have a positive influence on smallholder farming. This is because money from social grants may help farmers access farming inputs by easing financial constraints.

The farmers indicated that the roads were generally poor and inaccessible in the rural areas, with many rural households found about 18 km from the nearest all-weather road (ROADDIST). The roads connecting the rural households to the major roads were generally inaccessible by car. Consequently, the households use wheelbarrows or bicycles to get to the all-weather roads in most rural areas. On average, the household heads have been involved in farming for about 20 years (FARMEXP), indicating a good wealth of farming experience among rural households.

Table 3.2 indicates that male-headed households made up less than 50% of the interviewed rural farming households (GENDER). The fact that female-headed households dominate smallholder farming activities in South Africa is consistent with the prevalent stereotype of rural agriculture and has been reported by other studies (e.g., Feynes and Meyer, 2003; Aliber and Hart, 2009). Men generally migrate to towns in search of employment, while women remain in the rural areas, practising smallholder agriculture and looking after children and other family members who need assistance. The results show that 46% of the household heads were married, while the remainder were either never married, divorced or widowed (MARRIED).

As expected, the majority of the farmers perceived their soils to be fertile (SOILQUAL) and rainfall to be good (RAINFALL). KZN is characterised by good soils and rainfall patterns. A sizable proportion (45%) indicated that they had access to tractors or draught power for tillage services (TILLAGE). The tractors from government play a significant role in terms of improving access to tillage services farmers in the rural areas who would otherwise have no access to these services. Most of the farmers felt that their access to land was insecure (TENURE), especially among female-headed households. There were indications during discussions that female-headed households, in particular, may lose their land to their deceased husbands' male relatives.

The survey results indicate poor access to markets (MARKET) and support services such as training (TRAINING), extension (EXTENSION) and credit (CREDIT). The results show low levels of non-farm entrepreneurship among the interviewed households, as only a small proportion of households owned some non-farm micro-businesses (BUSINESS), such as weaving, handicrafts or tuck shops. A significant proportion of the households practised some form of irrigation (IRRIGAT). Some were members of smallholder irrigation schemes, while others watered their crops using cans and hosepipes.

Table 3.2: Description and proportions of categorical variables

Variable code	Variable name and description	Proportion
GENDER	Household head gender (1=Male)	0.47
MARRIED	Household head marital status (1=Married)	0.46
SCHOOLNG	Household head formal schooling (1=Yes)	0.69
GRANTS	Access to social grants (1=Yes)	0.84
GRANTUSE	Use social grants income for farming activities	0.78
HIREDLAB	Hiring in farm labour (1=Yes)	0.37
RAINFALL	Perceived rainfall (1=Good)	0.67
SOILQUAL	Perceived soil quality (1=Good)	0.55
TENURE	Secured land tenure (1=Yes)	0.37
TILLAGE	Tillage access (1=Yes)	0.45
MARKET	Market access (1=Yes)	0.20
ASSOC	Farmer association member (1=Yes)	0.42
CREDIT	Access to credit (1=Yes)	0.36
EXTENSION	Access to extension (1=Yes)	0.46
TRAINING	Access to agricultural training (1=Yes)	0.41
HHEMPLOY	Household head off-farm employment (1=Yes)	0.20
BUSINESS	Small off-farm business ownership (1=Yes)	0.08
IRRIGAT	Access to water for watering crops (1=Yes)	0.46
HGWALA	Harry Gwala district (1=Harry Gwala)	0.42
UMZINYAT	Umzinyathi district (1=Umzinyathi)	0.24
UTHUKELA	Uthukela district (1=Uthukela)	0.19
UMKHANYA	Umkhanyakude (1=Umkhanyakude)	0.15

***Notes**: n=984*

***Source**:* 2014 household survey

To further explore the importance of social grants to rural households, the Foster, Greer Thorbecke (FGT) poverty indices (Foster *et al.*, 1984) were calculated. A comparison was made between the poverty situation where household income includes social grant income (TOTINC/CA) as well as the poverty situation excluding social grant income (NOGRNTINC/CA). In other words, a comparison is made of what would have happened had the households not received income from social grants. The poverty line used was R6 528 per capita per annum. This poverty line was derived from the lower-bound poverty line of R443 per capita per month suggested by NPC (2012) in 2011 prices. The figure was adjusted to the 2014 prices using the consumer prices index (CPI) (Stats SA, 2014b). Table 3.3 presents the FGT poverty indices for the with and without social grant income scenarios.

Table 3.3: Poverty level comparisons of with and without social grant income scenarios

FGT poverty index	Poverty level with social grant income	Poverty level without social grant income
Poverty headcount index	0.54	0.83
Poverty gap index	0.21	0.53
Poverty severity index	0.11	0.37

***Source**:* 2014 household survey

Table 3.3 shows that the current poverty levels are high among the rural households of KZN, as 54% of the households were below the poverty line. This headcount poverty rate is comparable to the 46% and 57% for South Africa and KZN, respectively, as reported by Stats SA (2014b). The results in Table 3.3 indicate that poverty levels would be very high, at 83%, without social grants. Moreover, the table indicates that the poverty gap and severity indices would have been worse without social grants, further reinforcing that social grants have a significant impact on poverty, as has been reported by a number of studies (Armstrong and Burger, 2009; Potts, 2012; Ulriksen, 2012).

In summary, descriptive analysis has shown that most of the sampled households were female-headed. The analysis has highlighted modest levels of land cultivation, a small contribution of farming to household income, low levels of household members' participation in farming as well as inadequate support services. The households were characterised by low levels of formal education, generally poor and dependent on social grants. Moreover, the FGT indices highlighted that poverty levels are high in the rural areas of KZN and that the poverty situation would have been worse without social grants. The next section presents mean comparisons of land area cultivation and household members' farming participation levels between social grant beneficiaries and non-beneficiaries.

3.3.2 Mean comparisons of land area cultivation and household members' farming participation levels according to social grant status

Table 3.4 presents the simple land and labour mean comparisons between grant beneficiaries and non-beneficiaries. The table shows that only 155 of the total sampled households were not recipients of any type of social grant, representing 16% of the sample. The table indicates that the households with access to grants have access to smaller land sizes compared to non-beneficiaries. This can be explained in two ways. Firstly, it could be that the social grant beneficiaries, because of their access to grants, have less incentives to increase their land size

compared to non-beneficiaries. The total land size included the land that is borrowed or leased, and there were indications during discussions with key informants that the social grant beneficiaries were more likely to lease out land.

Table 3.4: Land and labour mean comparisons according to social grant access status

Variables	No grant (N=155)		Grant access (N=829)		t-test
	Mean	SD	Mean	SD	
LANDSZE	2.74	9.24	1.79	2.87	2.42**
LANDCULT	0.96	1.39	1.10	1.44	-1.12
CULTPROP	0.63	0.38	0.70	0.36	-2.17**
TOTLAB	3.44	2.34	3.65	2.30	-1.03
HMEMP	0.94	1.13	0.98	1.35	-0.30
HMEMPROP	0.46	0.42	0.31	0.35	2.63**
FLAB	1.48	1.00	1.43	0.88	0.67
FLABPROP	0.57	0.33	0.51	0.31	2.15**

Notes: ***, ** and * means significant at 1%, 5% and 10% significance levels, respectively.

Source*:* 2014 household survey

Whereas there is no statistical difference between cultivated land sizes of the two groups, the results suggest that grant beneficiaries put most of their land under cultivation. A logical explanation is that because the social grant recipient households have small land sizes, *ceteris paribus*, they are more likely to put more under cultivation compared to the non-beneficiaries who have more land. However, it may also suggest, in contrast to the disincentive hypothesis, that access to grants has a positive effect on the proportion of land cultivated.

While showing no significant statistical difference in terms of the total household labour (number of primed-aged, able-bodied members) between the social grant beneficiaries and non-beneficiaries, Table 3.4 indicates that a lower proportion of working age members are employed among social grant beneficiary households compared to non-beneficiary households. The mean comparison indicates that fewer members of social grants beneficiary households participate in farming activities. In line with the disincentive hypothesis, these results suggest that social grants have a negative effect on labour participation, both on and off-farm.

To further the exposition, Table 3.5 presents mean comparison among households at three levels of social grant contribution to household income. 'No income from grants' means those households who received zero income from grants in the 12 months prior to the survey; whereas 'Low income from grants' means households who received income from social grants and social grants income contributed below 50% of total household income. 'High income from grants' are those households with 50% or more of their total income from social grants.

Table 3.5: Land and labour mean comparisons according to level of social grant dependency

Variables	No income from grants (n=155)		Low income from grants (n=478)		High income from grants (n=351)		F test
	Mean	SD	Mean	SD	Mean	SD	
LANDSZE	2.75	9.24	1.85	3.46	1.70	1.76	3.09**
LANDCULT	0.97	1.39	1.07	1.47	1.15	1.40	0.82
CULTPROP	0.63	0.38	0.70	0.36	0.71	0.35	2.46*
TOTLAB	3.51	2.36	3.62	2.40	3.65	2.15	0.19
HMEMP	0.97	1.14	0.91	1.32	1.05	1.39	1.19
HMEMPROP	1.50	1.01	1.45	0.88	1.39	0.82	0.93
FLAB	0.55	0.34	0.53	0.31	0.49	0.30	3.86**
FLABPROP	0.46	0.42	0.29	0.33	0.33	0.36	4.13**

Notes: ***, ** and * means significant at 1%, 5% and 10% significance levels, respectively.

Source*:* 2014 household survey

Table 3.5 shows that a significant proportion (36%) of the total sampled households derived more than 50% of their income from social grants. Table 3.5, just like the preceding table, indicates that households who mostly depend on social grants have less land and cultivate most of their land. Households less dependent on grants have access to more land and cultivate less proportion of their land. Table 3.5 indicates a statistically significant progressive decline in the proportion of household members supplying their labour (whether on-farm or off-farm), as households become more dependent on social grants.

The mean comparisons have produced conflicting results with regards to the two proxies of incentives to farm. On the one hand, the results seem to suggest that social grants are positively associated with the proportion of land area cultivated, that is, positive incentive effects. This result is plausible. As previously highlighted, social grants help reduce the cash constraints among the rural households, enabling them to buy inputs in time. On the other hand, the results are consistent with the disincentive effect hypothesis when the incentives to farm are captured using the proportion of household members who work. These results imply that social grant beneficiary households are likely to reduce their labour supply to farming, even though they cultivate more of their land. However, before dwelling much on these descriptive results, it is important to control for the influence of other confounding factors. The succeeding sub-sections make use of econometric techniques to achieve this. Before presenting the results on the impact of social grants on the incentives to farm, the next sub-section presents the determinants of access to social grants.

3.3.3 Factors affecting access to, and level of dependency on, social grants

The binary probit model was estimated to examine the socio-economic characteristics and resource endowments that predict a household's access to social grants. Table 3.6 presents the results of the binary probit model. The results indicate that, collectively, the estimated coefficients are statistically significant, since the LR statistic has a p-value less than 1%. The model also correctly predicted about 85% of the cases, confirming that the model fits the data reasonably well.

The results show that the bigger the household (HHSIZE), the higher the chances of accessing social grants. Table 3.6 indicates that an increase in the household size by one member increases the probability of a household being a social grant beneficiary by 1.5%. This could be because bigger families have higher chances of having a member or two who qualify for social grants than smaller families. This could also be indicative of the fact that access to social access influence household formation. It has been reported by researchers (e.g., Agüero *et al.*, 2007; Klasen and Woolard, 2008; Armstrong and Burger, 2009) that people move into households in which social grants are received.

The negative coefficient on non-grant income (NOGRNTINC) indicates that income increases from other sources are associated with decreasing likelihood of receiving social grants. Table 3.6 shows that a rand increase in non-grant income decreases the chances of a household accessing social grants by 12.7%. This is expected, as the qualification to social grants is based on income levels, among other criteria. The results indicate that the targeting mechanism of the income criterion in the means test is working properly, since it excludes the high income households. As a means tested programme, the social grants are meant for the poorest members of society. The insignificant estimated coefficient of asset values (ASSETS) indicates that the asset criterion of the means test is not being used. As reported by Abel (2013), the difficulties with asset valuation have resulted in asset values being not used in practice.

As expected, the household head's education level (EDUCAT) was negatively associated with receipt of social grants. An additional year of the household head's education was associated with 1.2% decrease in the chances of access to social grants. Higher levels of education imply more livelihood options and opportunities of generating income and hence less chance of applying for social grants. There was a negative relationship between livestock size (TLU) and

access to social grants. This result suggests success in targeting, as those households with bigger livestock size, a measure of wealth, are likely to be excluded from social grants.

Table 3.6: Determinants of access to social grants, Probit results

Variables	Coefficients		Marginal effects	
	Value	Std. Err.	Value	Std. Err
AGE	-0.004	0.005	-0.001	0.001
GENDER	-0.183	0.123	-0.036	0.026
MARRIED	-0.050	0.119	-0.010	0.024
EDUCAT	-0.059***	0.015	-0.012***	0.003
HHSIZE	0.075***	0.018	0.015***	0.004
NOGRNTINC	-0.633***	0.087	-0.127***	0.019
ASSETS	-0.123	0.083	-0.025	0.015
LANDSZE	-0.060	0.051	-0.012	0.010
TLU	-0.003*	0.003	-0.001*	0.000
ASSOC	-0.200	0.139	-0.040	0.029
CREDIT	0.191	0.121	0.038	0.023
ROADDIST	-0.003**	0.001	-0.001***	0.000
HHEMPLOY	-0.359**	0.146	-0.072**	0.030
BUSINESS	-0.325*	0.199	-0.065	0.044
UMZINYAT	-0.085	0.158	-0.017	0.032
UTHUKELA	0.479***	0.183	0.096**	0.037
UMKHANYA	-0.240	0.196	-0.048	0.041
CONSTANT	-3.862***	1.170		
Correctly predicted	0.85			
LR $\chi^2(17)$	143.6***			
Pseudo R^2	0.16			
N	984			

Notes: ***, ** and * means significant at 1%, 5% and 10% significance levels, respectively.

***Source**:* 2014 household survey

Moreover, those households with employed household heads (HHEMPLOY) had lower chances of receiving social grants. The results show that the households with employed head had a 7.2% probability of accessing social grants compared to the households where the heads are not employed. This is because households with employed heads depend on the wages and are less likely to be interested in accessing the social grants. The same applies to those who are owners of small businesses (BUSINESS). Given that social grants may result in erosion of dignity due to some discourses associated with being a social grant recipient (Wright *et al.*, 2015), those who have alternative livelihood options such as the educated, employed and

owners of thriving microbusinesses may decide not to apply for social grants, even when they qualify to receive social grants.

The results indicate that those households far from good, all-weather roads (ROADDIST) are less likely to receive social grants compared to those with closer access to roads. This is because isolated households have less access to information, and often are without the important requirements such as identity cards (DSD *et al.*, 2012). This is unfortunate, as it results in the exclusion of the poorest members of society who need the social grants the most. The results indicate that rural households from Uthukela district (UTHUKEL) were more likely to access social grants than those in Harry Gwala district. This result is surprising, as one would expect no location influence with regards to social grant access. The result may be suggestive of efficiency of the social welfare department in reaching out to the people in Uthukela more than to those in the Harry Gwala district.

For comparison purposes, an ordered logit model was estimated to determine the factors that influence the level of dependency on social grants. The dependent variable was the three levels of social grant contribution to household income that were generated in the previous sub-section and presented in Table 3.5. The ordered model results are presented in Table 3.7. In Table 3.7, GDL=0 means zero dependency on social grants i.e., no income from grants. GDL=1 and GDL=2 mean low and high dependency levels on social grants, respectively. The model was significant, as the LR value was significant at the 1% significance level. The brant test was insignificant, indicating that the parallel regression assumption was not violated.

The results were largely consisted with expectations and support those presented in Table 3.6. Table 3.7 indicates that bigger households and those headed by older people were likely to depend more on social grants than those headed by younger household heads. The table shows that an additional year on household head's age increases the chance that a household will be in the group highly dependent on social grants (GDL=2) by 0.4%. The same additional year decreases the probability of belonging to both the medium and less grant dependent groups by 0.2%. The results show that households with higher non-grant income, and those headed by the educated and employed, depend less on social grants. Table 3.7 indicates that increasing assets were associated with less dependency on social grants.

Table 3.7: Factors affecting the level of dependency on social grants, ordered logit results

Variables	Coefficients		Marginal effects		
	Value	**Std. Err.**	**GDL=0**	**GDL=1**	**GDL=2**
AGE	0.017***	0.006	-0.002**	-0.002***	0.004***
GENDER	-0.183	0.154	0.020	0.021	-0.040
MARRIED	-0.135	0.148	0.015	0.015	-0.030
EDUCAT	-0.041**	0.018	0.004**	0.005**	-0.009**
HHSIZE	0.105***	0.019	-0.011***	-0.012***	0.023***
NOGRNTINC	-0.499***	0.114	0.053***	0.057***	-0.110***
ASSETS	-0.326***	0.098	0.035***	0.037***	-0.072***
LANDSZE	-0.078	0.061	0.008	0.009	-0.017
TLU	-0.008	0.007	0.001	0.001	-0.002
ASSOC	0.055	0.167	-0.006	-0.006	0.012
CREDIT	0.202	0.139	-0.021	-0.024	0.045
ROADDIST	-0.005***	0.002	0.001***	0.001***	-0.001***
HHEMPLOY	-0.581***	0.189	0.071***	0.049***	-0.120***
BUSINESS	-0.402	0.277	0.049	0.034**	-0.083
UMZINYAT	-0.398**	0.188	0.046**	0.039**	-0.085**
UTHUKELA	0.482**	0.196	-0.046***	-0.065**	0.111**
UMKHANYA	-0.738***	0.245	0.096**	0.050***	-0.146***
/cut1	0.729	1.491			
/cut2	3.416	1.497			
N	984				
LR χ^2 (17)	192.77***				
Pseudo R^2	0.10				
Brant test (χ^2 (17)=27.13, p=0.25)					

Notes: ***, ** and * means significant at 1%, 5% and 10% significance levels, respectively.

Source: 2014 household survey

Tables 3.6 and 3.7 show that social grants seem to be efficiently targeted at the poor households that they are intended to reach. Social grant beneficiary households were found to be those which are not only poor, but have less alternative livelihood options (such as the less educated, unemployed, smaller livestock size owners and non-owners of non-farm microbusinesses). The significance of variables such as education level and small business ownership implies that, on top of the income based means test, the stigma associated with being a social grant recipient may be leading to some qualifying households opting out, especially if they have other options. The result is that the social grants are benefiting the poorest of the poor among the rural households. Studies such as those of Abel (2013), Armstrong and Burger (2009) and DSD *et al.* (2012) also reported that social grants in South Africa are well-targeted, in as far as they

benefit members of the relatively poorer households. However, the problem is that the non-beneficiary, unintended household members, may also benefit from the social grants, resulting in their decreased incentives to work. The question is, to what extent do access to, and level of dependency on, social grants affect the proportion of land area that rural farming households cultivate? The next sub-section presents results answering this important question.

3.3.4 The impact of social grants on the proportion of land cultivated

Table 3.8 presents the results of the PW and the logit transformation models. There was no evidence of selection bias at the conventional 10% significance level, as the IMR was insignificant in both models. This demonstrates the possible insignificant effect of unobservable factors. The Hausman test indicated that the level of dependency on social grants was not endogenous in the two models. The results from both models are largely similar, implying that they are robust. Only access to extension (EXTENSION) and credit (CREDIT) vary in statistical significance in the two models. Henceforth, the interpretations that follow apply to both models, although emphasis is placed on the PW results due to PW model's advantages described in the previous sections.

Both models indicate that access to social grants (GRANTS) was insignificant. This implies that access to social grants does not influence, whether positively or negatively, the proportion of land cultivated by a household. The insignificance of estimated coefficient of the proportion of income from social grants (GRANTPROP) indicates that the level of dependency on social grants also had no significant impact on the proportion of land cultivated by the rural households. While several studies (e.g., White and Killick, 2001; Aliber and Hart, 2009; Aliber and Hall, 2012), relying on limited descriptive statistics, have reported that the rural households in South Africa no longer put much land under cultivation because they receive social grants, the present study shows that this is not the case.

Table 3.8: The impact of social grants on the proportion of land cultivated, logit transformation and PW model results

Variables	PW model		Logit transformation model	
	Coeff.	**Std. Err**	**Coeff.**	**Std. Err**
GRANTS	-0.105	0.201	-0.033	0.329
GRANTPROP	0.447	0.302	0.562	0.470
AGE	-0.004	0.005	-0.007	0.008
GENDER	-0.002	0.126	-0.096	0.206
EDUCAT	-0.017	0.015	-0.028	0.024
MARRIED	0.091	0.119	0.229	0.197
HHSIZE	-0.038***	0.015	-0.060**	0.024
LANDSZE	-0.394***	0.054	-0.484***	0.081
RAINFALL	-0.124	0.138	-0.080	0.229
SOILQUAL	0.247**	0.112	0.394**	0.176
TENURE	0.183	0.119	0.240	0.186
TILLAGE	-0.026	0.107	-0.112	0.169
MARKET	0.318**	0.137	0.382*	0.205
TLU	-0.002	0.002	-0.002	0.002
ASSETS	-0.098	0.078	-0.150	0.121
ASSOC	0.305**	0.137	0.384*	0.210
CREDIT	0.190	0.120	0.314*	0.187
EXTENSION	0.206*	0.113	-0.200	0.177
TRAINING	0.368***	0.127	0.612***	0.202
ROADDIST	-0.001	0.002	-0.002	0.003
FARMEXP	0.009*	0.005	0.015**	0.007
IRRIGAT	0.033	0.116	-0.056	0.184
HHEMPLOY	0.262	0.169	0.336	0.254
BUSINESS	-0.886***	0.229	-1.035***	0.354
UMZINYAT	-0.708***	0.161	-1.078***	0.273
UTHUKELA	1.272***	0.177	1.659***	0.210
UMKHANYA	-0.937***	0.205	-1.649***	0.356
CONSTANT	1.259	0.918	1.993	1.404
IMR	0.707	1.01	1.14	0.771
	Deviance =640 Pearson =539 AIC = 1.08 N=984 Mean VIF=1.33 Hausman test (F=2.18, p=0.13)		R^2=0.21 N=984 F(27, 949)=14.71*** Mean VIF=1.38 Hausman test (F=1.43, p=0.23) Ramsey RESET test F=1.78, p=0.15)	

Notes: ***, ** and * means significant at 1%, 5% and 10% significance levels, respectively.

***Source**:* 2014 household survey

The results of the study imply that the potential complementarity between social grants and smallholder farming has not materialised in South Africa. This is despite the fact that researchers such as Devereux (2002) and Mabugu *et al.* (2013) in South Africa and other African studies (e.g., Diao *et al.*, 2012; Proctor, 2014) have indicated that social grants and smallholder farming have potential for complementarity as options for rural livelihoods in Africa. Although the social grants were not designed to promote smallholder farming, they have potential to ease the financial constraints facing rural households. In the non-farm job sector, for instance, the complementarity between social grants and employment has been reported by several scholars (e.g., Posel *et al.*, 2006; Williams, 2007; Ardington *et al.*, 2009; Ardington *et al.*, 2013). These studies have concluded that additional income from social grants has a positive impact on employment, by relaxing the constraints associated with job search. The results in Table 3.7, however, suggest that social grants have not relaxed the financial constraint of the farmers as social grants do in the job sector.

The results indicate a negative relationship between household size (HHSIZE) and the proportion of land area cultivated. The explanation of this result is that bigger households are less dependent on farming compared to smaller households, as their bigger families demand that they instead engage in other economic activities. This is because farming can only absorb a certain amount of labour. Increasing family size beyond that reduces labour returns, hence bigger families tend to look for other opportunities that have higher returns for their labour. As expected, the results indicate a negative relationship between land size (LANDSZE) and proportion of cultivated land. This is because the households with less land are better able to manage it and secure enough inputs to cultivate most of their land. The bigger the land, the harder it is to put most of it under cultivation.

As expected, perceived soil fertility (SOILQUAL) was positively associated with increased proportion of land cultivated. This is because putting more land under cultivation comes at a price, such that only those farmers with good land quality, expecting better yields, would put more land under cultivation than those with poor soils. The farmers with access to good soils face lower production costs because they do not have to apply as much fertiliser as those with poor soils, meaning they can afford to put more of their land under cultivation. The importance of market access as a motivator for rural households to increase their farming activities is demonstrated by a positive estimated coefficient of market access (MARKET). The households with better access to markets cultivated more of their land than those with poor market access.

This result is consistent with other studies in South Africa (e.g., Kirsten and Sartorius, 2002; van der Heijden and Vink, 2013) that have highlighted the important role played by access to markets in the success of smallholder farming. Market access speaks of opportunities of making good profits out of farming activities and it is these prospects that encourage farmers to put most of their land under cultivation.

The results also show that members of farmers' associations (ASSOC) put more land under cultivation than those who are not members. This is because association membership may help the individual farmers through pooling of resources and sharing of knowledge and experiences. The positive role of farmer organisation in smallholder farming success has been reported by several authors (e.g., Hellin *et al.*, 2009; Markelova *et al.*, 2009; HLPE, 2013; Sinyolo *et al.*, 2014b). The significant credit access (CREDIT) estimate highlights the importance of credit support to the success of smallholder producers, as has been reported by others (Louw, 2013; Rahman and Smolak, 2014). Access to credit reduces the liquidity problem that usually affects the farmers during the planting season and this enhances the use of agricultural inputs in production, by ensuring that farmers secure the inputs in time. This leads to improved agricultural productivity, resulting in increased farm revenues and incentives for the farmers to put more land under cultivation.

Access to agricultural training (TRAINING) was associated with a higher proportion of land area cultivated. Access to training improves farmers' skills, increasing their motivation to put more land under cultivation. This is in line with the literature (e.g., Man *et al.*, 2002; de Wolf and Schoorlemmer, 2007; Man *et al.*, 2008), which has emphasised the importance of focussed agricultural training in improving farm entrepreneurship. Most of the farmers in the rural areas use only trial and error, which, in most cases, results in poor yields and losses, discouraging the farmers to put more land area under cultivation. Those who have received some form of agricultural training have more confidence that they will produce more and incur fewer losses and thus put more land under cultivation.

As expected, contact with extension officers (EXTENSION) was associated with a higher proportion of land area under cultivation. This is, in part, because of the advice and encouragement the farmers get from extension officers. Farmers with contact with extension officers may have access to information on markets and new technologies. It was also emphasised by these farmers that contact with extension officers helps them to access government support such as tillage and inputs. Therefore, farmers who contact extension

officers have access to more resources, resulting in them putting more of their land under cultivation.

The results indicate that those who own non-farm businesses (BUSINESS) put a lower proportion of land under cultivation. This is because non-farm business owners are less dependent on farming, because of the money from the non-farm business activities. The business owners' commitments in non-farm businesses means they have less time to focus on the farming activities compared to non-business owners. Also, since non-farm ventures are usually more profitable than farming, the non-farm business owners may prioritise the more paying ventures. The significant district dummies capture variations that impact on farming incentives, but were not captured in the model (such as the political, social and agro-climatic variations in these areas). The results show that rural households in Umzinyathi and Umkhanyakude districts cultivate a lower proportion of their land than those in Harry Gwala district. Harry Gwala district has higher agro-ecological potential than the Umzinyathi and Umkhanyakude districts, due to an abundance of high-quality soils, high altitude and abundant water. As a result, the farmers in the Harry Gwala district have more incentives to put more land area under cultivation, compared to the two hotter and drier districts.

Table 3.8 indicates that farmers in Uthukela district cultivated a higher proportion of their land than those in Harry Gwala district. While both Uthukela and Harry Gwala districts are regarded as higher agricultural potential areas, the difference may be due to differing levels of political support for smallholder farming activities in Uthukela district. Smallholder farming is prioritised and promoted in Uthukela district, with the local political representatives showing keen interest and attending farmer meetings. Conversely, the level of interest and/or participation in farmer meetings by the local political representatives is lower in Harry Gwala district.

To check the robustness of the access to social grants impact parameter, PSM was estimated. The PSM results presented in Table 3.9 indicate that both the nearest neighbour and kernel matching methods supported the conclusion that access to social grants had no significant impact on the proportion of land area cultivated.

Table 3.9: Impact of access to social grants on the proportion of land area cultivated, PSM results

Matching method	Number of households		ATT	t-test
	Treatment	Control		
Nearest neighbour	823	132	0.053 (0.050)	1.055
Kernel matching method	823	153	0.048 (0.036)	1.332

Notes: ***, ** and * means significant at 1%, 5% and 10% significance levels, respectively.

Source: 2014 household survey

The Rosenbaum (2002) bounds test was done to test the sensitivity of the PSM results to hidden bias. It showed that the conclusion would change at Γ=2.65. This implies that the results are only sensitive to a hidden bias that would more than double the odds of being a social grant recipient. Therefore it is concluded that the results are not very sensitive to hidden bias, since it would require more than 160% of bias to reverse the conclusion.

The impact of level of dependency on social grants on the proportion of land area cultivated was estimated using PSM and the generalised propensity score (GPS) methods. For the PSM analysis, the low social grant-dependency category was considered as the control group while the high social grant-dependency category was considered as the treatment group, as explained in the empirical methods section. The PSM results, presented in Appendix B, indicated that the social grant-dependency status did not have a significant impact on the proportion of land area under cultivation.

The GPS approach was implemented following Bia and Mattei (2008) and the results are presented in Figure 3.1 and Appendix C. The tests for normality and balancing property indicated that these assumptions were satisfied. Figure 3.2 shows the average dose-response and treatment effect functions and the 95% confidence bands for the proportion of land area cultivated. The confidence bands were based on 100 bootstrap replications to account for the uncertainty associated with the estimation of the GPS and the parameters, as suggested by previous studies (Bia and Mattei, 2008; Bia and Mattei, 2012). In Figure 3.1, E[cultprop(t)] means the average proportion of land area cultivated at treatment level t, while treatment level means the contribution level of social grants income to total household income, i.e., the level of household dependency on social grants. The E[cultprop(t+0.1)]-E[cultprop(t)] shows the average effect of a social grant contribution increase of 10% to household income on the proportion of land area cultivated. In other words, the treatment effect function shows the

marginal effect of an increase in the household's level of social grant-dependency of 10% on the proportion of land area cultivated.

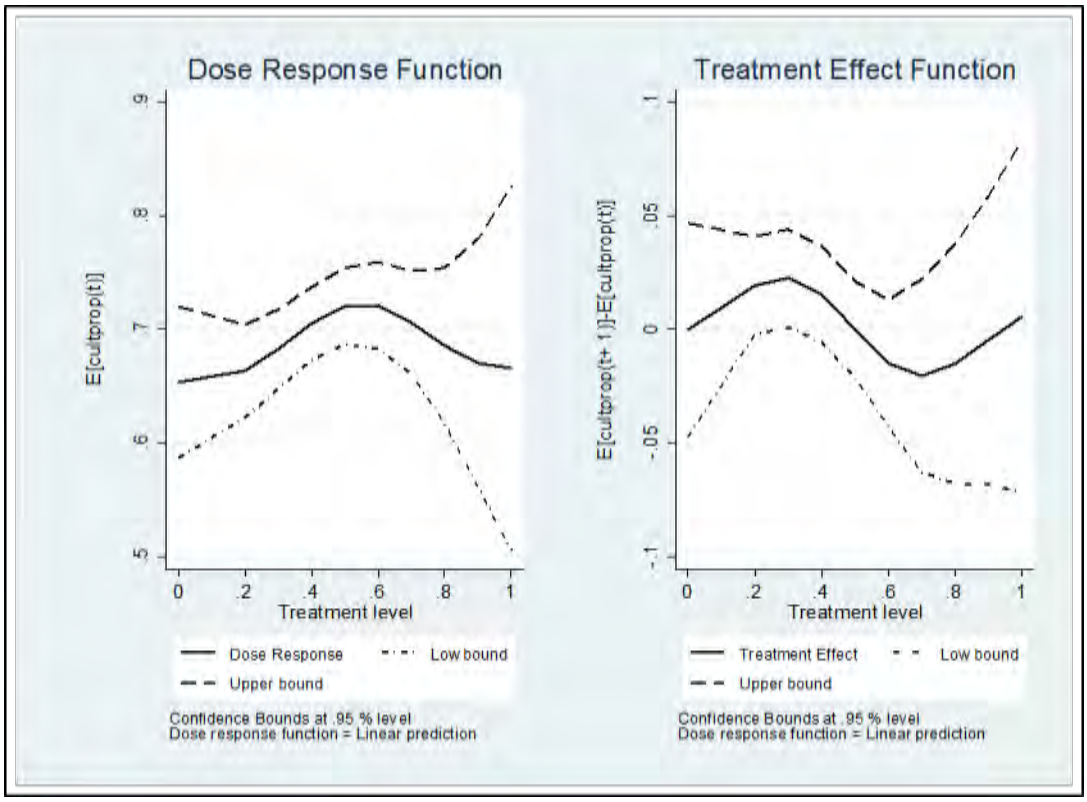


Figure 3.1: The average dose-response and treatment functions and 95% confidence bands for the proportion of land area cultivated

Figure 3.1 shows that the average proportion of land area cultivated was an increasing function of the contribution levels of social grants to household income for each contribution of social grants greater than 10% and less than 50% (See also Appendix C). The confidence bands are quite narrow in this range, implying that the increase in the contribution of social grants to household income has a significant and positive impact on the proportion of land area cultivated. The treatment effect function shows that marginal effects are larger at lower levels of social grant-dependency. For example, for a household where social grants currently contribute 20% to household income, a further 10% increase in social grant contribution would result in an increase of 2% in the proportion of land area cultivated. However, the increase of the same percentage of social grant contribution would result in a 0.01% increase in the proportion of land area cultivated by a household where social grants currently contribute 40%.

The figure also shows that there is a decrease in the proportion of land area cultivated for dosages greater than 60%. However, the decrease on the proportion of land area cultivated after a dosage of 60% should not be interpreted as an indicator that treatment has disincentive effects after that level, since this increase coincides with a growth of the width of the confidence interval estimator. The wide 95% confidence bands imply a high level of uncertainty on the shape of the average dose-response function (Bia and Mattei, 2012) at dosages greater than 60%.

The empirical results in this sub-section have indicated that, by and large, neither access to social grants, nor the level of dependency on social grants, have an influence on the proportion of land area cultivated. Most of the econometric models used confirmed this result, with only the GPS approach indicating a positive role of social grants contribution on land area cultivation when social grants income contributes between 10 and 50% to household income. The next sub-section presents the results on the impact of social grants on the proportion of unemployed working age members who participate in smallholder farming activities.

3.3.5 The impact of social grants on the proportion of working age household members who participate in farming activities

Table 3.10 presents the results showing the impact of access to, and dependency on, social grants on the proportion of the unemployed working age household members that participate in farming activities. There was no evidence of selection bias at the conventional 10% significance, since the IMR was insignificant. This demonstrates the possible insignificant effect of unobservable factors, implying that the results from the two models would have been unbiased, even without adding the IMR. The results from both models are largely similar in terms of statistical significance and signs. The only difference in the results is that the employment status of the household head (HHEMPLOY) is significant in the logit transformation model, but insignificant in the PW model. The interpretations that follow apply to both models.

Table 3.10 shows that access to social grants (GRANTS) and level of dependency on social grants (GRANTPROP) were associated with decreasing proportion of prime-aged, able-bodied household members who participate in farming activities. These results are in line with the disincentive hypothesis and support other studies in the non-farm sector (e.g., Bertrand *et al.*,

2003; Abel, 2013), which concluded that an increase in social grants income increases the reservation wage and lowers labour force participation. Similarly, these results support the claims by the descriptive and anecdotal evidence in the farm sector (e.g., White and Killick, 2001; Aliber and Hart, 2009; Aliber and Hall, 2012; Tshuma, 2012), which have reported that the poor are shunning smallholder agriculture because they depend on social grants for income.

The results imply that at least some of the social grant income is being redistributed towards the working-age members of the households, even though, in theory, social grants are aimed at the elderly, young or sick. As explained in Lund (2002), this is because cash is fungible, i.e., a Rand is a Rand, no matter the source. This suggests that the income from social grants is pooled with other household income and used as general household income. The result of this intra-family redistribution is a significant reduction of the number of working-age members that participate in smallholder farming activities.

Table 3.10 indicates that the relationship between the age of the household head and farm household labour supply is non-linearly (AGE and AGESQ). This means that up to a certain age, household members are less likely to increase their participation in farming activities with the increasing age of the household head. However, after the household head reaches a particular age, more household members become involved in farming activities. This can be explained in terms of the earning opportunities of the household head. At younger ages, additional years speak of more experience and more connections, such that the household head has more opportunities. It is these opportunities that result in the household becoming less reliant on smallholder farming, hence the less commitment of household members to farming. However, when household heads are older, the likely loss of income due to household head retiring results in household members becoming more involved in farming. Another explanation is that at more advanced age, the household head is losing his/ her energy, hence the need for other family members to help with farming activities.

Table 3.10: The impact of social grants on the proportion of working age household members who participate in farming activities, PW and logit transformation models results

Variables	PW model		Logit transformation	
	Coef.	**Std. Err.**	**Coef.**	**Std. Err**
GRANTS	-0.052*	0.031	-0.218*	0.128
GRANTPROP	-0.548***	0.181	-1.533***	0.516
AGE	-0.076***	0.022	-0.206***	0.062
AGESQ	0.001***	0.000	0.002***	0.001
GENDER	0.100	0.092	0.233	0.255
EDUCAT	-0.010	0.011	-0.008	0.032
MARRIED	0.072	0.090	0.306	0.251
INVDEP	1.293***	0.308	1.889**	0.854
LANDSZE	0.047	0.039	0.042	0.110
RAINFALL	-0.045	0.106	-0.030	0.293
SOILQUAL	-0.053	0.083	-0.189	0.232
TILLAGE	-0.190**	0.081	-0.584**	0.227
MARKET	-0.093	0.102	-0.268	0.279
TLU	-0.002**	0.001	-0.007***	0.002
ASSETS	-0.035	0.054	-0.041	0.155
ASSOC	0.297***	0.102	0.835***	0.284
CREDIT	-0.019	0.086	-0.092	0.239
EXTENSION	0.281***	0.084	0.640***	0.237
TRAINING	0.027	0.095	0.029	0.263
ROADDIST	0.002	0.001	0.005	0.003
FARMEXP	0.002	0.003	0.005	0.009
IRRIGAT	0.255***	0.084	0.619***	0.234
HHEMPLOY	-0.162	0.109	-0.642**	0.306
HMEMP	-0.095***	0.032	-0.244***	0.078
HIREDLAB	-0.026***	0.013	-0.056*	0.030
BUSINESS	0.297*	0.167	1.041**	0.478
UMZINYAT	-0.158	0.118	-0.127	0.335
UTHUKELA	-0.436***	0.113	-1.090***	0.312
UMKHANYA	-0.071	0.156	0.042	0.426
_CONS	3.446***	0.839	9.965***	2.375
IMR	-0.091	0.93	-0.015	0.085
	Deviance =424		F=5.35***	
	Pearson =3742		R^2=0.23	
	AIC = 1.08		N=984	
	N=984		Mean VIF=4.50	
	Mean VIF=4.50			

Notes: ***, ** and * means significant at 1%, 5% and 10% significance levels, respectively.

***Source**:* 2014 household survey

The results also show a positive relationship between the inverse dependency ratio (INVDEP) and labour supply to farming activities. This is expected, since the higher inverse dependency ratio implies a relatively higher number of primed-aged, able bodied household members compared to dependents. Therefore, an increase in the number of non-dependents results in increased participation in farming activities. Table 3.10 further indicates that access to tillage services (TILLAGE) was associated with a decrease in the proportion of household members involved in farming. Access to tractors or animals for draught power reduces the work burden and/or drudgery. As a result, households with access to tillage services such as tractors require fewer people to perform farming activities, such as land preparation, compared to households that rely on labour for the same task.

Table 3.10 demonstrates a negative relationship between livestock size and proportion of working age household members who participate in farming activities. As explained in the previous sub-section, a bigger livestock size implies a wealthy household and increasing wealth is associated with decreasing dependency on smallholder farming. Household members become less committed to farming as the household becomes richer. Similarly, the results in Table 3.9 show that household members participate less in farming activities if the household head is employed (HHEMPLOY), as well as when an increasing number of members are employed off-farm (HMEMP). These results are consistent with Anim (2011), who found a negative relationship between off-farm employment of household members and a household's supply of farm labour in the Limpopo province.

As expected, the results demonstrate that those households who depend on hired labour (HIREDLAB) have fewer of their members engaged in farming activities. This is because hired labour substitutes for family labour, such that increasing hired labour leads to decreased family labour. Table 3.9 also shows that access to institutional and/or organisational support motivates the household members to participate in farming activities. For example, the results show that farmers' association members (ASSOC) supplied more farm labour compared to non-members. Access to extension (EXTENSION) is a motivator for more family members to be involved in farming. This is because farming is more likely to succeed where households have access to support services and more household members are more likely to engage in farming when success is expected. The same explanation applies to the positive estimated coefficient of irrigation access (IRRIGAT). Access to irrigation speaks of less chances of crop failure,

higher productivity and higher expected revenues, hence more family members are likely to be involved in irrigation farming.

A somewhat unexpected result in Table 3.9 is that ownership of non-farm microbusinesses (BUSINESS) had a positive estimated coefficient. Whereas one would have expected that households who own non-farm businesses would be less committed to farming (as indeed implied in Table 3.8), this result implies the opposite. An explanation to this result is that it may be indicative of pluri-activity among rural households, as has been reported by several studies (Carter, 1998; Alsos *et al.*, 2003; Jacobs and Makaudze, 2012; Tshuma, 2012). According to these studies, households diversify into non-farming activities to supplement farming, not substitute it. This suggests that starting non-farm businesses may be motivated by the need to find ways and means to relax credit constraints in farming, or raise supplementary income to augment what they get from farming, especially during lean seasons.

In other words, ownership of a non-farm business may suggest that the farming household is more advanced, with an increasing number of its members engaged in farming activities. A comparison of Tables 3.9 and 3.10 suggests that this increasing participation in farming by business owners is associated with a decreasing proportion of land area cultivated. Although Table 3.9 showed that households in Uthukela district cultivate larger proportions of their land than those in Harry Gwala, Table 3.10 indicates that a smaller proportion of household members in Uthukela district is engaged in farming. This suggest that, even though smallholder farming is important in Uthukela district in terms of the proportion of land area cultivated, it is not driven by household labour.

PSM was used to check the robustness of the access to social grant impact parameters in the farm labour proportion models. It was implemented as explained in the previous sub-section, with the outcome in this section being the proportion of working age household members who participated in farming activities. The results presented in Table 3.11 are consistent with those reported in Table 3.10, showing that households with access to social grants were likely to have fewer of their household members participating in farming activities. The Rosenbaum (2002) bounds test indicated that this conclusion can be questioned at the critical level of Γ=1.75. This implies that the results are sensitive to a hidden bias of about 75%. Since this is a large percentage (Asfaw *et al.*, 2012), it is concluded that the results are robust and not very sensitive to hidden bias.

Table 3.11: The impact of social grants on the proportion of working age household members who participate in farming activities, PSM results

Matching method	Number of households		ATT	t-test
	Treatment	Control		
Nearest neighbour	823	132	-0.061 (0.033)	1.848*
Kernel matching method	823	153	-0.053 (0.027)	1.963**

Notes: ***, ** and * means significant at 1%, 5% and 10% significance levels, respectively.

Source: 2014 household survey

Similar to the previous sub-section, the impact of level of dependency on social grants on the proportion of household members who participate in farming activities was estimated using PSM and the generalised propensity score (GPS) effect methods. For the PSM analysis, the low social grant-dependency category was considered as the control group, while the high social grant-dependency category was considered as the treatment group, as explained in the empirical methods and the previous sub-section. The PSM results, presented in Appendix D, indicated that those households in the high social grant-dependent category had a lower proportion of household members participating in farming activities compared to those in the low social-grant dependency category. These results support the conclusions made above that an increasing level of social grant-dependency is associated with decreasing participation in farming activities.

The GPS results are presented in Appendix E. The graph showing the average dose-response and the treatment functions and their respective 95% confidence bands for the the proportion of working age member who engage in farming activities is presented as Figure 3.2. Figure 3.2 and the results in Appendix E should be interpreted as explained in the previous sub-section, with the only change being the outcome variable. The results show that increasing treatment (i.e., increasing dependency on social grants) is associated with decreasing participation by the unemployed household members in smallholder farming activities. This result applies for dosages of up to 50%. The confidence bands are narrow in this range, implying that the results are reliable. Even though the dose-response function appears to suggest that there is an increase on the proportion of working age member who engage in farming after a dosage of 60%, this should be regarded with doubt, since the increase is associated with wide confidence bands.

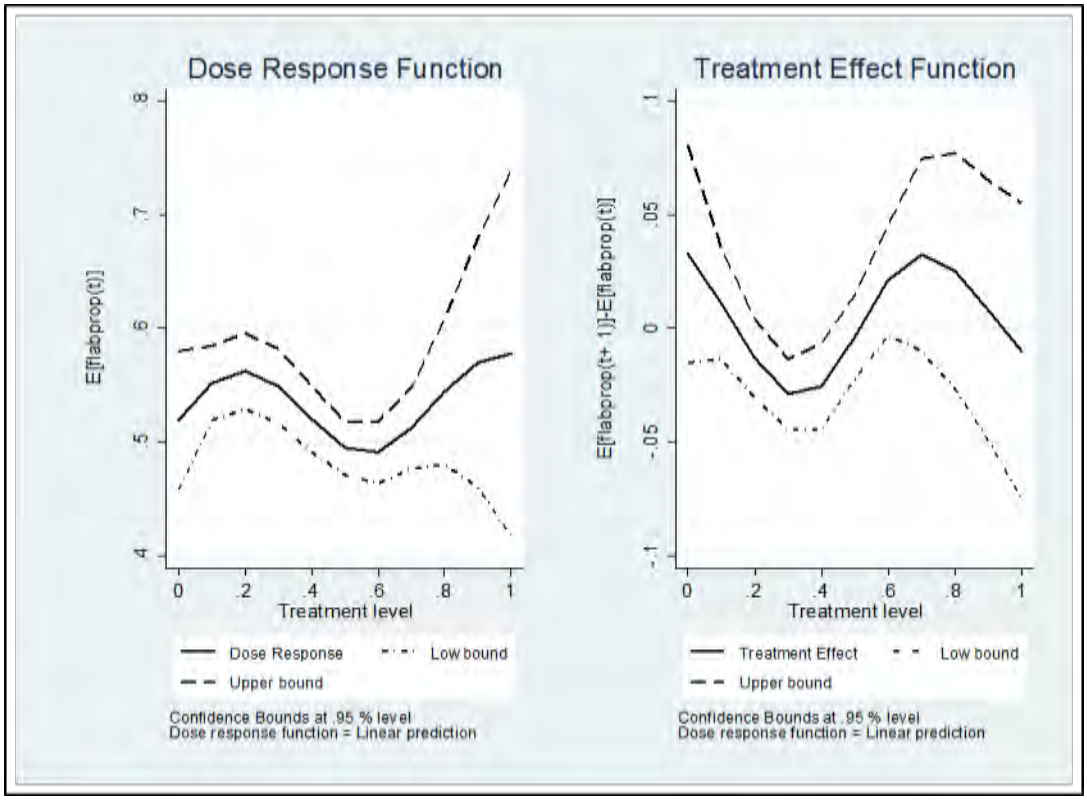


Figure 3.2: The average dose-response and treatment functions and 95% confidence bands for the proportion of working age members who engage in farming activities

The results in this sub-section have indicated that both access to social grants and the level of dependency on social grants negatively influence the incentives of the unemployed working age members to participate in smallholder farming activities. This result was consistent across all the methods that were used. The next sub-section presents the main conclusions and policy recommendations of this chapter.

3.4 Conclusions and policy recommendations

This chapter has examined the impact of access to, and dependency on, social grants on the incentives of rural households to farm. The incentives to farm were captured using two variables: (1) the proportion of land area cultivated by rural households; and (2) the proportion of the unemployed working age household members who participate in farming activities. The results indicated that social grants have a wide coverage, benefiting most of the rural households that were interviewed. The results also indicated that the social grants are well-targeted, benefiting the poor with less alternative livelihood options. The descriptive statistics indicated high levels of unemployment among the household members in the rural areas of

KZN, indicating a shortage of economic opportunities in these areas. While this underscores the importance of smallholder farming as a livelihood option, the results indicated low levels of land area cultivation and participation by the unemployed household members in smallholder farming activities.

The question answered in this chapter is whether the decline in land area cultivated or low participation rates of household members in farming activities is due to the households' access to, or dependency on, social grants. The empirical results indicated that, by and large, there was no negative or positive relationship between access to social grants or level of dependency on social grants, and the proportion of land area cultivated. Most of the econometric models used confirmed this result, with only the GPS approach indicating a positive role of social grants contribution on land area cultivation when social grants income contributes between 10 and 50% of household income. The chapter concludes that neither access to social grants, nor level of dependency on social grants, have disincentive effects on the proportion of land area cultivated by rural households. This implies that the descriptive reports, suggesting that social grants are causing declining land area cultivated by smallholder farmers, are incorrect. In fact, the GPS results suggest that social grants may play a positive role in improving land area cultivation, especially if the contribution of social grants is maintained at below 50% of total household income.

The chapter found a negative relationship between social grants and the proportion of the unemployed working age household members who participate in smallholder farming activities. In line with the disincentive argument, the chapter concludes that social grants have a negative effect on the proportion of farm household members engaged in farming activities. The implication of this result is that, although social grants are targeted to the vulnerable household members, they also reach the unintended members, creating disincentive effects. Since social grants are important in addressing the poor's immediate basic needs, the study recommends that they should continue, but policy-makers should be particularly cognisant of their possible adverse consequences on the participation of the rural households in smallholder farming.

The study also identified other variables that affect land area cultivated and participation by household members in smallholder farming. In general, the chapter highlighted the importance of expectations of success in motivating household members to participate in farming and put more land area under cultivation. For example, households with access to irrigation cultivated

more of their land and had more of their unemployed members participating in farming activities, because of reduced risk of crop failure under irrigation. Access to institutional and/or organisational support such as extension or associations was positively related to both land area cultivated and farming participation, as these also increase chances of farming success. It is, therefore, recommended that policy should prioritise creating a conducive environment for smallholder success (such as introducing irrigation or improving access to extension and input supply services), in order for the unemployed rural people to participate in smallholder farming and improve land area cultivation. This is especially so in South Africa, where the government's employment strategy puts smallholder agriculture at the core of its rural development and employment creation drive.

References

Abebaw, D., Fentie, Y. and Kassa, B. 2010. The impact of a food security program on household food consumption in Northwestern Ethiopia: A matching estimator approach. *Food Policy* 35 (4):286-293.

Abebaw, D. and Haile, M.G. 2013. The impact of cooperatives on agricultural technology adoption: Empirical evidence from Ethiopia. *Food Policy* 38:82-91.

Abel, M. 2013. Unintended labour supply effects of cash transfer programmes: Evidence from South Africa's old age pension. Cape Town: University of Cape Town.

Agüero, J., Michael, C. and Ingrid, W. 2007. The impact of unconditional cash transfers on nutrition: The South African Child Support Grant. Brasilia, Brazil: International Poverty Centre.

Aliber, M. and Hall, R. 2012. Support for smallholder farmers in South Africa: Challenges of scale and strategy. *Development Southern Africa* 29 (4):548-562.

Aliber, M. and Hart, T.G.B. 2009. Should subsistence agriculture be supported as a strategy to address rural food insecurity? *Agrekon* 48 (4):434-458.

Alsos, G.A., Ljunggren, E. and Toril, P.L. 2003. Farm-based entrepreneurs: What triggers the start-up of new business activities? *Journal of Small Business and Enterprise Development* 10 (4):435-443.

Andrew, M., Ainslie, A. and Shackleton, C. 2003. Evaluating land and agrarian reform in South Africa: Land use and livelihoods. Cape Town: Programme for Land and Agrarian Studies (PLAAS), University of the Western Cape.

Anim, F.D.K. 2011. Factors affecting rural household farm labour supply in farming communities of South Africa. *Journal of Human Ecology* 34 (1):23-28.

Ardington, C., Bärnighausen, T., Case, A. and Menendez, A. 2013. Social protection and labour market outcomes of youth in South Africa. Cape Town: University of Cape Town.

Ardington, C., Case, A. and Hosegood, V. 2009. Labour supply responses to large social transfers: Longitudinal evidence from South Africa. *American Economic Journal: Applied Economics* 1 (1):22-24.

Armstrong, P. and Burger, C. 2009. Poverty, inequality and the role of social grants: An analysis using decomposition techniques. Stellenbosch Economic Working Papers15/09. Cape Town: University of Stellenbosch.

Asfaw, S., Shiferaw, B., Simtowe, F. and Lipper, L. 2012. Impact of modern agricultural technologies on smallholder welfare: Evidence from Tanzania and Ethiopia. *Food Policy* 37 (3):283-295.

Baker, J.L. 2000. *Evaluating the impact of development projects on poverty: A handbook for practitioners.* Washington, D.C: World Bank.

Barrett, C.B. 2006. Food aid's intended and unintended consequences. Background paper for FAO State of Food and Agriculture 2006. Ithaca, NY: Cornell University.

Baum, C.F. 2008. Stata tip 63: Modeling proportions. *The Stata Journal* 8 (2):299-303.

Becker, O.S. and Ichino, A. 2002. Estimation of average treatment effects based on propensity scores. *The Stata Journal* 2 (4):358-377.

Becker, S.O. and Caliendo, M. 2007. Sensitivity analysis for average treatment effects. *The Stata Journal* 7 (1):71-83.

Bertrand, M., Mullainathan, S. and Miller, D. 2003. Public policy and extended families: Evidence from pensions in South Africa. *World Bank Economic Review* 17 (1):27-50.

Bia, M. and Mattei, A. 2008. A Stata package for the estimation of the dose–response function through adjustment for the generalized propensity score. *The Stata Journal* 8 (3):354-373.

Bia, M. and Mattei, A. 2012. Assessing the effect of the amount of financial aids to Piedmont firms using the generalized propensity score. *Statistical Methods and Applications* 21:485-516.

Binger, B.R. and Hoffman, E. 1998. *Microeconomics with calculus.* Second edition. Massachusetts: Addison-Wesley Publsihers Inc.

Blundell, R. and Costa-Dias, M. 2000. Evaluation methods for non-experimental data. *Fiscal Studies* 21 (4):447-468.

Caliendo, M. and Kopeinig, S. 2005. *Some practical guidance for the implementation of propensity score matching. Discussion Paper No. 1588*. Bonn: Institute for the Study of Labor (IZA). Available at: http://ftp.iza.org/dp1588.pdf [Accessed 27 February 2014].

Carter, S. 1998. Portfolio entrepreneurship in the farm sector: Indigenous growth in rural areas? *Entrepreneurship and Regional Development* 10 (1):17-32.

Cobb-Clark, D.A. and Crossley, T. 2003. Econometrics for evaluations: An introduction to recent developments. *The Economic Record* 79 (247):491-511.

Cuong, N.V. 2007. An introduction to alternative methods in program impact evaluation. Discussion paper no. 33. Wageningen, The Netherlands: Mansholt Graduate School of Social Sciences.

de Wolf, P. and Schoorlemmer, H. (eds.). 2007. *Exploring the significance of entrepreneurship in agriculture.* Frick, Switzerland: Research Institute of Organic Agriculture.

DED. 2011. *The New Growth Path: Framework*. Pretoria: DED (Department of Economic Development). Available at: http://www.economic.gov.za/communications/publications/new-growth-path-series [Accessed 25 August 2015].

Dehejia, R. and Wahba, S. 2002. Propensity score matching methods for nonexperimental causal studies. *The Review of Economics and Statistics* 84 (1):151-161.

Department of Labour. 2014. *Investigation into a national minimum wage in South Africa*. Pretoria: Department of Labour. Available at: http://www.labour.gov.za/DOL/downloads/documents/tenders/minimumwages_tenders2014.pdf [Accessed 2 March 2015].

Devereux, S. 2002. Can social safety nets reduce chronic poverty? *Development Policy Review* 20 (5):657-675.

Devereux, S. 2013. Trajectories of social protection in Africa. *Development Southern Africa* 30 (1):13-23.

Diao, X., Thurlow, J., Benin, S. and Fan, S. (eds.). 2012. *Strategies and priorities for African agriculture: economy wide perspectives from country studies.* Washington DC: International Food Policy Research Institute.

DiPrete, T.A. and Gangl, M. 2004. Assessing bias in the estimation of causal effects: Rosenbaum bounds on matching estimators and instrumental variables estimation with imperfect instruments. *Sociological Methodology* 34 (1):271-310.

DSD, SASSA and UNICEF. 2012. The South African Child Support Grant impact assessment: Evidence from a survey of children, adolescents and their households. Pretoria: UNICEF South Africa.

Eastwood, R., Kirsten, J. and Lipton, M. 2006. Premature deagriculturalisation? Land inequality and rural dependency in Limpopo province, South Africa. *The Journal of Development Studies* 42 (8):1325-1349.

Feynes, T. and Meyer, N. 2003. Structure and production in South African agriculture. *In:* Nieuwoudt, L. and Groenewald, J. (eds.) *The challenge of change: Agriculture, land and the South African economy.* Pietermaritzburg: University of Natal Press.

Foster, J., Greer, J. and Thorbecke, E. 1984. A class of decomposable poverty measures. *Econometrica* 52 (3):761-766.

Gardiner, M. 2008. Education in rural areas. Issues in education policy number 4. Johannesburg: Center for Education Policy Development.

Gollin, D. 2014. *Smallholder agriculture in Africa: An overview and implications for policy. IIED Working Paper*. London: IIED. Available at: http://pubs.iied.org/14640IIED [Accessed 5 March 2015].

Greene, W.H. 2003. *Econometric Analysis.* 5th Edition. New Jersey: Prentice-Hall, Inc.

Hall, R. and Aliber, M. 2010. The case of re-strategizing spending priorities to support small-scale farmers in South Africa. Working Paper 17. Cape Town: Institute for Poverty, Land and Agrarian Studies (PLAAS), University of Western Cape.

Hausman, J.A. 1978. Specification tests in econometrics. *Econometrica* 46 (6):1251-1271.

Heckman, J.J. 1979. Sample selection bias as specification error. *Econometrica* 47 (1):153-162.

Heckman, J.J., Ichimura, H. and Todd, P. 1997. Matching as an econometric evaluation estimator: Evidence from evaluating a job training programme. *Review of Economic Studies* 64 (4):605-654.

Hellin, J., Lundy, M. and Meijer, M. 2009. Farmer organization, collective action and market access in Meso-America. *Food Policy* 34:16-22.

Hirano, K. and Imbens, G.W. 2004. The propensity score with continuous treatments. *In:* Gelman, A. and Meng, X.-L. (eds.) *Applied Bayesian modeling and causal inference fromiIncomplete data perspectives.* New York: Wiley.

HLPE. 2013. Investing in smallholder agriculture for food security. HLPE Report 6. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security. Rome: Food and Agricultural Organisation (FAO).

Hoff, A. 2007. Second stage DEA: Comparison of approaches for modelling the DEA score. *European Journal of Operational Research* 181 (1):425-435.

Hussain, I. and Wijerathna, D. 2004. Irrigation and income-poverty alleviation: A Comparative analysis of irrigation systems in developing Asia. Colombo, Sri Lanka: International Water Management Institute.

Jacobs, P. and Makaudze, E. 2012. Understanding rural livelihoods in the West Coast District, South Africa. *Development Southern Africa* 29 (4):574-587.

Jalan, J. and Ravallion, M. 2003a. Does piped water reduce diarrhea for children in rural India? *Journal of Econometrics* 112:153-173.

Jalan, J. and Ravallion, M. 2003b. Estimating the benefit incidence of an antipoverty program by propensity score matching. *Journal of Business and Economic Statistics* 21 (1):19-30.

Johannsmeier, C. 2007. The social and economic effects of the disability grant for people with disabilities and their Households: A qualitative study in KwaZulu Natal province. Research Report No. 74. Durban: University of KwaZulu-Natal.

Khandker, S.R., Koolwal, G.B. and Samad, H.A. 2010. *Handbook on impact evaluation: Quantitative methods and practice.* Washington, D.C: The World Bank.

Kirsten, J. and Sartorius, K. 2002. Linking agribusiness and small-scale farmers in developing countries: Is there a new role for contract farming. *Development Southern Africa* 19 (4):503-529.

Klasen, S. and Woolard, I. 2008. Surviving unemployment without state support: Unemployment and household formation in South Africa. *Journal of African Economies* 18 (1):1-51.

KZNDAE. 2012. Annual performance plan 2012/13. Pietermaritzburg: KwaZulu-Natal Department of Agriculture and Environmental Affairs (KZNDAE).

KZNPPC. 2011. KwaZulu-Natal Provincial Growth and Development Strategy (PGDS). Pietermaritzburg: KZNPPC (KwaZulu-Natal Provincial Planning Commission)

Louw, A. 2013. Sustainable policy support for smallholder agriculture in South Africa: Key issues and options for consideration. *In:* Greenberg, S. (ed.) *Smallholder and agro-food value chains in South Africa: Emerging practices, emerging challenges.* Cape Town: Institute of Poverty, Land and Agrarian Studies (PLAAS).

Lund, F. 2002. 'Crowding in' care, security, and micro-enterprise formation: Revisiting the role of the state in poverty reduction and development. *Journal of International Development* 14:681-694.

Mabugu, R., Chitiga, M., Fofana, I., Abidoye, B. and Mbanda, V. 2014. Assessing the general equilibrium effects of social grants in South Africa. *Paper presented at the 17th Annual Conference on Global Economic Analysis "New Challenges in Food Policy, Trade and Economic Vulnerability"*, Dakar, Senegal, 18-20 June 2014.

Mabugu, R., Tiberti, L., Maisonnave, H., Chitiga, M., Hoareau, S., Robichaud, V. and Ngandu, S. 2013. Quantitative analysis of impact of social grants in South Africa. Midrand, South Africa: Financial and Fiscal Commission.

Maddala, G.S. 1991. A perspective on the use of limited-dependent and qualitative variables models in accounting research. *The Accounting Review* 66 (4):788-807.

Man, T.W.Y., Lau, T. and Chan, K.F. 2002. The competitiveness of small and medium enterprises: A conceptualization with focus on entrepreneurial competencies. *Journal of Business Venturing* 17:123-142.

Man, T.W.Y., Lau, T. and Snape, E. 2008. Entrepreneurial competencies and the performance of small and medium enterprises: An investigation through a framework of competitiveness. *Journal of Small Business and Entrepreneurship* 21 (3):257-276.

Maponya, P., L.Venter, S., Modise, D., Van Den Heever, E., Kekana, V., Ngqandu, A., Ntanjana, N. and Pefile, A. 2015. Determinants of agricultural market participation in

the Sarah Baartman District, Eastern Cape of South Africa. *Journal of Human Ecology* 50 (1):1-9.

Markelova, H., Meinzen-Dick, R., Hellin, J. and Dohrn, S. 2009. Collective action for smallholder market access. *Food Policy* 34:1-7.

Midgley, J. 2013. Social development and social protection: New opportunities and challenges. *Development Southern Africa* 30 (1):2-12.

Mnkeni, P.N.S., Chiduza, C., Modi, A.T., Stevens, J.B., Monde, N., van Der Stoep, I. and Dladla, R.W. 2010. Best management practices for smallholder farming on two irrigation schemes in the Eastern Cape and KwaZulu-Natal through participatory adaptive research. WRC Report No. TT 478/10. Pretoria, South Africa: Water Research Commission.

Neves, D., Samson, M., van Niekerk, I., Hlatshwayo, S. and du Toit, A. 2009. The use and effectiveness of social grants in South Africa. Cape Town: Institute for Poverty, Land and Agrarian Studies (PLAAS) and Economic Policy Research Institute (EPRI).

NPC. 2012. *Our future-make it work: National Development Plan 2030*. Pretoria: NPC (National Planning Commission). Available at: http://www.info.gov.za/issues/national-development-plan [Accessed 9 October 2013].

Papke, L.E. and Wooldridge, J.M. 1996. Econometric methods for fractional response variables with an application to 401(k) plan participation rates. *Journal of Applied Econometrics* 11 (6):619-632.

Patel, L., Hochfeld, T. and Moodley, J. 2013. Gender and child sensitive social protection in South Africa. *Development Southern Africa* 30 (1):69-83.

Peel, M.J. 2014. Addressing unobserved endogeneity bias in accounting studies: control and sensitivity methods by variable type. *Accounting and Business Research* 44 (5):545-571.

Posel, D., Fairburn, J.A. and Lund, F. 2006. Labour migration and households: A reconsideration of the effects of the social pension on labour supply in South Africa. *Economic Modelling* 23 (5):836-853.

Potts, R. 2012. Social welfare in South Africa: Curing or causing poverty? *Pennsylvania State University Journal of International Affairs* 1 (2):74-92.

Proctor, F.J. 2014. Rural economic diversification in sub-Saharan Africa. IIED Working Paper. London: IIED.

Rahman, A. and Smolak, J. 2014. Financing smallholder farmers in developing countries. *In:* Hazell, P. and Rahman, A. (eds.) *New directions of smallholder agriculture.* Oxford: Oxford University Press.

Ramalho, E.A., Ramalho, J.J.S. and Murteira, J.M.R. 2011. Alternative estimating and testing empirical strategies for fractional regression models. *Journal of Economic Surveys* 25 (1):19-68.

Ravallion, M. 2008. Evaluating anti-poverty programs. *In:* Evenson, R.E. and Schultz, T.P. (eds.) *Handbook of Agricultural Economics.* Amsterdam, North-Holland.

Rosenbaum, P.R. 1991. Discussing Hidden Bias in Observational Studies. *Annals of Internal Medicine* 115 (11):901-905.

Rosenbaum, P.R. 2002. *Observational studies.* New York: Springer.

Rosenbaum, P.R. 2005. Heterogeneity and Causality. *The American Statistician* 59 (2):147-152.

Rosenbaum, P.R. and Rubin, R.D. 1983. The central role of the propensity score in observational studies for causal effects. *Biometrika* 70 (1):41-55.

Rubin, D. and Thomas, D. 2000. Combining propensity score matching with additional adjustments for prognostic covariates. *Journal of American Statistical Association* 95:573-585.

Samson, M., Heinrich, C., Williams, M., Kaniki, S., Muzondo, T., Quene, K.M. and van Niekerk, I. 2008. Quantitative analysis of the impact of the Child Support Grant. New York: United Nations Children's Fund.

Samson, M., Lee, U., Ndlebe, A., Quene, K.M., van Niekerk, I., Gandhi, V., Harigaya, T. and Abrahams, C. 2004. The social and economic impact of South Africa's social security system. Summary Report. Cape Town: Economic Policy Research Institute.

Samuelson, P.A. 1956. Social indifference curves. *The Quarterly Journal of Economics* 70 (1):1-21.

SASSA. 2014. *Fact sheet: Issue no 12 of 2014. A statistical summary of social grants in South Africa*. Pretoria: South Africa Social Security Agency (SASSA). Available at: http://www.sassa.gov.za/index.php/statistical-reports [Accessed 28 June 2015].

Sharaunga, S. and Wale, E. 2013. The dis-incentive effects of food aid and agricultural policies on local land allocation in developing countries: The case of Malawi. *Development Southern Africa* 30 (4-5):491-507.

Singh, I., Squire, L. and Strauss, J. 1986. A survey of agricultural household models: Recent findings and policy implications. *The World Bank Economic Review* 1 (1):149-179.

Sinyolo, S. 2013. *The impact of smallholder irrigation and water security on household welfare: The case of Tugela Ferry Irrigation Scheme in KwaZulu-Natal, South Africa.* MSc Disertation, University of KwaZulu-Natal.

Sinyolo, S., Mudhara, M. and Wale, E. 2014a. The impact of smallholder irrigation on household welfare: The case of Tugela Ferry irrigation scheme in KwaZulu-Natal, South Africa. *Water SA* 40 (1):145-156.

Sinyolo, S., Mudhara, M. and Wale, E. 2014b. Water security and rural household food security: Empirical evidence from the Mzinyathi district in South Africa. *Food Security* 6 (3):483-499.

Smith, J. and Todd, P. 2005. Does matching overcome LaLonde's critique of nonexperimental estimators? *Journal of Econometrics* 125 (1-2):303-353.

Stats SA. 2012a. *Census 2011 Municipal fact sheet*. Pretoria: Statistics South Africa. Available at: http://www.statssa.gov.za/Census2011/Products/Census_2011_Municipal_fact_sheet.pdf [Accessed 20 July 2013].

Stats SA. 2012b. *Census 2011 Municipal report – KwaZulu-Natal*. Pretoria: Statistics South Africa. Available at: http://www.statssa.gov.za/Census2011/Products/KZN_Municipal_Report.pdf [Accessed 9 March 2015].

Stats SA. 2014a. *Mid-year population estimates 2014*. Pretoria: Statistics South Africa. Available at: http://www.statssa.gov.za/publications/P0302/P03022014.pdf [Accessed 12 July 2015].

Stats SA. 2014b. Poverty trends in South Africa: An examination of absolute poverty between 2006 and 2011. Pretoria: Statistics South Africa.

Stats SA. 2015. General Household Survey 2014. Pretoria: Stats SA (Statistics South Africa).

Tshuma, M.C. 2012. A review of the poverty and food security issues in South Africa: Is agriculture the solution? *African Journal of Agricultural Research* 7 (28):4010-4020.

Ulriksen, M.S. 2012. How social security policies and economic transformation affect poverty and inequality: Lessons for South Africa. *Development Southern Africa* 29 (1):3-18.

van der Heijden, T. and Vink, N. 2013. Good for whom? Supermarkets and small farmers in South Africa: A critical review of current approaches to increasing access to modern markets. *Agrekon* 52 (1):68-86.

Vance, C. and Geoghegan, J. 2004. Modeling the determinants of semi-subsistent and commercial land uses in an agricultural frontier of Southern Mexico: A switching regression approach. *International Regional Science Review* 27 (3):326-347.

Wale, E. 2010. How do farmers allocate land for coffee trees? Implications for on-farm conservation and seed technology adoption in Ethiopia. *Journal of Sustainable Agriculture* 34 (3):270-291.

White, H. and Killick, T. 2001. African poverty at the millennium, causes, complexities and challenges. Strategic Partnership with Africa. Washington D.C: World Bank.

Williams, M.J. 2007. The social and economic impacts of South Africa's Child Support Grant. Cape Town: Economic Policy Research Institute.

Wright, G., Neves, D., Ntshongwana, P. and Noble, M. 2015. Social assistance and dignity: South African women's experiences of the child support grant. *Development Southern Africa* 32 (4):443-457.

CHAPTER 4 THE IMPACT OF SOCIAL GRANTS ON THE ADOPTION AND INTENSITY OF CHEMICAL FERTILISER USE AMONG SMALLHOLDER FARMERS IN KWAZULU-NATAL, SOUTH AFRICA

4.0 Abstract

This chapter assesses the extent to which social grants relieve liquidity constraints and improve chemical fertiliser use among South African smallholder farmers. A total of 984 rural farming households, randomly selected in four districts of KwaZulu-Natal, were analysed using the double-hurdle model. The empirical results indicated that, while the decision to adopt chemical fertilisers was not influenced by social grants, the level of fertiliser use was affected by both access to and level of dependency on social grants. However, the influence of these two variables on fertiliser adoption levels was mixed. On the one hand, access to social grants was associated with higher levels of fertiliser use, implying that social grants help relax the financial constraints facing rural farmers amidst imperfect credit markets. On the other, the results showed that increasing levels of dependency on social grants was associated with decreasing intensity of fertiliser use, suggesting that increasing income from social grants entrenches a culture of dependency and entitlement, creating production and/or investment disincentives. The results of this chapter suggest that the disincentive impact of social grants on technology adoption is not a question of whether or not a household is a social grant beneficiary but the level of household dependency on social grant income. In order to promote self-sufficiency and independence among the rural poor, the study stresses the need to find strategies, such as introducing subsidies and focussed training, to encourage rural households to invest part of their social grants in smallholder farming activities.

Keywords: social grants, chemical fertiliser use, double-hurdle model, smallholder farming, KwaZulu-Natal, South Africa

4.1 Introduction

The urgent need to increase crop production and/or productivity in Sub-Saharan Africa (SSA) to address poverty and food insecurity problems has been widely acknowledged (Crawford *et al.*, 2006; Diao *et al.*, 2008; Zingore *et al.*, 2014). Even though some progress has been made to achieve agricultural productivity growth in the region during the past decades, it is below the level required to meet the food security and poverty reduction goals set forth in national and regional plans (Kelly, 2006; AU/NEPAD, 2011). Given the poor fertility of soils in the region (Dorward *et al.*, 2004; AU/NEPAD, 2011; Zingore *et al.*, 2014), and that intensification of crop-based agriculture has been associated with a sharp increase in the use of chemical fertilisers in other regions of the world (Kelly, 2006; Zhou *et al.*, 2010), several researchers (e.g., Akpan *et al.*, 2012; Yirga and Hassan, 2013; Thuo *et al.*, 2014) agree that reversing the problems of low crop productivity in SSA requires increased use of chemical fertilisers and other technologies.

There have been commitments by African governments to increase chemical fertiliser use in the continent. For example, the African Union (AU) member states in 2006 resolved to increase chemical fertiliser use from 8 kg/ha to 50 kg/ha by 2015 (AU/NEPAD, 2011). The Comprehensive Africa Agricultural Development Programme (CAADP), enacted by African Union member states in 2003, promotes, among others, investment in agricultural research, technology dissemination and adoption to increase agricultural productivity and economic growth on the continent (AU/NEPAD, 2003; Abebaw and Haile, 2013). However, the adoption of chemical fertilisers has remained relatively low in SSA compared to other developing regions (AU/NEPAD, 2011; Yirga and Hassan, 2013; Diiro *et al.*, 2015; Mwangi and Kariuki, 2015). The average intensity of chemical fertiliser use in SSA has remained below 10 kg/ha of cultivated land since the 1990s (AU/NEPAD, 2011), much lower than the 86 kg/ha in Latin America and the 100-135 kg/ha in Asia (Crawford *et al.*, 2006; Morris *et al.*, 2007). Kelly (2006) reported that Africa as a whole uses less than 3% of total world chemical fertiliser consumption, while SSA applies less than 1%.

In particular, the use of chemical fertilisers among smallholder farmers has remained very low, despite notable improvements in the supply of chemical fertilisers and supporting services such as extension and credit in SSA (Yirga and Hassan, 2013). The situation is the same in South Africa, which, although it has a well-developed commercial farming sector that uses modern technology, its smallholder farming sector is still characterised by the use of out-of-date

technology (Diale, 2011; DAFF, 2012). The low rates of chemical fertiliser use among smallholder farmers in South Africa pull the country's average fertiliser intensity to below 50 kg/ha (AU/NEPAD, 2011), despite that large-scale commercial farmers apply an average of over 500 kg/ha (Essa and Nieuwoudt, 2001). The average chemical fertiliser use rates by smallholder farmers in South Africa are too low and ineffective for sustaining crop and soil fertility and are significantly below the recommended levels for the different agro-ecological regions of the country (Mkhabela and Materechera, 2003; Mkhabela, 2006; Fanadzo *et al.*, 2010; Murovhi *et al.*, 2011).

Among other reasons, liquidity constraints have been identified as a major factor limiting smallholder farmers' investments in modern technologies in South Africa (Odhiambo and Magandini, 2008; Fanadzo *et al.*, 2010). For example, Odhiambo and Magandini (2008) reported that 75% of the surveyed smallholder farmers in the Limpopo province could not access the required quantities of chemical fertiliser due to lack funds. This is exacerbated by the fact that chemical fertilisers are costly and have risky returns (Odhiambo and Magandini, 2008; Murovhi *et al.*, 2011). On one hand, chemical fertilisers produce variable crop yield responses under small-scale conditions, making the technology very risky for smallholder farmers (Mkhabela, 2006; Odhiambo and Magandini, 2008). On the other hand, the cost of chemical fertilisers is high, and increasing, making it unaffordable to the liquidity-constrained smallholder farmers (Mkhabela and Materechera, 2003; Mkhabela, 2006; Fanadzo *et al.*, 2010). This is especially true of rural farming households who operate under pervasive market imperfections that result in missing credit markets (Bezu and Holden, 2008). While organic fertilisers such as cattle manure provide a cheaper option , the amount of manure produced is never sufficient due to the limited number of animals kept by smallholder farmers (Odhiambo and Magandini, 2008; Sikwela, 2013).

Improving chemical fertiliser adoption rates among poor rural farming households is key, and requires strategies that relax the liquidity constraint. Since South Africa has social grants that reached an average of over 16 million people per month in 2014 (SASSA, 2014), benefitting most of the rural farming households, a relevant question to ask is the extent to which these social grants encourage technology adoption by reducing the cash constraints of these households. While the specific purpose of these social grants is to reduce poverty, vulnerability and inequality, one of their stated purposes is to promote self-sufficiency and independence among the poor (RSA, 1997; Mabugu *et al.*, 2014). In other words, the social grants are not

just a livelihood protection measure, but are also a key livelihood promotion strategy (Devereux, 2002; Mabugu *et al.*, 2013).

Though smallholder farming is an important livelihood activity among poor rural households and social grants benefit most of the poor (Stats SA, 2012b; Gutura and Tanga, 2014), limited in-depth research has explored the potential linkages between social grants and investment in farming activities in rural South Africa. Only anecdotal evidence (e.g., Samson *et al.*, 2008; Neves *et al.*, 2009) is available and it suggests that the poor households use some of their social grants income to acquire farming inputs. Evidence from other countries, such as Bolivia (Martinez, 2004), indicate that cash transfers to the poor and liquidity-constrained households can result in households increasing their productive potential through investment in household-level economic activities such as farming.

Technology adoption in smallholder agriculture is one of the extensively studied topics in agricultural economics literature. Several studies (e.g., Winter-Nelson and Temu, 2005; Wale and Yalew, 2007; Shiferaw *et al.*, 2008; Ali and Abdulai, 2010; Kafle, 2010; Asfaw *et al.*, 2011; Diale, 2011; Asfaw *et al.*, 2012a; Asfaw *et al.*, 2012b; Kaguongo *et al.*, 2012; Mal *et al.*, 2012; Gregory and Sewando, 2013; Jaleta *et al.*, 2013; Abidoye and Mabaya, 2014; Alabi *et al.*, 2014; Bezu *et al.*, 2014; Shiferaw *et al.*, 2014; Mabaya *et al.*, 2015) have investigated the determinants of the adoption of agricultural technologies such as improved seed varieties, genetically modified crops and agrochemicals. Moreover, a plethora of studies (e.g., Isham, 2002; Croppenstedt *et al.*, 2003; Freeman and Omiti, 2003; Asfaw and Admassie, 2004; Chianu and Tsujii, 2004; Abdoulaye and Sanders, 2005; Chirwa, 2005; Waithaka *et al.*, 2007; Alene *et al.*, 2008; Bezu and Holden, 2008; Thuo *et al.*, 2010; Zhou *et al.*, 2010; Akpan *et al.*, 2012; Mapila *et al.*, 2012; Yirga and Hassan, 2013; Lambrecht *et al.*, 2014; Martey *et al.*, 2014; Ogada *et al.*, 2014; Thuo *et al.*, 2014; Diiro *et al.*, 2015) have been done on the determinants of chemical fertiliser adoption in developing countries in general, and SSA in particular. These studies have indicated that chemical fertiliser adoption is influenced by several factors, which include the household characteristics (such as household head age, gender and education level), factor endowments (such as land, capacity to bear risks, human capital and social capital), institutional and organisational support (credit, extension, tenure and group membership) as well as the ecological and environmental factors (such as land quality and rainfall).

The review of the literature on chemical fertiliser adoption revealed a few gaps. Firstly, most of the studies have investigated the general determinants of chemical fertiliser adoption without

focussing on the impact of one particular factor on chemical fertiliser adoption. This approach has resulted in methodological issues such as endogeneity with regards to a number of variables not tested and/or corrected for. However, there are a few exceptions. For example, Asfaw and Admassie (2004) focussed on the impact of education in Ethiopia, Diiro *et al.* (2015) assessed the impact of gender in Uganda, while Isham (2002) explored the role of social capital in Tanzania.

Secondly, there is a scarcity of literature investigating the potential impact of transfers on chemical fertiliser adoption. An exception is Bezu and Holden (2008), who assessed the impact of food-for-work on chemical fertilisers adoption in Ethiopia. Bezu and Holden (2008) found that food-for-work positively influenced the decision to adopt fertilisers and that there was no evidence of disincentive effect. According to Bezu and Holden (2008), the question of whether or not transfers have disincentive effects may not be even the right question to ask in the developing country context characterised by market imperfections. The more relevant question to ask is whether or not transfers help improve agricultural production by relieving liquidity constraints, thereby improving input use in agriculture (Bezu and Holden, 2008).

Thirdly, despite an abundance of literature on chemical fertiliser adoption in the SSA region, very few studies (e.g., Essa and Nieuwoudt, 2001; Odhiambo and Magandini, 2008) have been done on chemical fertiliser adoption among smallholder farmers in South Africa. As explained by Kafle (2010) and Ogada *et al.* (2014), agricultural technology adoption studies should not be generalised, since adoption is context specific. Fourthly, the few studies that have investigated chemical fertiliser determinants in South Africa have relied on limited analytical approaches. For example, Odhiambo and Magandini (2008) relied on descriptive statistics, whereas Essa and Nieuwoudt (2001) used a binary logit model. The present study relies on the double-hurdle model, an econometric model popular in adoption studies (Croppenstedt *et al.*, 2003; Asfaw *et al.*, 2011; Mal *et al.*, 2012; Bezu *et al.*, 2014; Martey *et al.*, 2014).

This chapter distinguishes itself from other adoption studies in the literature by exploring the linkages between chemical fertiliser adoption and social grants among smallholder farmers in South Africa, using the double-hurdle model. To the best of the author's knowledge, no study has examined the impact of social grants on chemical fertiliser adoption. Most of the fertiliser adoption studies have not accounted for the potential linkages of chemical fertiliser use with social grants, arguably missing an important variable. Including this variable extends the traditional adoption analysis and links it to an important issue that has taken centre stage in the

South African rural development discourse. The remainder of this chapter is divided into three sections. The next section presents the research methodology, introducing the conceptual framework and the empirical models. The subsequent section presents results and their discussions, while the main conclusions and policy implications are presented in the final section.

4.2 Research methodology

4.2.1 Data

This chapter uses the same data set as the previous chapter. As explained in the preceding chapter, a total of 984 households were randomly selected from the four district municipalities in the KwaZulu-Natal province, South Africa. The data was collected using a structured, pretested questionnaire. The questionnaire contained a number of modules, some of which have been briefly described in the previous chapter. The modules presented in Chapter 2 that are relevant to this chapter include the basic demographics and socio-economic characteristics of the household, measures of wealth and resource endowment (e.g., assets, land, livestock), agricultural production activities, and household income amounts and sources. The module specific to this chapter was that capturing the use of chemical fertilisers, asking questions about whether the household had used any chemical fertiliser, the types and quantities used in the previous agricultural season.

4.2.2 Conceptual framework and selection of variables

The adoption decision was modelled in a random utility framework, following other agricultural technology adoption studies (e.g., Ali and Abdulai, 2010; Kassie *et al.*, 2011). The random utility theory postulates that a utility-maximising farm household will adopt a new technology when the utility from choosing the technology (U_A) is greater than that of not adopting the technology (U_N). For example, if the difference between the net benefits from the adoption of the technology and non-adoption may be denoted as U_{DF}, then a household would adopt fertiliser if $U_{DF}=U_A-U_N > 0$.

The unobservable net utility U* can be expressed as a function of observable elements in the following latent variable model:

$$U^*_i = \beta x_i + \varepsilon_i,\ U_i = 1 \text{ if } U^*_i > 0 \quad (4.1)$$

Where: U_i is a binary indicator variable that equals 1 for household *i* in case of adoption and 0 otherwise, β is a vector of parameters to be estimated, x_i is a vector of household and farm characteristics and ε_i is an error term.

The selection of variables in the model was based on the theory of farm household decision-making under imperfect markets (de Janvry *et al.*, 1991). The market failures that are prevalent in the rural areas of developing countries imply that input use decisions of farmers cannot be reasonably assumed to depend only on market prices (Bezu *et al.*, 2014). Under conditions of imperfect markets, household technology choices are influenced by their economic position and institutional environment. Since farmers are risk averse, and crop production is subject to random shocks, the ability to bear risk, in terms of wealth endowment and social capital, may positively influence fertiliser adoption (Alene *et al.*, 2008). In this study, wealth endowment was proxied by farm size, livestock size and asset values, whereas social capital was proxied by education level and networks or membership in farmer groups.

It was also hypothesised that, since credit markets are imperfect or missing in the rural areas, income from social grants may relieve the liquidity constraints of farm households, and enable them to purchase more inputs. This agrees with what is explained in Bezu and Holden (2008), who indicated that poor smallholder farmers may fail to adopt improved technology not only because of risk or that they are not convinced of the benefits. Instead, the smallholder farmers may be unable to secure the funds necessary to purchase such inputs (Bezu and Holden, 2008). Social grants ease the liquidity constraints by either making more cash available to buy inputs, or by reducing the pressure to use cash from other sources to buy basic household needs as these would be covered by social grants.

It was also taken into consideration that high levels of dependency on social grants would create perverse economic behaviour which results in production disincentives. Assuming that leisure is a normal good (as explained in the preceding chapter), increasing levels of dependency on social grants create possible disincentive effects. This may then cause social grant-dependency to be negatively correlated with fertiliser adoption. The influence of social grants was captured using two variables: a dummy variable, showing whether or not a household has access to social grants, and a proportion variable, showing the percentage of household income that comes from social grants.

Following previous studies on farmers' adoption of chemical fertilisers (Bezu and Holden, 2008; Akpan *et al.*, 2012; Abebaw and Haile, 2013; Yirga and Hassan, 2013; Lambrecht *et al.*, 2014), the study considered household characteristics (household head age, gender and household size), access to information (number of information sources), perception of the problem or constraint (soil quality) and institutional factors such as land tenure and access to markets. The study also included a variable capturing farmers' perceptions of whether fertiliser prices were high, average or low. Even though the individual prices the households face were collected, they were not included as an explanatory variable in the model. The major reason is that there was not enough variation in the prices that individual farmers faced. Moreover, if household specific prices were used, those households who bought no chemical fertiliser would have been excluded from the analysis. The use of farmers' perceptions is justified because farmers make their production and business decisions based on their perceptions (Morgan *et al.*, 2010).

It was hypothesised that increasing age would be associated with decreasing chances of chemical fertiliser adoption, as older farmers are less receptive to new ideas and are more risk averse than younger farmers. In terms of gender, the expectation was that male-headed households would be more likely to adopt chemical fertilisers due to their advantages in bargaining, negotiating and enforcing contracts. Bigger households were expected to adopt, due to labour availability, while access to more information sources was also expected to be positive, as it reduces search costs. Institutional factors were expected to reduce transaction costs and enhance the expected profitability of the technology, thus were expected to have positive signs. Those who felt that their soils were infertile were expected to adopt and apply more fertiliser than those with better soils. The next sub-section discusses the econometric model.

4.2.3 Model choice and specification

A number of models have been used to investigate the determinants of technology adoption. The choice of econometric specification largely depends on the objective of the study and the type of data available (Shiferaw *et al.*, 2008). The binary logit or probit models have been used when the decision to adopt is modelled as a one-step process (e.g., Essa and Nieuwoudt, 2001; Gregory and Sewando, 2013; Jansen *et al.*, 2014). This approach estimates the decision to adopt as a dichotomous variable and the level or intensity of adoption is ignored. The Tobit,

double-hurdle and Heckman selection models have been employed when technology is modelled as a two-step process: the decision to adopt and the intensity of adoption. A key limitation of the Tobit model is that the decision to adopt and the intensity of adoption are assumed to be made jointly and factors affecting the probability to adopt and intensity of adoption are assumed to be the same (Burke, 2009).

The double-hurdle and Heckman selection models assume that the decision to adopt and intensity of adoption are determined by separate processes. These two models have the same statistical structure that allows factors affecting the probability to adopt and intensity of adoption to be independent. However, the two models have some differences. Whereas the Heckman selection model assumes that all the zeros are the respondents' deliberate choices, the double-hurdle model considers non-adoption as a corner solution in a utility-maximising model. The double-hurdle model accounts for the existence of a significant number of farmers with positive desired demand for modern inputs, but are too constrained to adopt them. In other words, the double-hurdle considers the possibility of zero outcomes in the second hurdle even after first-stage hurdle is passed. In contrast, the Heckman selection model assumes that there will be no zero observations in the second stage once the first-stage selection is passed.

Even though the Heckman selection model has been used by several agricultural technology adoption studies (e.g., Alene *et al.*, 2008; Bezu and Holden, 2008; Yirga and Hassan, 2013; Lambrecht *et al.*, 2014), Mal *et al.* (2012) argued that the assumptions of the Heckman selection model are too restrictive in the case of agricultural technology adoption. A discussion by Dow and Norton (2003) showed that the double-hurdle model produces superior estimates than the Heckman selection model when one is dealing with true zeros. Since a zero amount of fertiliser is an actual value, and does not represent missing values, there is no selection bias problem (Dow and Norton, 2003). Therefore, this study uses the double-hurdle model, proposed by Cragg (1971), to estimate the two-step process of chemical fertiliser adoption. However, the Heckman selection and Tobit models were also estimated for comparison purposes and to check the robustness of the estimated impact parameters.

According to the double-hurdle model, a farmer faces two hurdles while deciding on chemical fertiliser adoption. The first is to decide whether or not to use chemical fertiliser. The second hurdle is related to the level of adoption, i.e., how much fertiliser to apply. The model integrates and simultaneously estimates the probit model to determine the probability of fertiliser use and

the truncated normal model for fertiliser intensity. The binary variable of chemical fertiliser use (w), assumed to follow a probit model, was specified as follows:

$$P(w = 1|x) = \Phi(x\gamma) \quad (4.2)$$

Where: P is probability, w is a binary variable of fertiliser use, Φ is the cumulative normal distribution, x is a vector of household characteristics that includes indicators of access to social grants and dependency on social grants; and γ are the coefficients to be estimated.

The intensity of fertiliser use, y*, assumed to have a truncated normal distribution with parameters that vary freely from those in the probit, was estimated as follows:

$$y^* = x\beta + \varepsilon_i \quad (4.3)$$

Where: y* represents quantity of chemical fertiliser applied in kg/ha; x is a vector of household characteristics which included indicators of access to social grant and level of dependency on social grants; β's are parameters estimated and ε_i is the error term. The double-hurdle model was estimated in Stata using the user-written command *craggit,* that was created by Burke (2009).

A log likelihood test was done to justify the use of the double-hurdle model over the Tobit. Based on the log-likelihood values obtained from a separate estimation of the probit, truncated regression and Tobit models, the likelihood ratio statistic (γ) was computed as follows:

$$\gamma = 2\ [LL_{probit} + LL_{trunc} - LL_{tobit}] \quad (4.4)$$

where: LL_{probit}, LL_{trunc} and LL_{tobit} are the likelihood values from the probit, truncated regression and Tobit models, respectively. The test statistic has a χ^2 distribution, with degrees of freedom equal to the number of independent variables (including the intercept). The Tobit model is rejected in favour of the double-hurdle model if γ exceeds the appropriate χ^2 critical value (Burke, 2009; Martey *et al.*, 2014).

As explained in the previous chapter, it was suspected that the estimated models may be affected by selection bias, since social grants are not a random intervention but a targeted intervention. Selection bias may occur because the farmers with higher intrinsic motivation and ability are more likely to have more income and assets, meaning that they are less likely to qualify to benefit from social grants. These motivated farmers are also more likely to adopt chemical fertilisers, resulting in selection bias. The probit model (Eq. 4.2) was first estimated

using the Heckman selection probit model (*heckprob* command in Stata), with access to social grants as the selection variable. The likelihood ratio test of independent equations was done to indicate if there was evidence of selection bias at the conventional 10% significance level.

The Hausman test (Hausman, 1978) was used to test for the potential endogeneity of level of dependency on social grants in the model. This is because it is possible that causality might flow from chemical fertiliser adoption to level of dependency on social grants, since increased chemical fertiliser use results in increased crop yields which might lead to increased farm income. The increased farm income would result in decreased levels of dependency on social grants. The test was implemented by: (1) firstly, regressing social dependency on the exogenous explanatory variables, as explained in Chapter 3 (see Eq. 3.6); (2) Obtaining the residuals and then adding these residuals in the fertiliser adoption models. This was done for both the probit (Eq. 4.2) and truncated regression model (Eq. 4.3). A statistically significant estimated coefficient of the residuals would mean endogeneity problems, while a statistically insignificant estimate means no evidence of the endogeneity problem (as was the case in this chapter).

The limitation of the double-hurdle model is that it uses all observations in the treatment and control samples, resulting in less reliable impact estimates (Rubin and Thomas, 2000; Abebaw *et al.*, 2010). Therefore, PSM and GPS were used to provide more accurate causal estimates, as explained in the previous chapter. The PSM was used to estimate the impact of access to social grants on the likelihood of chemical fertiliser adoption and on the level of fertiliser use. The GPS method was used to investigate the impact of the level of dependency on social grants on the likelihood of chemical fertiliser adoption as well as the level of fertiliser use. These matching techniques were implemented as explained in Chapter 3. The next section presents the results of this chapter.

4.3 Results and discussions

4.3.1 Descriptive statistics

Table 4.1 shows the variables that were used in the chemical fertiliser adoption double-hurdle model and their means. The table shows that 56% of the rural farmers used chemical fertilisers (FERTUSE), and applied over 70 kg/ha (FERTKGHA). The amount of fertiliser applied per hectare is lower than the 151 kg/ha reported by Essa and Nieuwoudt (2001) for three communal areas in the same KZN province. However, the amount of fertiliser applied per hectare is higher than what other studies (e.g., Bezu and Holden, 2008; Yirga and Hassan, 2013) have reported for other SSA countries. The amount is also higher than the 50 kg/ha target agreed upon by AU member states as a target for 2015 (AU/NEPAD, 2011), implying that South Africa may have met the target.

However, the levels of chemical fertiliser application are below the recommended application rates (Fanadzo *et al.*, 2010). It is against this background that strategies for increasing fertiliser adoption rates and as fertiliser use intensity in rural South Africa should be identified. The table shows that, on average, the farmers bought a 50 kg bag of chemical fertiliser for about R270, which translates to R5400/ ton (PRICE). In line with other studies (e.g., Mkhabela and Materechera, 2003; Odhiambo and Magandini, 2008; Murovhi *et al.*, 2011) which have reported price as a major issue in chemical fertiliser adoption among smallholder farmers, 72% of the sampled households felt that chemical fertiliser prices were too high, with very few farmers saying they felt the prices were moderate or low (PRICEPERC).

As discussed in the previous chapter, the results show poor to modest levels of institutional and/or organisational support from government. Whereas few households reported having access to credit, the table highlights that most of the households had access to social grants. Since the income from social grants is unconditional, and households are free to use it as they see fit, there is potential that the households may use part of it to alleviate credit constraints. The table also shows that the majority of the sampled households were female-headed, and were characterised with low levels of formal education, generally poor and more dependent on social grants than on farming. The figures in Table 4.1 are generally consistent with other smallholder studies in South Africa (e.g., Feynes and Meyer, 2003; Eastwood *et al.*, 2006;

Samson *et al.*, 2008; Aliber and Hart, 2009; Fanadzo *et al.*, 2010; Tshuma, 2012; Sinyolo *et al.*, 2014).

Table 4.1: Variables used in the fertiliser adoption double-hurdle model and their means

Variable code	Variable name and description	Mean	SD
FERTUSE	Fertiliser adoption (1=Adopter 0=Non-adopter)	0.56	-
FERTKG	Amount of fertiliser used (kg)	138	390
FERTKGHA	Amount of fertiliser used per ha (kg/ha)	74	146
PRICE	Price of fertiliser (Rands/ 50 kg)	270	32
PRICEPERC	Fertiliser price perception (1=High)	0.72	-
AGE	Household head age (Years)	56	13
GENDER	Household gender (1=Male)	0.47	-
EDUCAT	Household head education level (Years)	4.67	4.17
HHSIZE	Household size (Numbers)	7.04	3.60
LANDSZE	Land size (ha)	1.90	4.47
TLU	Livestock size (TLUs)	3.53	17.40
ASSETS	Value of household assets (Rands)	82,105	38,937
GRANTS	Access to social grants (1=Yes)	0.85	0.36
GRANTBEN	Number of social grant beneficiaries per household	3.18	1.81
TOTINC	Annual total household income (Rands)	46,757	32,707
GRANTINC	Annual income from social grants (Rands)	16,916	15,877
FARMINC	Annual income from farm activities (Rands)	6,553	12,438
OTHERINC	Annual income from other off-farm activities (Rands)	23,617	26,374
GRANTPROP	Proportion of income from social grants	0.38	0.26
FARMPROP	Proportion of income from farming activities	0.13	0.14
EXTENSION	Access to extension (1=Yes)	0.57	-
INFORM	Number of information sources	2.28	1.10
SOILQUAL	Perceived soil fertility (1=Good)	0.55	-
TENURE	Secure land tenure (1=Yes)	0.37	-
MARKET	Market access (1=Good)	0.20	-
CREDIT	Access to credit (1=Yes)	0.36	-
TRAINING	Access to agricultural training (1=Yes)	0.41	-
ASSOC	Farmer association member (1=Yes)	0.58	-
ROADDIST	Distance to the nearest all-weather road (km)	17.75	39.93
FARMEXP	Household head farming experience (Years)	18.70	13.28
IRRIGAT	Access to water for irrigation purposes (1=Yes)	0.46	-
HHEMPLOY	Household head off-farm employment (1=Yes)	0.20	-
BUSINESS	Ownership of small non-farm business (1=Yes)	0.08	-
HGWALA	Harry Gwala district (1=Harry Gwala)	0.42	-
UMZINYAT	Umzinyathi district (1=Umzinyathi)	0.24	-
UTHUKELA	Uthukela (1=Uthukela)	0.19	-
UMKHANYA	Umkhanyakude (1=Umkhanyakude)	0.15	-

***Notes**: n=984*

Source: 2014 household survey

Table 4.2 shows the demographics and socio-economic characteristics of the sampled households, according to their fertiliser adoption status. The t-test was done to investigate mean comparisons for continuous variables while the χ^2 test was done to measure associations for categorical variables. While their demographics are generally the same, the results show significant differences in wealth and institutional support between adopters and non-adopters. Households using chemical fertiliser were wealthier (have more land, livestock and valuable assets) than non-adopters. This may be indicative of the fact that asset ownership plays an important role in technology adoption due to imperfect factor market in the rural areas. Wealthier households are more likely to use improved inputs, as they are less liquidity constrained to purchase improved inputs and often less risk averse.

The results show that chemical fertiliser adopters were characterised by better access to support services such as extension. Contact with extension officers is an important source of information with regards to new technologies. The results also indicate that the adopters have more sources of information than non-adopters. Farmers get information not only from formal sources (such as extension workers, input dealers and agricultural universities) but also from informal sources (such as other farmers and friends). The fact that adopters had more access to irrigation than non-adopters is suggestive of complementarity between irrigation and the use of improved inputs. The results in Table 4.2 show that almost all the non-adopters (95%) felt that fertiliser prices were high, while less than 60% of the adopters felt the same.

The results show that fertiliser adopters earn more from farming than non-adopters and have more off-farm income. Fertiliser adopters were more experienced in farming and closer to all-weather roads than non-adopters. There were no significant differences between adopters and non-adopters in terms of their access to, or level of dependency on, social grants. However, these comparisons do not control for other factors. The next section investigates the impact of social grants on the adoption and intensity of chemical fertiliser use, controlling for other relevant factors.

Table 4.2: Socio-economic characteristics of the sampled households according to fertiliser adoption status

Variable name	Adopters (n=554)	Non-adopters (n=430)	T tests (χ^2 tests)
AGE	57	55	1.55
GENDER	0.47	0.46	0.28
EDUCAT	4.52	4.86	-1.27
HHSIZE	6.95	7.16	-0.89
LAND	2.27	1.50	2.68***
TENURE	0.41	0.31	12.83***
LIVESTOCK	4.34	2.47	1.68*
ASSETS	87,142	75,616	4.65***
GRANTS	0.85	0.85	0.04
OFFFARMINC	41,051	39,112	1.08
FARMINC	7,167	5,763	1.76*
GRANTINC	16,511	16,685	0.20
GRANTPROP	0.37	0.39	1.48
SOILQ	0.57	0.52	3.06*
PRICE	0.58	0.95	177.35***
MARKET	0.21	0.20	0.37
ASSOC	0.46	0.39	3.86**
CREDIT	0.36	0.36	0.01
EXTENSION	0.62	0.49	16.58***
INFORM	2.38	2.15	3.22***
TRAINING	0.41	0.42	0.68
ROADDIST	12.29	22	-3.80***
FARMEXP	20.53	16.33	4.99***
EMPLOYED	0.22	0.18	2.13
BUSINESS	0.10	0.06	5.49**
IRRIGATION	0.49	0.42	4.95**
HGWALA	0.39	0.45	4.03**
UMZINYAT	0.25	0.23	0.67
UTHUKEL	0.24	0.14	14.54***
UMKHANY	0.12	0.18	6.07**

Notes: ***, **, and * means significant at 1%, 5%, and 10% levels, respectively.

Source*:* 2014 household survey

4.3.2 The impact of access to, and level of dependency on, social grants on the adoption and intensity of chemical fertiliser use

Table 4.3 presents the results from the double-hurdle model. The likelihood ratio test of independent equations indicated that there was no evidence of selection bias at the conventional 10% significance level. Since there was no evidence of selection bias problem, the double-hurdle model results reported in Table 4.3 do not suffer from selection bias. The tests for collinearity were done using VIFs, which indicated that there was no evidence of severe multi-

collinearity between GRANT and GRANTPROP, and among other variables (Mean VIF = 1.41, Min VIF = 1.07 and Max VIF = 1.99). A log-likelihood test was done and the test statistic λ exceeded the χ^2 critical value, indicating that the double-hurdle model performed better than the Tobit. This implies that the decision to adopt and the level of fertiliser adoption are governed by separate processes. The Hausman tests were insignificant in both equations, showing that the level of dependency on social grants was not endogenous in the model. The highly significant Wald statistic indicates that, collectively, the variables are significant determinants of fertiliser adoption, suggesting good model fit.

The model results indicate that access to social grants (GRANTS) and the level of dependency on social grants (GRANTPROP) were not significant in the decision to use fertiliser. This implies that the decision to use chemical fertiliser is not influenced by social grants. However, these variables significantly influenced the intensity of fertiliser use. As expected, access to social grants had a positive impact on the level of fertiliser use, with social grants beneficiaries using 204 kg more fertiliser per hectare than non-beneficiaries. This implies that, in line with descriptive and anecdotal evidence from other studies (e.g., Samson *et al.*, 2008; Neves *et al.*, 2009), social grants do relax the liquidity constraints facing the rural farmers who have a positive demand for chemical fertilisers.

The results imply that for those farmers who would have passed the first hurdle, i.e., developed positive demand for chemical fertilisers, access to social grants helps them pass the second hurdle. As explained in Vincent and Cull (2009), the regularity and predictability of social grants allow beneficiary households to take a longer term perspective and invest to improve livelihoods. This augurs well for the country's social welfare policy, as enunciated in the White Paper for Social Welfare of 1997 (RSA, 1997), which emphasised not just poverty reduction but also the need to find strategies to increase the poor's capacity and promote self-sufficiency and independence. However, increasing dependency on social grants (GRANTPROP) was associated with decreasing fertiliser use intensity.

Table 4.3: The impact of access to and level of dependency on social grants on the adoption and intensity of chemical fertiliser use, the double-hurdle model results

Variables	1st Hurdle (Probit)		2nd Hurdle (Truncated)	
	Coef.	**Std. Err.**	**Coef.**	**Std. Err.**
GRANTS	0.108	0.171	203.7**	104.5
GRANTPROP	-0.019	0.256	-290.8*	177.5
AGE	0.000	0.004	2.983	2.665
GENDER	-0.040	0.098	25.49	67.50
EDUCAT	-0.024*	0.013	10.01	8.681
HHSIZE	-0.020	0.013	2.277	9.660
LANDSZE	0.084*	0.044	-472.7***	73.89
TLU	0.002	0.006	0.842	3.363
ASSETS	0.277***	0.073	148.1**	65.76
EXTENSION	0.218**	0.111	5.939	70.80
INFORM	0.062**	0.030	-60.23	36.73
SOILQUAL	-0.692***	0.114	-300.9***	109.5
MARKET	-0.130	0.122	127.47*	73.48
ASSOC	0.306**	0.120	-96.525	72.73
CREDIT	0.041	0.102	20.372	62.91
TRAINING	0.206**	0.108	-177.2**	71.62
ROADDIST	-0.005***	0.002	-1.495**	0.603
PRICEPERC	-1.023***	0.158	-411.2***	95.16
FARMEXP	0.011***	0.004	1.145	2.533
IRRIGAT	0.169*	0.101	63.543*	37.86
HHEMPLOY	0.185	0.137	-213.53*	115.1
BUSINESS	0.239	0.203	292.01**	140.9
TENURE	0.385***	0.104	39.39***	63.44
UMZINYA	0.151	0.137	54.645	88.04
UTHUKELA	0.681***	0.142	97.527	112.7
UMKHANYA	-0.231	0.182	-54.795	113.2
_CONS	-2.744***	0.884	-217.2***	810.4
N	984			
Wald $\chi^2(26)$	261.82***			
Hausman tests	$\chi^2(1)=2.02$, p=0.14		F(1, 956)=0.64, p=0.42	
Likelihood ratio test of independent equations: χ^2 (1) = 1.52, p = 0.22				
Log-likelihood test: λ=574; χ^2 critical value=39				

Notes: ***, **, and * means significant at 1%, 5%, and 10% levels, respectively.

Source: 2014 household survey

The results in Table 4.3 indicate that households that had a higher proportion of their income being from social grants, i.e., depend more on social grants, applied less chemical fertilisers than those that were less dependent on social grants. An increase of 1% in the contribution of

social grants to household income was associated with a decrease of 290 kg in chemical fertiliser application. A plausible explanation is that, in line with the food aid literature (e.g., Tadesse and Shively, 2009; Sharaunga and Wale, 2013), and some studies on the impact of social grants on labour supply in South Africa (e.g., Bertrand *et al.*, 2003; Samson *et al.*, 2004; Abel, 2013), increasing income from social grants entrenches a culture of dependency and entitlement, creating production disincentives. As explained in other studies (e.g., Samson, 2009; Gomersall, 2013), the households with higher levels of dependency on social grants may be those households whose incentives to produce have been undermined, since social grants income reduces the opportunity cost of failing to produce.

The incentives to invest in farming are undermined because investing in farming would mean better capacity to generate more extra income, and the social grant-dependent households may be afraid that investing in farming may result in them being disqualified from the social grants. Even though there are not many reported cases of beneficiaries being disqualified from social grants because of their improved income status, the fact that the possibility is there may be enough to cause the production disincentives. Mabugu *et al.* (2014), for example, found that social grant recipient households preferred to remain into low productivity subsistence farming, since the negligible extra income from these farming activities would not disqualify the household from accessing the social grants. Another possible explanation is that households that depend more on social grants are the poorer households with fewer other income sources, such that social grant income is used to meet urgent household needs such as food and clothing. As a result, these poorer households will have less money remaining to invest in production activities such as farming. This is unfortunate, as it implies that these households are trapped in a vicious cycle of poverty and dependency on social grants which will be difficult to break without external intervention.

The results show that education (EDUCAT) was negatively associated with fertiliser adoption, but has no significant influence on fertiliser use intensity. The result is contrary to expectations and several other agricultural technology adoption studies (e.g., Asfaw and Admassie, 2004; Chirwa, 2005; Akpan *et al.*, 2012; Gregory and Sewando, 2013; Kassie *et al.*, 2013; Yirga and Hassan, 2013). The expectation was that education would increase fertiliser adoption since the more educated are better at understanding and interpreting new information on technologies. A plausible explanation to the negative relationship between education level and fertiliser

adoption, a result consistent with Bezu and Holden (2008), is that the most educated household heads usually opt out of farming, hence their lower likelihood of adopting farming technologies. More educated people have higher opportunity costs of labour, since their time may be able to earn higher returns in alternative economic activities, and thus may be less likely to invest in labour-intensive technologies and practices such as chemical fertilisers.

Table 4.3 shows that, consistent with the literature (e.g., Essa and Nieuwoudt, 2001; Chirwa, 2005; Yirga and Hassan, 2013), households with bigger land sizes (LANDSZE) were most likely to use chemical fertilisers. The explanation is that those households with bigger farm sizes are better able to bear risks than those with smaller farms. In terms of fertiliser use intensity, increasing farm size was associated with decreasing fertiliser amounts per hectare. This result is in line with the literature (e.g., Alene *et al.*, 2008; Zhou *et al.*, 2010; Akpan *et al.*, 2012). The explanation is that households with bigger farm sizes incur more total input costs than those with smaller farms, such that they have to apply less fertiliser per hectare. The same amount of fertiliser results in less intensity for those with bigger farms than for those with smaller farms.

The results also indicate that wealthier households in terms of assets were more likely to use chemical fertilisers, and they also applied more fertiliser amounts in a hectare than the poorer farmers. This is also because, just like with land, wealthier households are better at bearing possible risks associated with adoption of new technologies and practices and may be more able to finance purchases of chemical fertilisers. The result is consistent with the literature (e.g., Kassie *et al.*, 2013; Lambrecht *et al.*, 2014). The positive role played by information access in creating positive demand for chemical fertilisers is highlighted by the positive estimated coefficients of access to information (INFORM), extension (EXTENSION) and association membership (ASSOC). The higher the number of information sources the household depends on for agricultural information, the higher their access to information and the greater the likelihood of chemical fertiliser adoption.

The positive estimated coefficient for access to agricultural extension, which is consistent with the literature (e.g., Akpan *et al.*, 2012; Yirga and Hassan, 2013), is because agricultural extension officers remain the main sources of information with regards to new technologies among the rural households. Regular contact with agricultural extension agents improves the awareness of new technologies and their likely benefits, hence the higher chances of adoption. In South Africa, access to agricultural extension officers also means higher chances of

accessing government free inputs, which include chemical fertilisers. However, the fact that access to agricultural extension has no significant impact on the amount of chemical fertiliser applied should be a cause for concern, since agricultural extension officers are expected to advise farmers on the impacts of fertilisers, how they should be applied and the rates of application.

The results demonstrate that members of associations or groups were most likely to adopt fertilisers than non-members. The explanation here is that social networks such as farmer groups facilitate the exchange of valuable information and experiences about new technologies in environments associated with inadequate information sources and imperfect markets such as rural areas. Moreover, group membership increases farmers' bargaining power, which may enable farmers to access inputs cheaper and on schedule. Several other studies (e.g., Mal *et al.*, 2012; Kassie *et al.*, 2013; Lambrecht *et al.*, 2014) have reported a positive relationship between agricultural technology adoption and household membership in collective action associations. Such associations reduce transaction costs of accessing input and output markets for smallholder farmers.

Table 4.3 shows that, contrary to expectations, the farmers who felt that their soil quality (SOILQUAL) was poor were less likely to adopt chemical fertiliser than those with good soils. Moreover, the farmers with poor soils applied less fertiliser per hectare than those with good soils. The explanation here is that, because chemical fertilisers are only profitable on moderate to good soils (Lambrecht *et al.*, 2014), the better the soils, the higher the chances of adoption. The results also show that the farmers that had received some agricultural training (TRAINING) were more likely to use chemical fertilisers than those with no training. This is expected, as most training modules promote adoption of yield-enhancing inputs such as chemical fertilisers. An interesting result in Table 4.3 is that trained farmers applied less fertiliser per hectare than the untrained. This may be indicative of the fact that trained farmers are less likely to over-apply fertilisers. As reported by Zingore *et al.* (2014), two problems facing smallholder farmers in developing countries are that of low adoption rates and over-application of fertilisers among the adopters. The results reveal the fact that relevant agricultural training can address these two issues simultaneously.

As expected, the farmers who stay far from all-weather roads (ROADIST) are less likely to adopt chemical fertilisers, and also apply less fertiliser per hectare. This is because of higher transport expenses and other transaction costs that households associated with poor roads incur

to access inputs including fertilisers. These farmers have higher transaction costs for buying inputs and selling outputs, which reduces the return of chemical fertiliser application. Other studies (e.g., Alene *et al.*, 2008; Zhou *et al.*, 2010; Diiro *et al.*, 2015) have reported this negative relationship between the difficulty of accessing fertiliser markets and fertiliser adoption. Perceptions that fertiliser prices are too high (PRICEPERC) had a negative influence on the decision to use fertiliser, and also on the amount applied per hectare. Most of the farmers felt that the biggest constraint to their adoption of chemical fertilisers, and applying the recommended rates was because they could not afford the fertilisers. This result supports the descriptive studies such as Fanadzo *et al.* (2010) and Odhiambo and Magandini (2008) which have reported that financial constraints are the major hindrance of fertiliser use among rural farming households in South Africa.

In line with expectations, the results show that access to a reliable source of water for irrigation purposes (IRRIGAT) results in increased chances of chemical fertiliser use and higher amounts applied per hectare. This is expected, since access to irrigation reduces the chances of crop failure and leads to increased yields. Farmers are more likely to invest in modern inputs, including chemical fertilisers, if the prospects of success are higher. As explained in Fanadzo *et al.* (2010), the interaction of moisture supply and nutrient supply is reciprocal such that if the farmer cannot irrigate, it is a waste to fertilise; and if a farmer cannot fertilise, it is a waste to irrigate. Dorward *et al.* (2003) and Zezza *et al.* (2011) have highlighted the importance of the joint benefits of resources or technologies, showing that the returns to a particular resource or technology are greater if other complementary resources or technologies are also available to the household. This has been referred to as 'bundling of services' (Zezza *et al.*, 2011).

The results show that households with more farming experience (FARMEXP) had higher chances of adopting fertilisers. This is because experienced farmers are confident in their farming abilities and may feel that they would be able to correctly apply the fertilisers. However, experience had no significant impact on the level of fertiliser use. Table 4.3 also indicates that perceived land tenure security (TENURE) was associated with increases in the chances of chemical fertiliser adoption and the level of fertiliser use. This result is consistent with the literature (e.g., Brasselle *et al.*, 2002; Chirwa, 2005; Fenske, 2011; Yirga and Hassan, 2013), which has reported a positive relationship between investments and land tenure security. Secure access to land results in farmers having greater incentive to undertake risky investments

in productive inputs and technology, since secure land tenure implies their right or ability to maintain long-term use of their land.

The results show that households where heads are employed non-farm applied less chemical fertiliser per hectare than households where heads have non-farm employment. A possible reason is that households with employed heads depend less on smallholder farming, and are thus less reluctant to invest in farming activities compared to their counterparts. This is in contrast to the 'prosperity pull' hypothesis (Brünjes and Diez, 2012) that suggests that greater access to employment should lead to an increase in farm investments because of the higher risk-bearing capacity of the employed household heads. However, the result is consistent with the 'recession push' hypothesis (Brünjes and Diez, 2012) which postulates that increasing access to non-farm employment decreases farm investments since people generally prefer to work in wage employment and are reluctant to invest in farming because it is risky. Stats SA (2012a) reported that people in KZN prefer non-farm wage employment than any other livelihood option.

The results of the present study also indicate that farmers in the Uthukela district are more likely to adopt chemical fertiliser than farmers in the Harry Gwala district. The significant district dummy implies that there are district-specific attributes (unobserved climatic variations, traditional values, attitudes and aspirations) that impact on fertiliser adoption and level of use. A possible explanation is that farmers in the Harry Gwala district are less likely to use chemical fertilisers than those in the Uthukela district because of the relatively higher agro-climatic potential in the former compared to the latter.

For robustness checks, the impact of social grants on chemical fertiliser adoption was estimated using the propensity score matching (PSM) and generalised propensity score (GPS) methods. The PSM results are presented in Tables 4.4 - 4.7.

Table 4.4 presents the impact of access to social grants on the probability of fertiliser adoption, whereas Table 4.5 shows the impact of access to social grants on the intensity of fertiliser use. Table 4.4 shows that households with access to social grants had higher chances of adopting chemical fertilisers than those without access to social grants. More specifically, the results in Table 4.4 show that the social grant beneficiaries had at least a 23% more chance of using chemical fertilisers than non-beneficiary households. The fact that PSM has found a positive impact on the chances of using chemical fertilisers, while the regressions found none,

emphasises the importance of matching when dealing with treatment and control groups. Unlike the regressions, PSM uses only matched sub-samples, resulting in more reliable causal estimates.

Table 4.4: The impact of access on social grants on the probability of fertiliser adoption, PSM results

Matching method	Number of households		ATT	t-test
	Treatment	Control		
Nearest neighbour	473	52	0.30 (0.09)	3.42***
Kernel matching method	473	55	0.23 (0.09)	2.48**

Notes: ***, **, and * means significance at 1%, 5% and 10%, respectively

Source: 2014 household survey

The Rosenbaum (2002) bounds test, implemented in Stata using an ado file (*mhbounds*) provided by Becker and Caliendo (2007) to deal with binary treatment outcomes, indicated that the conclusion of a positive impact of access to social grants on chemical fertiliser adoption would change at Γ=1.55. This implies that if households with the same covariates differ in their odds of being social grants recipients by a factor of 55%, the significance of access to social grants on the probability of fertiliser adoption may be questionable. Since this percentage is relatively high, it is concluded that the PSM results in Table 4.4 are robust to hidden bias.

Table 4.5 shows that the social grant beneficiaries applied more fertiliser per hectare than non-beneficiary households. Specifically, the results show that the social grant beneficiaries applied about 22 kg/ha more chemical fertiliser than non-beneficiary households. The PSM results support the conclusions made above that access to social grants has a positive impact on the intensity of fertiliser use. The Rosenbaum (2002) test, implemented following DiPrete and Gangl (2004) since the outcome is continuous, indicated that the critical level of Γ at which the conclusion of a positive effect would be reversed was Γ=2.1. This implies that the results are only sensitive to a hidden bias that would more than double the odds of being a social grant recipient.

Table 4.5: The impact of access to social grants on the fertiliser use intensity, PSM results

Matching method	Number of households		ATT	t-test
	Treatment	Control		
Nearest neighbour	473	52	22.77 (5.95)	3.83***
Kernel matching method	473	55	22.60 (5.99)	3.77***

Notes: ***, **, and * means significance at 1%, 5% and 10%, respectively

Source: 2014 household survey

Tables 4.6 and 4.7 present the impact of social grant-dependency status on fertiliser adoption rates and intensity of fertiliser use, respectively. For this analysis, the low social grant-dependency category, where social grants contributed less than 50% to household income, was considered the control group. The high social grant-dependency category (i.e., households where social grants contributed at least 50% to household income) was considered the treatment group. This has been explained in previous sections. Consistent with other analytical methods, Table 4.6 shows that the level of dependency on social grants (low versus high dependency categories) does not influence the decision to adopt chemical fertilisers.

Table 4.6: The impact of social grant-dependency status on the probability of fertiliser adoption, PSM results

Matching method	Number of households		ATT	t-test
	Treatment	Control		
Nearest neighbour	264	104	0.09 (0.08)	1.08
Kernel matching method	264	204	0.06 (0.06)	1.00

***Notes**:* ***, **, and * means significance at 1%, 5% and 10%, respectively

***Source**:* 2014 household survey

Table 4.7 supports the findings from other econometric methods that high levels of dependency on social grants were associated with decreasing intensity of chemical fertiliser adoption. The table shows that those households in the high social grant-dependency category applied about 7 kg/ha less chemical fertiliser than those who are less dependent on social grants.

Table 4.7: The impact of social grant-dependency status on the intensity of chemical fertiliser use, PSM results

Matching method	Number of households		ATT	t-test
	Treatment	Control		
Nearest neighbour	264	104	-12.47 (7.52)	1.66*
Kernel matching method	264	204	-7.83 (4.68)	1.67*

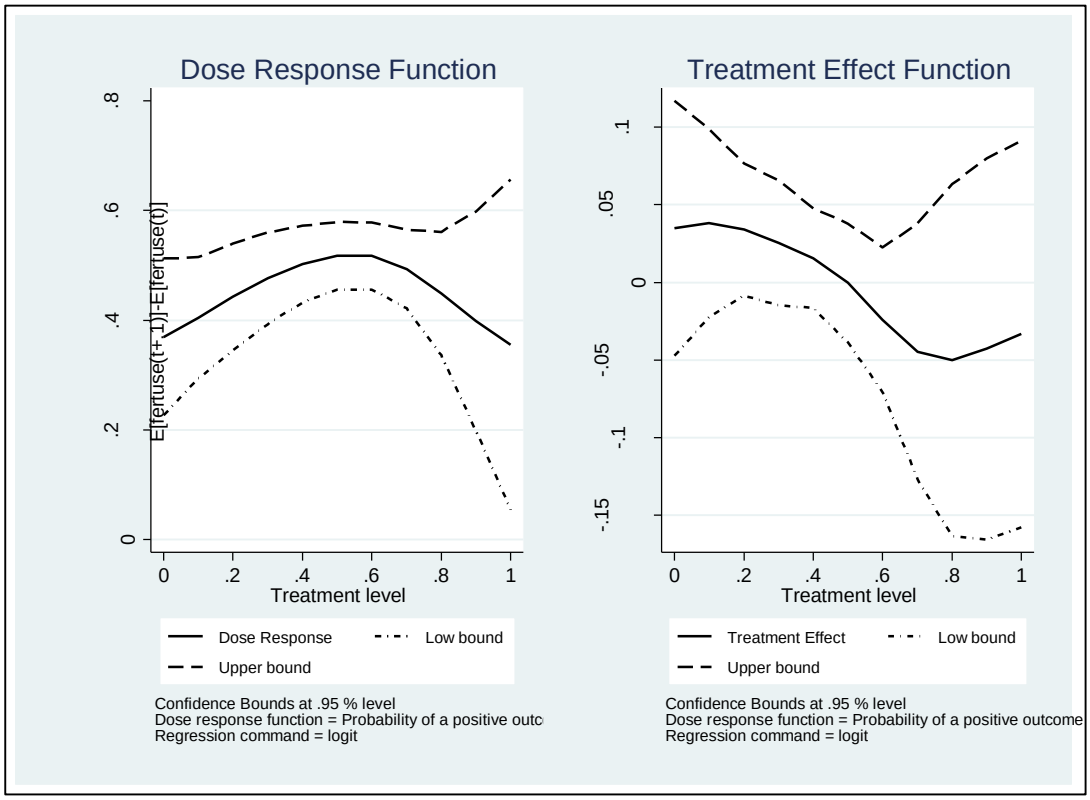
***Notes**:* ***, **, and * means significance at 1%, 5% and 10%, respectively

***Source**:* 2014 household survey

To further assess the impact of the level of dependency on social grants on the probability of chemical fertiliser use and intensity levels, the GPS method was used. The GPS was implemented as discussed in Chapter 3, Sub-section 3.2.5.5. The outcomes in this case were the probability of chemical fertiliser use and the level of fertiliser use in kg/ha. Figure 4.1 presents the graphs showing the average dose-response and the treatment functions and their

respective 95% confidence intervals for the probability of fertiliser use. The table of results is presented in Appendix F. The probability of fertiliser adoption was estimated using the logit model and the confidence intervals were based on 100 bootstrap repetitions. The normality and balancing property assumptions were satisfied at 5% and 1% significance levels, respectively.

Figure 4.1 shows that the probability of chemical fertiliser adoption increases at a decreasing rate with increasing levels of dependency on social grants up to 50% of social grants contribution to total household income. The graph shows a decrease in the chances of chemical fertiliser adoption at levels of social grant-dependency higher than 50%, implying that increasing levels of social grant-dependency reduce the probability of fertiliser adoption at treatment levels above 50%. However, the confidence bands are quite wide in this range, particularly after dosages of 80%, implying that the shape of the dose-response curve is not reliable after treatment levels of 80%.



E[fertuse(t)]

Figure 4.1: The average dose-response and treatment functions and 95% confidence bands for the probability of fertiliser adoption

The results of the impact of social grant-dependency levels on the intensity of fertiliser use are presented in Figure 4.2 and Appendix G. The results show a similar trend, indicating that income from social grants has a positive impact on fertiliser use intensity at lower levels of

social grant dependency. The graph shows that the relationship changes at the treatment level of 50%, implying that increasing contribution of social grants at levels greater than 50% leads to a decline in fertiliser use levels.

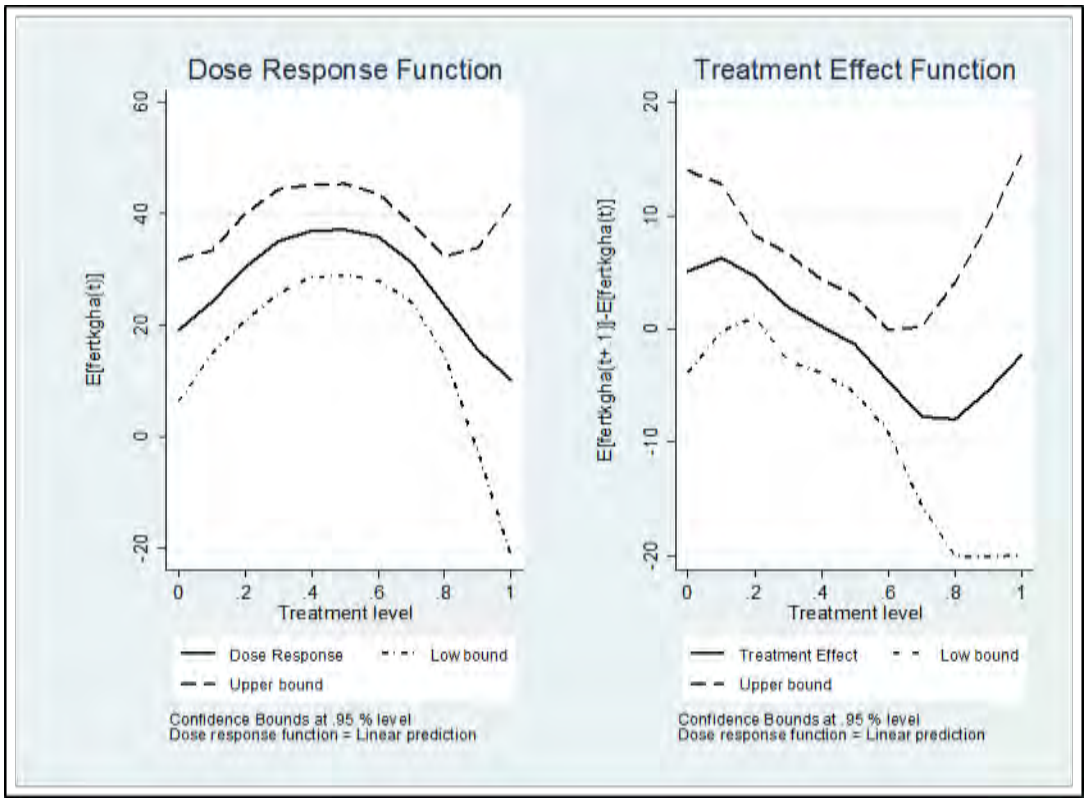


Figure 4.2: The average dose-response and treatment functions and 95% confidence bands for the probability of fertiliser adoption

Since the confidence bands are also narrow for dosages greater than 50% and less than 80%, it can be reliably concluded that there is a decline in chemical fertiliser use intensity when social grants contribute more than 50% and less than 80% of household income. However, as explained above, the shape of the dose function at dosages greater than 80% is uncertain, since the confidence intervals are wide in this range. The next section presents the main conclusions of this chapter and their policy implications.

4.4 Conclusions and policy implications

This paper has investigated the extent to which social grants relieve liquidity constraints and improve chemical fertiliser use among smallholder farming households in the KZN province,

South Africa. A sample of 984 households was analysed using the double-hurdle model. The descriptive statistics indicated that the levels of chemical fertiliser application were below the recommended application rates, suggesting that the strategies for increasing fertiliser adoption rates, as well as fertiliser use intensity in rural South Africa should be identified. The double-hurdle results indicated that access to and level of dependency on social grants had no significant impact on the decision to adopt chemical fertilisers. The variables that had the most influence on the decision to adopt chemical fertilisers were soil fertility status, wealth (assets, land, etc.), perceived fertiliser prices and security of tenure.

While access to social grants had a positive impact on fertiliser use level, increasing level of dependency on social grants had a negative impact. The positive influence of access to social grants on chemical fertiliser use intensity indicates that social grants play a significant role in alleviating the liquidity constraints facing rural farmers. This result is consistent with the presence of credit constraints that limit poor rural households' ability to invest in modern farming technologies. It supports the hypothesis that social grant beneficiary households use some of the grant income to alleviate financial constraints in agricultural production. However, the negative association between increasing level of dependency on social grants and fertiliser use intensity suggests that increasing incomes from social grants may entrench a culture of dependency and entitlement, creating production disincentives.

The results of this study suggest that the disincentive impact of social grants on technology adoption is not a question of whether or not a household is a social grant beneficiary but the relative importance of the grant to household income. Specifically, the GPS results indicated that social grants contribution of more than 50% to household income creates disincentives to adopt chemical fertilisers. As social grants are not enough to pull households out of poverty completely if they are not complemented by other livelihood options (such as farming), there is a need for strategies to reduce this social grant-dependency and production disincentives. This implies the need to prioritise strategies that allow for social grants to play a positive role in technology adoption without creating negative dependency and production disincentives. The study results suggest that subsidies accompanied by policies that target to increase smallholder farmers' assets to increase their risk-bearing capacity could improve the chances of chemical fertiliser adoption.

To ensure that social grants have the most effect on the adoption of fertiliser and other technological innovations, interventions should focus on aspects (e.g., secure land tenure,

information access, extension and group membership) that allow households to overcome the first hurdle, i.e., decide to use chemical fertilisers. Creating a positive demand for chemical fertilisers requires that the farmers be made aware of the technology and its benefits. The importance of agricultural extension as a source of information as well as social networks such as groups in reducing transaction costs means that they should be utilised to promote chemical fertiliser use among smallholder farmers. The study has also highlighted the importance of complementary inputs (such as irrigation), as well as public infrastructure (such as roads), in encouraging chemical fertiliser adoption in the rural areas. Farmers are most likely to adopt new technology if they are confident on the prospective success of the new technology (mainly due to the availability of other complementary inputs and a conducive infrastructural environment). Thus, one improved technology does not work in isolation and policy-makers aiming to promote new technology adoption should address all the other production/productivity constraints in the rural areas.

References

Abdoulaye, T. and Sanders, J.H. 2005. Stages and determinants of fertilizer use in semiarid African agriculture: The Niger experience. *Agricultural Economics* 32 (2):167-179.

Abebaw, D., Fentie, Y. and Kassa, B. 2010. The impact of a food security program on household food consumption in Northwestern Ethiopia: A matching estimator approach. *Food Policy* 35 (4):286-293.

Abebaw, D. and Haile, M.G. 2013. The impact of cooperatives on agricultural technology adoption: Empirical evidence from Ethiopia. *Food Policy* 38:82-91.

Abel, M. 2013. Unintended labour supply effects of cash transfer programmes: Evidence from South Africa's old age pension. Cape Town: University of Cape Town.

Abidoye, B.O. and Mabaya, E. 2014. Adoption of genetically modified crops in South Africa: Effects on wholesale maize prices. *Agrekon* 53 (1):104-123.

Akpan, S.B., Udoh, E.J. and Nkanta, V.S. 2012. Factors influencing fertilizer use intensity among smallholder crop farmers in Abak agricultural zone in Akwa Ibom State, Nigeria. *Journal of Biology, Agriculture and Healthcare* 2 (1):54-65.

Alabi, O.O., Lawal, A.F., Coker, A.A. and Awoyinka, Y.A. 2014. Probit model analysis of smallholder's farmers decision to use agrochemical inputs in Gwagwalada and Kuje Area Councils of Federal Capital Territory, Abuja, Nigeria. *International Journal of Food and Agricultural Economics* 2 (1):85-93.

Alene, A.D., Manyong, V.M., Omanya, G., Mignouna, H.D., Bokanga, M. and Odhiambo, G. 2008. Smallholder market participation under transactions costs: Maize supply and fertilizer demand in Kenya. *Food Policy* 33 (4):318-328.

Ali, A. and Abdulai, A. 2010. The adoption of genetically modified cotton and poverty reduction in Pakistan. *Journal of Agricultural Economics* 61 (1):175-192.

Aliber, M. and Hart, T.G.B. 2009. Should subsistence agriculture be supported as a strategy to address rural food insecurity? *Agrekon* 48 (4):434-458.

Asfaw, A. and Admassie, A. 2004. The role of education on the adoption of chemical fertiliser under different socioeconomic environments in Ethiopia. *Agricultural Economics* 30 (3):215-228.

Asfaw, S., Kassie, M., Simtowe, F. and Lipper, L. 2012a. Poverty reduction effects of agricultural technology adoption: A micro-evidence from rural Tanzania. *The Journal of Development Studies* 48 (9):1288-1305.

Asfaw, S., Shiferaw, B., Simtowe, F. and Haile, M.G. 2011. Agricultural technology adoption, seed access constraints and commercialization in Ethiopia. *Journal of Development and Agricultural Economics* 3 (9):436-447.

Asfaw, S., Shiferaw, B., Simtowe, F. and Lipper, L. 2012b. Impact of modern agricultural technologies on smallholder welfare: Evidence from Tanzania and Ethiopia. *Food Policy* 37 (3):283-295.

AU/NEPAD. 2003. Comprehensive Africa Agricultural Development Program (CAADP). Midrand, South Africa: AU/NEPAD (African Union/New Partnership to Africa's Development).

AU/NEPAD. 2011. The Abuja Declaration on Fertilizers for an African Green Revolution: Status of implementation at regional and national levels. Midrand: AU/NEPAD (African Union/New Partnership to Africa's Development).

Becker, S.O. and Caliendo, M. 2007. Sensitivity analysis for average treatment effects. *The Stata Journal* 7 (1):71-83.

Bertrand, M., Mullainathan, S. and Miller, D. 2003. Public policy and extended families: Evidence from pensions in South Africa. *World Bank Economic Review* 17 (1):27-50.

Bezu, S. and Holden, S. 2008. Can food-for-work encourage agricultural production? *Food Policy* 33 (6):541-549.

Bezu, S., Kassie, G.T., Shiferaw, B. and Ricker-Gilbert, J. 2014. Impact of improved maize adoption on welfare of farm households in Malawi: A panel data analysis. *World Development* 59:120-131.

Brasselle, A.-S., Gaspart, F. and Platteau, J.-P. 2002. Land tenure security and investment incentives: Puzzling evidence from Burkina Faso. *Journal of Development Economics* 67:373-418.

Brünjes, J. and Diez, J.R. 2012. 'Recession push' and 'prosperity pull' entrepreneurship in a rural developing context. *Entrepreneurship & Regional Development* 25 (3-4):251-271.

Burke, W.J. 2009. Fitting and interpreting Cragg's tobit alternative using Stata. *The Stata Journal* 9 (4):584-592.

Chianu, J.N. and Tsujii, H. 2004. Determinants of farmers' decision to adopt or not adopt inorganic fertilizer in the savannas of northern Nigeria. *Nutrient Cycling in Agroecosystems* 70:293-301.

Chirwa, E.W. 2005. Adoption of fertiliser and hybrid seeds by smallholder maize farmers in southern Malawi. *Development Southern Africa* 22 (1):1-12.

Cragg, J.G. 1971. Some statistical models for limited dependent variables with application to the demand for durable goods. *Econometrica* 39 (5):829-844.

Crawford, E.W., Jayne, T.S. and Kelly, V.A. 2006. Alternative approaches for promoting fertilizer use in Africa. Agriculture and Rural Development Discussion Paper 22. Washington, DC: The International Bank for Reconstruction and Development/ The World Bank.

Croppenstedt, A., Demeke, M. and Meschi, M.M. 2003. Technology adoption in the presence of constraints: The case of fertiliser demand in Ethiopia. *Review of Development Economics* 7 (1):58-70.

DAFF. 2012. A framework for the development of smallholder farmers through cooperatives development. Pretoria: DAFF (Department of Agriculture, Forestry and Fisheries).

de Janvry, A., Fafchamps, M. and Sadoulet, E. 1991. Peasant household behaviour with missing markets: Some paradoxes explained. *The Economic Journal* 101 (409):1400-1417.

Devereux, S. 2002. Can social safety nets reduce chronic poverty? *Development Policy Review* 20 (5):657-675.

Diale, N.R. 2011. Socio-economic indicators influencing the adoption of hybrid sorghum: The Sekhukhune district perspective. *South African Journal of Agricultural Extension* 39:75-85.

Diao, X., Headey, D. and Johnson, M. 2008. Toward a green revolution in Africa: What would it achieve, what would it require? *Agricultural Economics* 39:539-550.

Diiro, G.M., Ker, A.P. and Sam, A.G. 2015. The role of gender in fertiliser adoption in Uganda. *African Journal of Agricultural and Resource Economics* 10 (2):117-130.

DiPrete, T.A. and Gangl, M. 2004. Assessing bias in the estimation of causal effects: Rosenbaum bounds on matching estimators and instrumental variables estimation with imperfect instruments. *Sociological Methodology* 34 (1):271-310.

Dorward, A., Kydd, J., Morrison, J. and Urey, I. 2004. A policy agenda for pro-poor agricultural growth. *World Development* 32 (1):73-89.

Dorward, A., Poole, N., Morrison, J., Kydd, J. and Urey, I. 2003. Markets, institutions and technology: Missing links in livelihoods analysis. *Development Policy Review* 21 (3):319-332.

Dow, W. and Norton, E. 2003. Choosing between and interpreting the heckit and two-part models for corner solutions. *Health Services and Outcomes Research Methodology* 4 (1):5-18.

Eastwood, R., Kirsten, J. and Lipton, M. 2006. Premature deagriculturalisation? Land inequality and rural dependency in Limpopo province, South Africa. *The Journal of Development Studies* 42 (8):1325-1349.

Essa, J.A. and Nieuwoudt, W.L. 2001. Determinants of hybrid maize seed adoption by emerging farmers in communal areas of KwaZulu-Natal. *Agrekon* 40 (4):537-548.

Fanadzo, M., Chiduza, C. and Mnkeni, P.N.S. 2010. Overview of smallholder irrigation schemes in South Africa: Relationship between farmer crop management practices and performance. *African Journal of Agricultural Research* 5 (25):3514-3523.

Fenske, J. 2011. Land tenure and investment incentives: Evidence from West Africa. *Journal of Development Economics* 95::137–156.

Feynes, T. and Meyer, N. 2003. Structure and production in South African agriculture. *In:* Nieuwoudt, L. and Groenewald, J. (eds.) *The challenge of change: Agriculture, land and the South African economy.* Pietermaritzburg: University of Natal Press.

Freeman, H.A. and Omiti, J.M. 2003. Fertilizer use in semi-arid area of Kenya: Analysis of smallholder farmers' adoption behavior under liberalized markets. *Nutrient Cycling in Agroecosystems* 66 (23-31).

Gomersall, J. 2013. The performance of the Child Support Grant: Review and research priorities. *Development Southern Africa* 30 (4-05):525-544.

Gregory, T. and Sewando, P. 2013. Determinants of the probability of adopting of quality protein maize (QPM) technology in Tanzania: A logistic regression analysis. *International Journal of Development and Sustainability* 2 (2):729-746.

Gutura, P. and Tanga, P.T. 2014. The intended consequences of the social assistance grants in South Africa. *Mediterranean Journal of Social Sciences* 5 (2):659-669.

Hausman, J.A. 1978. Specification tests in econometrics. *Econometrica* 46 (6):1251-1271.

Isham, J. 2002. The effect of social capital on fertiliser adoption: Evidence from rural Tanzania. *Journal of African Economies* 11 (1):39-60.

Jaleta, M., Yirga, C., Kassie, M., de Groote, H. and Shiferaw, B. 2013. Knowledge, adoption and use intensity of improved maize technologies in Ethiopia. *Paper presented at the 4th International Conference of the African Association of Agricultural Economists*, Hammamet, Tunisia, 22-25 September 2013.

Jansen, A., Moses, M., Mujuta, S. and Yu, D. 2014. Measurements and determinants of multifaceted poverty in South Africa. *Development Southern Africa* 32 (2):151-169.

Kafle, B. 2010. Determinants of adoption of improved maize varieties in developing countries: A review. *International Research Journal of Applied and Basic Sciences* 1 (1):1-7.

Kaguongo, W., Ortmann, G., Wale, E., Darroch, M. and Low, J. 2012. Factors influencing adoption and intensity of adoption of orange flesh sweet potato varieties: Evidence from an extension intervention in Nyanza and Western provinces, Kenya. *African Journal of Agricultural Research* 7 (3):493-503.

Kassie, M., Jaleta, M., Shiferaw, B., Mmbando, F. and Mekuria, M. 2013. Adoption of interrelated sustainable agricultural practices in smallholder systems: Evidence from rural Tanzania. *Technological Forecasting and Social Change* 80 (3):525-540.

Kassie, M., Shiferaw, B. and Muricho, G. 2011. Agricultural technology, crop income, and poverty alleviation in Uganda. *World Development* 39 (10):1784-1795.

Kelly, V.A. 2006. Factors affecting demand for fertilizer in sub-Saharan Africa. Agriculture and Rural Development Discussion Paper 23. Washington, DC: The International Bank for Reconstruction and Development/ The World Bank.

Lambrecht, I., Vanlauwe, B., Merckx, R. and Maertens, M. 2014. Understanding the process of agricultural technology adoption: Mineral fertilizer in Eastern DR Congo. *World Development* 59:132-146.

Mabaya, E., Fulton, J., Simiyu-Wafukho, S. and Nang'ayo, F. 2015. Factors influencing adoption of genetically modified crops in Africa. *Development Southern Africa* 32 (5):577-591.

Mabugu, R., Chitiga, M., Fofana, I., Abidoye, B. and Mbanda, V. 2014. Assessing the general equilibrium effects of social grants in South Africa. *Paper presented at the 17th Annual Conference on Global Economic Analysis "New Challenges in Food Policy, Trade and Economic Vulnerability"*, Dakar, Senegal, 18-20 June 2014.

Mabugu, R., Tiberti, L., Maisonnave, H., Chitiga, M., Hoareau, S., Robichaud, V. and Ngandu, S. 2013. Quantitative analysis of impact of social grants in South Africa. Midrand, South Africa: Financial and Fiscal Commission.

Mal, P., Anik, A.R., Bauer, S. and Schmitz, P.M. 2012. Bt cotton adoption: A double-hurdle approach for North Indian farmers. *AgBioForum* 15 (3):294-302.

Mapila, M.A.T.J., Njuki, J., Delve, R.J., Zingore, S. and Matibini, J. 2012. Determinants of fertiliser use by smallholder maize farmers in the Chinyanja Triangle in Malawi, Mozambique and Zambia. *Agrekon* 51 (1):21-41.

Martey, E., Wiredu, A.N., Etwire, P.M., Fosu, M., Buah, S.S.J., Bidzakin, J., Ahiabor, B.D.K. and Kusi, F. 2014. Fertilizer adoption and use intensity among smallholder farmers in northern Ghana: A case study of the AGRA soil health project. *Sustainable Agriculture Research* 3 (1):24-36.

Martinez, S. 2004. *Pensions, poverty and household investments in Bolivia*. California: Berkeley University of California. Available at: http://eml.berkeley.edu/~webfac/bardhan/e271_f04/martinez.pdf [Accessed 20 June 2015].

Mkhabela, T.S. 2006. A review of the use of manure in small-scale crop production systems in South Africa. *Journal of Plant Nutrition* 29 (7):1157-1185.

Mkhabela, T.S. and Materechera, S.A. 2003. Factors influencing the utilization of cattle and chicken manure for soil fertility management by emergent farmers in the moist Midlands of KwaZulu-Natal Province, South Africa. *Nutrient Cycling in Agroecosystems* 65:151-162.

Morgan, S.L., Marsden, T., Miele, M. and Morley, A. 2010. Agricultural multifunctionality and farmers' entrepreneurial skills: A study of Tuscan and Welsh farmers. *Journal of Rural Studies* 26 (2):116-129.

Morris, M., Kelly, V.A., Kopicki, R.J. and Byerlee, D. 2007. Fertilizer use in African agriculture: Lessons learned and good practice guidelines. Washington, DC: World Bank.

Murovhi, N.R., Materechera, S.A. and Mkhabela, T.S. 2011. Socio-economic determinants of small-scale farmers' fruit trees leaf litter utilization for soil fertility management in a sub-tropical environment: The case of Mpumalanga, South Africa. *African Journal of Agricultural Research* 6 (32):6674-6683.

Mwangi, M. and Kariuki, S. 2015. Factors determining adoption of new agricultural technology by smallholder farmers in developing countries. *Journal of Economics and Sustainable Development* 6 (5):208-2016.

Neves, D., Samson, M., van Niekerk, I., Hlatshwayo, S. and du Toit, A. 2009. The use and effectiveness of social grants in South Africa. Cape Town: Institute for Poverty, Land and Agrarian Studies (PLAAS) and Economic Policy Research Institute (EPRI).

Odhiambo, J.J.O. and Magandini, V.N. 2008. An assessment of the use of mineral and organic fertilizers by smallholder farmers in Vhembe district, Limpopo province, South Africa. *African Journal of Agricultural Research* 3 (5):357-362.

Ogada, M., Mwabu, G. and Muchai, D. 2014. Farm technology adoption in Kenya: A simultaneous estimation of inorganic fertilizer and improved maize variety adoption decisions. *Agricultural and Food Economics* 2 (1):1-18.

Rosenbaum, P.R. 2002. *Observational studies.* New York: Springer.

RSA. 1997. *White Paper for Social Welfare*. Pretoria: Republic of South Africa (RSA). Available at: http://www.gov.za/sites/www.gov.za/files/White_Paper_on_Social_Welfare_0.pdf [Accessed 8 June 2015].

Rubin, D. and Thomas, D. 2000. Combining propensity score matching with additional adjustments for prognostic covariates. *Journal of American Statistical Association* 95:573-585.

Samson, M. 2009. Social cash transfers and employment: A note on empirical linkages in developing countries. Paris: The Organisation for Economic Co-operation and Development (OECD).

Samson, M., Heinrich, C., Williams, M., Kaniki, S., Muzondo, T., Quene, K.M. and van Niekerk, I. 2008. Quantitative analysis of the impact of the Child Support Grant. New York: United Nations Children's Fund.

Samson, M., Lee, U., Ndlebe, A., Quene, K.M., van Niekerk, I., Gandhi, V., Harigaya, T. and Abrahams, C. 2004. The social and economic impact of South Africa's social security system. Summary Report. Cape Town: Economic Policy Research Institute.

SASSA. 2014. *Fact sheet: Issue no 12 of 2014. A statistical summary of social grants in South Africa*. Pretoria: South Africa Social Security Agency (SASSA). Available at: http://www.sassa.gov.za/index.php/statistical-reports [Accessed 28 June 2015].

Sharaunga, S. and Wale, E. 2013. The dis-incentive effects of food aid and agricultural policies on local land allocation in developing countries: The case of Malawi. *Development Southern Africa* 30 (4-5):491-507.

Shiferaw, B., Kassie, M., Jaleta, M. and Yirga, C. 2014. Adoption of improved wheat varieties and impacts on household food security in Ethiopia. *Food Policy* 44:272-284.

Shiferaw, B.A., Kebede, T.A. and You, L. 2008. Technology adoption under seed access constraints and the economic impacts of improved pigeonpea varieties in Tanzania. *Agricultural Economics* 39 (3):309-323.

Sikwela, M.M. 2013. *The impact of farmer support programmes on market access of smallholder farmers in the Eastern Cape and KwaZulu-Natal provinces, South Africa.* PhD Thesis, University of Fort Hare.

Sinyolo, S., Mudhara, M. and Wale, E. 2014. The impact of smallholder irrigation on household welfare: The case of Tugela Ferry irrigation scheme in KwaZulu-Natal, South Africa. *Water SA* 40 (1):145-156.

Stats SA. 2012a. *Census 2011 Municipal report – KwaZulu-Natal*. Pretoria: Statistics South Africa. Available at: http://www.statssa.gov.za/Census2011/Products/KZN_Municipal_Report.pdf [Accessed 9 March 2015].

Stats SA. 2012b. GHS Series, volume IV, Food security and agriculture, 2002–2011: In-depth analysis of the General Household Survey data. Pretoria: Statistics South Africa.

Tadesse, G. and Shively, G. 2009. Food aid, food prices and producer disincentives in Ethiopia. *American Journal of Agricultural Economics* 3:123-145.

Thuo, M., Bravo-Ureta, B.E., Hathie, I. and Obeng-Asiedu, P. 2010. Adoption of chemical fertilizer by smallholder farmers in the peanut basin of Senegal. *African Journal of Agricultural and Resource Economics* 6 (1):1-17.

Thuo, M.W., Bravo-Ureta, B.E., Obeng-Asiedu, K. and Hathie, I. 2014. The adoption of agricultural inputs by smallholder farmers:The case of an improved groundnut seed and chemical fertilizer in the Senegalese Groundnut Basin. *The Journal of Developing Areas* 48 (1):61-82.

Tshuma, M.C. 2012. A review of the poverty and food security issues in South Africa: Is agriculture the solution? *African Journal of Agricultural Research* 7 (28):4010-4020.

Vincent, K. and Cull, T. 2009. Impacts of social cash transfers: Case study evidence from across southern Africa. *Paper presented at the II Conferencia do IESE "Dinamicas da Pobreza e Padrões de Acumulação em Moçambique"*, Maputo, 22-23 April 2009.

Waithaka, M.M., Thornton, P.K., Shepherd, K.D. and Ndiwa, N.N. 2007. Factors affecting the use of fertilizers and manure by smallholders: The case of Vihiga, western Kenya. *Nutrient Cycling in Agroecosystems* 78:211-224.

Wale, E. and Yalew, A. 2007. Farmers' variety attribute preferences: Implications for breeding priority setting and agricultural extension policy in Ethiopia. *African Development Review* 19 (2):379-396.

Winter-Nelson, A. and Temu, A. 2005. Impacts of prices and transactions costs on input usage in a liberalizing economy: evidence from Tanzanian coffee growers. *Agricultural Economics* 33 (3):243-253.

Yirga, C. and Hassan, R.M. 2013. Determinants of inorganic fertiliser use in the mixed crop-livestock farming systems of central highliands of Ethiopia. *African Crop Science Journal* 21 (3):669-681.

Zezza, A., Winters, P., Davis, B., Carletto, G., Covarrubias, K., Tasciotti, L. and Quiñones, E. 2011. Rural household access to assets and markets: A cross-country comparison. *The European Journal of Development Research* 23 (4):569-597.

Zhou, Y., Yang, H., Mosler, H.-J. and Abbaspour, K.C. 2010. Factors affecting farmers' decisions on fertilizer use: A case study for the Chaobai watershed in Northern China. *Consilience: The Journal of Sustainable Development* 4 (1):80-102.

Zingore, S., Njoroge, S., Chikowo, R., Kihara, J., Nziguheba, G. and Nyamangara, J. 2014. *4R plant nutrient management in African agriculture: An extension handbook for fertilizer management in smallholder farming systems*. Nairobi: International Plant Nutrition Institute (IPNI).

CHAPTER 5 THE IMPACT OF SOCIAL GRANT-DEPENDENCY ON SMALLHOLDER MAIZE PRODUCERS' MARKET PARTICIPATION IN KWAZULU-NATAL, SOUTH AFRICA

5.0 Abstract

This chapter assessed the impact of access to, and level of dependency on, social grants on the incentives of smallholder maize producers to participate in the produce markets. The double-hurdle model was used to analyse a sample of 774 smallholder maize producers from four districts in KwaZulu-Natal province, South Africa. The results showed that higher social grant-dependency was associated with decreased probability of market participation. Households with access to social grants sold less maize in the market. The study concluded that the smallholder farmers who have access to, and depend on, social grants are less likely to be market-oriented, as they are more likely to produce only for subsistence purposes and depend on social grants for income. This has negative implications on the government's drive to increase commercialisation levels of smallholder farmers and points to the need to address the social grants disincentives issue in order to meet its targets. The results identified a number of factors that significantly influenced household market participation, highlighting the importance of institutional support (e.g., extension, training and information) in reducing market transaction costs. The study results imply that policies aimed at reducing both fixed and variable transaction costs (such as improved road infrastructure and institutional support like extension, training, organising farmers into groups) should be prioritised to increase both rates and levels of smallholder participation in the maize markets.

Keywords: social grants, maize markets, smallholder producers, double-hurdle model, KwaZulu-Natal, South Africa

5.1 Introduction

Several studies (e.g., de Janvry *et al.*, 1991; von Braun, 1995; Barrett and Swallow, 2006; Carter and Barrett, 2006; Alene *et al.*, 2008; Zhou *et al.*, 2013) have long agreed on the importance of promoting smallholder market participation as a pathway towards poverty reduction, economic growth and development in the developing countries. It has been suggested that smallholder agriculture would contribute more to rural livelihoods if it breaks out of the subsistence trap into commercial agricultural production (Barrett and Swallow, 2006; Hazell *et al.*, 2010; Jagwe *et al.*, 2010). As a result, the transition from low productivity, semi-subsistence agriculture to high productivity, commercialised agriculture has been a core theme of rural development initiatives for many years across the developing countries, in general, and Sub-Saharan Africa in particular (Barrett, 2008; Agwu *et al.*, 2012; Poole *et al.*, 2013; Zhou *et al.*, 2013).

Despite growing market opportunities that have been brought about by market liberalisation policies, lowering of trade barriers and changes in the global agricultural economy, smallholder farmers market participation has not significantly increased in many developing countries, especially in Sub-Saharan Africa (SSA) (Barrett, 2008; Markelova *et al.*, 2009; Minten *et al.*, 2009; Jayne *et al.*, 2010; Mather *et al.*, 2013; Arinloye *et al.*, 2015; Mmbando *et al.*, 2015). Several studies done on smallholder market participation in the region (e.g., Key *et al.*, 2000; Poulton *et al.*, 2005; Alene *et al.*, 2008; Mendoza and Thelen, 2008; Markelova *et al.*, 2009; Hazell *et al.*, 2010; Jagwe *et al.*, 2010; Mmbando *et al.*, 2015) have emphasised that the major constraints to improved market participation of smallholder farmers are the high transaction costs, information asymmetries and weak institutions. Transaction costs are the costs associated with arranging and carrying out a market transaction (Goetz, 1992; Alene *et al.*, 2008).

This also applies to South Africa, which on one hand is characterised by well market-connected large-scale producers, and on the other hand, has a smallholder farming sector that is unprofitable and is characterised by weak links to markets (Makhura *et al.*, 2001; Senyolo *et al.*, 2009; Ortmann and King, 2010; Biénabe and Vermeulen, 2011; van der Heijden and Vink, 2013). The general view is that smallholder farmers' market participation should be improved to reduce rural poverty and household food insecurity in South Africa (Randela *et al.*, 2008; Senyolo *et al.*, 2009; van Schalkwyk *et al.*, 2012; Chikazunga, 2013; Khumalo, 2013; Thamaga-Chitja and Morojele, 2014; Maponya *et al.*, 2015; Raleting and Obi, 2015). The high unemployment rates and limited prospects for labour absorption in the non-farm sector in South

Africa has led the government to prioritise the expansion of the smallholder sector as part of its broader job creation strategy (Aliber and Hall, 2012; NPC, 2012). An important element of such a strategy is that it should promote the graduation of subsistence producers, so that they can earn an income as commercial smallholder producers (Aliber and Hall, 2012; van Schalkwyk *et al.*, 2012).

The South African government has identified increased commercialisation of smallholder farming as key in reducing rural poverty and stimulating rural economic development (NPC, 2012; DAFF, 2013). For example, the New Growth Path set a target of establishing 300 000 additional market-oriented smallholder producers by 2020 (DED, 2011). In line with these targets, the national Department of Agriculture, Forestry and Fisheries (DAFF) has been implementing the Strategic Plan for Smallholder Support (SPSS), aimed at supporting smallholder farmers to improve production and/or productivity levels and graduate to commercial status (DAFF, 2013). One of the key indicators of commercialisation of smallholder farmers is their participation in the marketing of their produce.

In spite of the noble efforts of the government, smallholder farmers' market participation has not significantly improved in South Africa (van Schalkwyk *et al.*, 2012; Hlongwane *et al.*, 2014; Jordaan *et al.*, 2014; Maponya *et al.*, 2015; Raleting and Obi, 2015). A range of constraints and barriers reducing the incentive for market participation have been identified, with most of the studies also stressing the issues of high transaction costs and inadequate assets or resources to mitigate the effects of these transaction costs (Makhura, 2001; Biénabe and Vermeulen, 2011; Jari and Fraser, 2013; van der Heijden and Vink, 2013; Hlongwane *et al.*, 2014; Mukwevho and Anim, 2014). However, the question that has not been adequately addressed in the literature is the impact of social grants on the incentives of smallholder farmers to commercialise their production activities. South Africa has social grants that benefited over 16 million of the poor in 2014 (SASSA, 2014). The majority of smallholder farming households are beneficiaries of at least one of the different social grants.

The question is, to what extent do smallholder farmers rely on social grants for income and tend to engage in farming just for subsistence purposes? Descriptive statistics and anecdotal evidence from several studies in South Africa (e.g., White and Killick, 2001; Aliber and Hart, 2009; Aliber and Hall, 2012; Tshuma, 2012) have highlighted the potential negative effect of social grant-dependency on smallholder farming activities. Tshuma (2012) reported that the majority of smallholder farmers are reducing the area under cultivation, even for subsistence

purposes, as they depend more on social grants for their income. This has resulted in social grants becoming the greatest source of income for the majority of rural households in South Africa, surpassing that of smallholder agriculture by far (Stats SA, 2012; Tshuma, 2012). As noted in Ulriksen (2012), subsistence farming is unlikely to help the poor escape poverty, as it does not necessarily make them a contributory part of the economy.

While this suggests that social grants may have created disincentives among smallholder producers to participate in agricultural produce markets, the understanding of the linkages between smallholder market participation and social grants have not been based on in-depth empirical analyses. Few studies, if any, have explicitly and systematically explored the relationship between the two variables in South Africa. This study, therefore, seeks to investigate the potential disincentive effect of social grants-dependency on smallholder maize producers' market participation, using the double-hurdle model. Maize was chosen because it is the most important grain crop in South Africa and is the main crop grown by the smallholder farmers (Akpalu *et al.*, 2010; Biénabe and Vermeulen, 2011; D'Haese *et al.*, 2013).

This chapter also aims to investigate the nature of transaction costs and other constraints that have hindered maize commercialisation among rural farming households. Understanding these constraints and how they can be alleviated is central to using smallholder maize production as an effective tool to integrate rural households into the commercial agricultural economy and improve their livelihoods (Makhura, 2001). As noted by Poole *et al.* (2013), there is need for regular studies that investigate the different local contexts and farmer characteristics and attitudes to better inform policy-makers, since there is no guarantee that what has worked in other areas would work in other contexts. The remainder of this chapter is organised into three sections. The next section presents the research methodology, where the theoretical framework and the empirical models are outlined. The succeeding section presents the results and their discussion, while the main conclusions and implications for policy are presented in the final section.

5.2 Research methodology

5.2.1 Data

This chapter depends on the same data set that was used in Chapters 3 and 4. A total of 984 households were randomly selected from the four district municipalities in the KwaZulu-Natal province, South Africa. Of the total sample, 774 had planted maize in the previous season (79% of the total sample), showing the importance of maize among smallholder farming activities. As indicated in the previous chapters, the data were collected using a structured questionnaire, which contained several modules. On top of the modules such as the basic demographics and socio-economic characteristics of the household, measures of wealth and resource endowment (e.g., assets, land and livestock), agricultural production activities, and household income amounts and sources, the questionnaire captured the crop production and marketing behaviour of the households. The households were asked questions about which crops they had planted in the previous season, quantities harvested and volumes sold or consumed for each crop.

5.2.2 Conceptual framework

The households' decision on whether or not to participate in the maize market was considered under the random utility framework and the theory of farm household decision-making under imperfect markets by de Janvry *et al.* (1991). The random utility framework postulates that the smallholder maize farmers will decide to participate in the market if the perceived utility or net benefit from participation (U_M) is greater than in the case without participation (U_N). If the difference between the net benefits from participation and non-participation may be denoted as U_{DF}, then a household would participate in the maize market if $U_{DF}=U_M-U_N > 0$.

The unobservable net utility U* can be expressed as a function of observable elements in the following latent variable model:

$$U^*_i= \beta x_i + \varepsilon_i,\ U_i=1 \text{ if } U^*_i>0 \qquad (5.1)$$

Where: U_i is a binary indicator variable that equals 1 for household *i* in case of participation and 0 otherwise, β is a vector of parameters to be estimated, x_i is a vector of household and farm characteristics and ε_i is an error term.

The selection of variables into the model was based on the theoretical work by de Janvry *et al.* (1991), which indicated that a household's market participation is a function of market transaction costs. According to de Janvry *et al.* (1991), market failure is household specific, not commodity specific. This is because households who participate in the market are those with market gains that are higher than the transaction costs, while those with market gains less than the transaction costs will not participate. Even though in some cases markets do not even exist, the majority of the cases of market failure in developing countries are due to high transactions costs (de Janvry *et al.*, 1991; Goetz, 1992; Staal *et al.*, 1997; Key *et al.*, 2000; Alene *et al.*, 2008). In South Africa, these transaction costs are due to the fact that the smallholder farmers are located in rural areas which are remote and far away from service providers and major consumers of farm products. The rural areas are also characterised by poor infrastructure, inadequate information and thin credit markets.

As explained in de Janvry *et al.* (1991) and other recent studies (e.g., Alene *et al.*, 2008; Mather *et al.*, 2013), the household's market participation is influenced by its economic position, institutional environment and local agro-ecological potential. In particular, studies such as Barrett (2008) and Boughton *et al.* (2007) have shown that it is heterogeneity in household resource endowments that mostly explains the variation in the ability of poor farmers to access the market. Transaction costs, as well as differential access to assets and services to mitigate transaction costs, help explain the heterogeneity of smallholder market participation (Boughton *et al.*, 2007; Zezza *et al.*, 2011). In this study, transaction costs were proxied by factors such as distance to the market and association membership. Wealth endowment (proxied by farm size, livestock size and asset values) and social capital (proxied by education level and networks) were also considered significant determinants of market participation.

It was hypothesised that, since participating in the market is not only difficult but also risky, the households who are highly dependent on social grants would have fewer incentives to participate. On the other hand, the constant and predictable income from social grants may actually have a positive effect on smallholder market participation. Access to social grants may help the farmers overcome transaction costs barriers and thus improve their market participation. For example, poor farmers may be able to invest in productive assets such as bicycles or cell phones (Rocha *et al.*, 2012; Piachaud, 2013), which help reduce transaction costs. The influence of social grants was therefore captured using two variables: a dummy variable showing whether or not a household has access to social grants and another variable

showing the proportion of household income that comes from social grants. The proportion variable captured the level of household dependency on social grants. Table 5.1 shows the variables that were considered and their description.

The quantities of maize produce harvested and sold, as well as prices, were based on the recall by the farmers. Even though the individual prices the households face were collected, the average ward prices were used as an explanatory variable in the model, following Komarek (2010). This is because, if household specific prices were used, those households with zero sales would have been excluded from the analysis. Therefore, average ward prices were calculated and assigned to farmers according to their wards. Total household income included the incomes that the household received from different sources, which included employment, remittances, social grants, farming and micro-businesses. To capture the amount of social grants income, the households were asked the social grant types that any member of the household received and when each member had begun receiving the grant

5.2.3 The empirical model

The maize output marketing decision was modelled as a two-step decision process: (1) the household decides whether or not to participate in the market, and (2) the household decides on the volume of transactions. The double-hurdle model (Cragg, 1971) was used to model this two-step decision process, following several other market participation studies (e.g., Holloway *et al.*, 2005; Komarek, 2010; Reyes *et al.*, 2012; Mather *et al.*, 2013; Mabuza *et al.*, 2014; Musah *et al.*, 2014; Ndoro *et al.*, 2014). This model was chosen over the Heckman sample selection model, which has been used by many studies (e.g., Goetz, 1992; Alene *et al.*, 2008; Jagwe *et al.*, 2010; Ouma *et al.*, 2010; Bwalya *et al.*, 2013; Geoffrey *et al.*, 2013; Sebatta *et al.*, 2014; Zamasiya *et al.*, 2014; Mmbando *et al.*, 2015). The presence of zero amounts sold in the dependent variable poses a statistical challenge when analysing market participation micro-data. The use of OLS is not appropriate, as it fails to take into account the fact that the data is limited at one end, resulting in biased parameter estimates (Tobin, 1958; Eakins, 2014).

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Table 5.1: Variables included in the market participation double-hurdle model and their description

Variable code	Variable name and description
MZOUTPUT	Maize output harvested last season (tons)
MZSELL	Household sold maize in the market last season (1=Yes)
MZSOLD	Quantity of maize sold (tons)
MZSOLDPROP	Proportion of maize output sold
AGE	Household head age (Years)
GENDER	Household head gender (1=Male)
EDUCAT	Household head education level (Years)
HHSIZE	Household size (Numbers)
MZPRICE	Price of maize output per ton (Rands/ton)
LANDSZE	Land size household has access to (ha)
TLU	Livestock size (TLUs)
ASSETS	Value of household assets (Rands)
GRANTS	Household has access to social grants (1=Yes)
GRANTBEN	Number of social grant beneficiaries per household
TOTINC	Annual total household income (Rands)
GRANTINC	Annual income from social grants (Rands)
FARMINC	Annual income from farm activities (Rands)
OTHERINC	Annual income from other off-farm activities (Rands)
GRANTPROP	Proportion of income from social grants
FARMPROP	Proportion of income from farming activities
GRANTUSE%	Proportion of social grants income used in farming
EXTENSION	Access to extension (1=Yes)
INFORM	Number of information sources
MARKET	Market access (1=Good)
CREDIT	Access to credit (1=Yes)
TRAINING	Access to agricultural training (1=Yes)
ASSOC	Farmer group member (1=Yes)
MKTDIST	Distance to the maize market (km)
FARMEXP	Household head farming experience (Years)
IRRIGAT	Access to water for irrigation purposes (1=Yes)
HHEMPLOY	Household head off-farm employment (1=Yes)
BUSINESS	Ownership of small non-farm business (1=Yes)
HGWALA	Harry Gwala district (1=Harry Gwala)
UMZINYAT	Umzinyathi district (1=Umzinyathi)
UTHUKELA	Uthukela (1=Uthukela)
UMKHANYA	Umkhanyakude (1=Umkhanyakude)

Source: 2014 household survey

The Heckman approach addresses the statistical challenge posed by cases where market sales equal zero as a missing data problem. The approach assumes that zero observation is due to non-participation solely, implying that the participation volume decision includes only non-zero observations. However, the issue of zero market sales was treated as a corner solution in this study, since a zero amount of maize output sold is a valid economic choice to be explained

and does not represent missing values (Reyes *et al.*, 2012; Mather *et al.*, 2013; Musah *et al.*, 2014). For example, a household may have decided to participate in the market, but fail to sell any volume, due to other challenges such as inability to transport the produce to the market. This implies that a zero observation could be due to either non-participation or participation but zero volume sold. The double-hurdle model produces better estimates than the Heckman model when one is dealing with true zeros (Dow and Norton, 2003).

A corner solution model may also be estimated using the Tobit model (Tobin, 1958), as has been done by a few market participation studies (e.g., Holloway *et al.*, 2000; Martey *et al.*, 2012; Adenegan *et al.*, 2013; Boniphace *et al.*, 2014). However, compared to the double-hurdle model, the Tobit model is more restrictive. The Tobit model assumes that the decision to participate and level of market participation are made jointly and are affected by the same set of variables (Burke, 2009). The double-hurdle model, on the other hand, allows the decision to participate and intensity of participation to be determined by separate processes.

The double-hurdle model can be thought of as a flexible version of both the Tobit and Heckman selection models (Eakins, 2014). Whereas the Tobit model assumes that the participation and volume decisions can be modelled as one equation, the double-hurdle model relaxes this assumption and models both decisions separately. Similarly, while the Heckman model assumes that zero observations arise due to non-participation only, the double-hurdle model relaxes this assumption and allows zero observations to arise in both the participation hurdle and volume hurdle. The double-hurdle model therefore features both the selection mechanism of the Heckman model (which is not a feature of the Tobit model) and the censoring mechanism of the Tobit model (which is not a feature of the Heckman selection model) (Eakins, 2014).

The double-hurdle model postulates that a farmer faces two hurdles before they are observed with a positive level of market participation. The first hurdle corresponds to factors affecting the decision to participate in the market and the second to the level of participation, i.e., how much maize to sell in the market. This approach allows for distinguishing between fixed transactions costs, which influence only the first decision of participation, and variable transactions costs, which can influence both decisions (Key *et al.*, 2000). For example, distance to the market was considered in both decision stages because farmers nearer to the market incur lower information costs, thus reducing fixed costs, and they also incur lower transport costs, reducing variable costs.

Similarly, association membership was considered in both stages, because group memberships may have higher access to information since group members exchange information and experience. On the other hand, individual members would incur less variables costs (transport costs and risks), as they share these with other group members. However, access to different information sources only mitigates the costs of accessing information, which are fixed costs, but not the variable transaction costs. According to Alene *et al.* (2008), this distinction not only improves the estimation procedure but also produces insights into the effectiveness of particular mechanisms for reducing transactions costs. The double-hurdle model was implemented in this chapter as explained in the previous chapter (with only minor notation variations), with fertiliser adoption replaced by market participation. However, for the sake of completion, the double-hurdle is presented as implemented in this chapter. While repetitions are inevitable, an attempt is made to minimise them.

The double-hurdle model involved use of different latent variables to model each decision process, with a probit model determining the participation process and a truncated regression model determining the participation level.

The model was specified as follows:

$Y^*_{i1} = z_i\alpha + u_i$	Participation decision	(5.1a)
$Y^*_{i2} = x_i\beta + v_i$	Volume decision	(5.1b)
$Y_i = x_i\beta + v_i$	if $Y^*_{i1} > 0$ and $Y^*_{i2} > 0$	(5.1c)
$Y_i = 0$	Otherwise	(5.1d)

Where: Y^*_{i1} is a latent endogenous variable representing a household's participation decision, Y^*_{i2} is a latent endogenous variable representing household's volume decision, Y_i is the observed volume of maize sold, z_i is a vector of household characteristics explaining the participation decision (including an indicator of access to social grants as well as dependency on social grants), x_i is a vector of variables explaining the volume decision (including an indicator of access to social grants and dependency on social grants), α and β are the coefficients to be estimated; u_i and v_i are independent, homoscedastic, normally distributed error terms.

It should be noted that the double-hurdle model reduces to the Tobit model when $z_i\alpha$ is equal to 1. Therefore, a log likelihood test was done to justify the use of the double-hurdle model over the Tobit. Based on the log-likelihood values obtained from a separate estimation of the

probit, truncated regression and Tobit models, the likelihood ratio statistic (λ) was computed as follows:

$$\lambda = 2\ [LL_{probit} + LL_{trunc} - LL_{tobit}] \qquad (5.2)$$

where: LL_{probit}, LL_{trunc} and LL_{tobit} are the likelihood values from the probit, truncated regression and Tobit models, respectively. The test statistic has a χ^2 distribution with degrees of freedom equal to the number of independent variables (including the intercept) (Greene, 2003). The Tobit model is rejected in favour of the double-hurdle model if λ exceeds the appropriate χ^2 critical value, as was the case in this study (Burke, 2009; Mabuza *et al.*, 2014).

As in previous chapters, selection bias was tested for in the model. This is because social grants are not a random intervention but a targeted intervention. Selection bias may occur because the farmers with higher intrinsic motivation and ability are more likely to have more income and assets, meaning that they are less likely to qualify to benefit from social grants. These motivated farmers are also more likely to participate in the maize markets, resulting in selection bias. The probit model (Eq. 5.1a) was first estimated using the Heckman selection probit model (*heckprob* command in Stata), with access to social grants as the selection variable. The likelihood ratio test of independent equations was done to indicate if there was evidence of selection bias at the conventional 10% significance level. The truncated regression (Eq. 5.1b) was also tested for selection bias by adding the inverse mills ratio (IMR) to determine its level of significance. The tests showed that there was no evidence of selection bias on both equations.

The Hausman test (Hausman, 1978) was done to test for potential endogeneity of level of dependency on social grants in the model. This is because it is possible that causality might flow from market participation to dependency on social grants, since increased market participation results in increased farm income. The increased farm income would result in decreased dependency on social grants. The test was implemented by firstly regressing social grant-dependency on the exogenous explanatory variables, obtaining the residuals, and then adding these residuals in Eq. 5.1a and 5.1b. A statistically significant estimated coefficient of the residuals would mean endogeneity problems, while a statistically insignificant estimate (as was the case in this study) means no evidence of the endogeneity problem. The potential endogeneity of other variables, such as quantity produced, prices and assets (Boughton *et al.*, 2007; Reyes *et al.*, 2012; Mather *et al.*, 2013) was not tested. Therefore, the estimated

coefficients of these variables should be interpreted as associations, not as causality relationships.

As explained in the previous chapters, one of the double-hurdle model's limitations is that it uses all observations in the treatment and control samples, resulting in less reliable impact estimates. PSM and GPS were thus also estimated in this chapter for robustness checks and to provide more reliable causal estimates. These matching techniques were implemented as explained in Chapter 3. The PSM was used to estimate the impact of access to social grants on the likelihood of market participation and on the level of market participation. The GPS method was used to investigate the impact of the level of dependency on social grants on the likelihood of market participation and on the level of market participation.

5.3 Results and discussions

5.3.1 Descriptive statistics

Table 5.2 shows the socio-economic characteristics of the respondents according to their market participation status. The table shows that close to 60% of the maize producers participated in the maize markets (MZSELL), selling, on average, over 200 kg (45% of the total maize output) in the 2013/14 season (MZSOLD and MZSOLDPROP). The proportion of maize market participators is comparable to other studies in South Africa. For example, Biénabe and Vermeulen (2011) reported a figure of 43% maize market participants in the Limpopo province. Again in Limpopo province, Hlongwane *et al.* (2014) reported that 51% participated in the maize market in Giyani. For the southern African region, Jayne *et al.* (2010) estimated that roughly 20-35% of the smallholder farmers sell grain in a given year.

The table shows some significant differences in wealth and institutional or organisation support between market participants and non-participants. Households participating in the maize markets had bigger family sizes, were richer in assets and had more farm income. In terms of institutional or organisation support, the market participants had more access to extension and information. The market-participant category had more members of associations than non-participants, highlighting the importance of groups in enhancing market participation by smallholder producers. Market participants had less access to social grants and received lower income from social grants. The table shows that, while non-market participants received 45%

of their income from social grants, market participants received 35% of their income from social grants. This indicates that market participants are less dependent on social grants than non-market participants. The table shows that the market participants were nearer to markets, had higher maize output and were more productive in maize production.

Table 5.2: Socio-economic characteristics of the sampled households according to maize market participation status

Variable name	All sample (n=774)	Marketers (n=441)	Non-marketers (n=333)	T tests (χ^2 tests)
AGE	56	56	57	-1.05
GENDER	0.47	0.49	0.45	0.77
EDUCAT	4.67	4.84	4.41	1.44
HHSIZE	7.04	7.27	6.82	1.77*
LANDSZE	1.93	2.15	1.80	0.97
TLU	3.54	4.60	2.55	1.45
ASSETS	82,105	85,637	79,579	2.15**
GRANTS	0.85	0.80	0.91	18.7***
OFFFARMINC	40,204	40,790	40,979	-0.09
FARMINC	6,553	7,343	5,249	2.47**
GRANTINC	16,587	13,552	20,068	-6.82***
GRANTPROP	0.38	0.31	0.45	-8.16***
MZPRICE	1,484	1,674	1,243	10.09***
MZOUTPUT	0.516	0.710	0.316	5.27***
MZYIELD	0.977	1.169	0.715	7.71***
MARKET	0.20	0.25	0.16	9.07***
ASSOC	0.42	0.45	0.38	4.39**
CREDIT	0.36	0.37	0.35	0.32
EXTENSION	0.57	0.68	0.42	55.34***
INFORM	2.28	2.36	2.14	2.80***
TRAINING	0.41	0.39	0.43	1.22
MKTDIST	24	20	33	5.23***
FARMEXP	19	19	19	0.24
HHEMPLOY	0.20	0.23	0.22	0.01
BUSINESS	0.08	0.12	0.05	11.02***
IRRIGAT	0.46	0.54	0.35	28.23***
HGWALA	0.42	0.37	0.47	8.49***
UMZINYAT	0.24	0.28	0.17	12.61***
UTHUKEL	0.19	0.11	0.34	64.02***
UMKHANY	0.15	0.25	0.02	6.07**
MZSELL	0.57			
MZSOLD	0.278			
MZSOLDPROP	0.45			

Notes: ***, **, and * means significant at 1%, 5%, and 10% levels, respectively.

Source: 2014 household survey

Table 5.3: The impact of social grants-dependency on maize market participation, the double-hurdle model results

Variables	Market participation		Maize marketed	
	Coef.	Std. Err.	Coef.	Std. Err.
GRANTS	0.277	0.210	-6.144**	2.937
GRANTPROP	-1.450***	0.323	2.003	4.730
AGE	0.012**	0.005	0.049	0.071
GENDER	-0.021	0.117	-6.021***	2.408
EDUCAT	0.037**	0.016	-0.136	0.213
HHSIZE	0.005	0.017	0.275	0.222
LANDSZE	0.122**	0.055	1.859**	0.918
TLU	-0.002	0.004	0.001	0.021
ASSETS	0.275***	0.084	-0.926	1.238
MZOUTPUT	0.676***	0.108	3.493***	0.783
MZPRICE	0.001***	0.000	0.002**	0.001
EXTENSION	0.325***	0.122	2.912	2.061
INFORM	0.068	0.059	-	-
ASSOC	-0.111	0.140	3.476*	1.953
CREDIT	-0.076	0.120	-1.892	1.680
TRAINING	0.244*	0.128	1.288	1.567
MKTDIST	-0.009***	0.002	0.051***	0.018
FARMEXP	0.005	0.005	0.016	0.063
HHEMPLOY	-0.411***	0.157	-1.750	2.225
BUSINESS	0.300	0.217	5.108*	2.910
UMZINYAT	0.510***	0.161	-0.311	2.344
UTHUKELA	-0.493***	0.158	4.736*	2.477
UMKHANYA	1.683***	0.267	-2.166	2.407
_CONS	-4.944***	1.022	-16.457	15.570
σ			2.794***	0.435
N	774			
Wald $\chi^2(23)$	231.42***			
Pseudo R^2	0.35			
% Correctly classified	80			
Hausman tests	$\chi^2(1)=0.87$, p=0.35		F(1, 750)=0.49, p=0.48	
Likelihood ratio test of independent equations (χ^2 (1) = 0.37, p = 0.54)				
Log-likelihood test: λ=622; χ^2 (23) critical value=35				

Notes: ***, **, and * means significant at 1%, 5%, and 10% levels, respectively.

Source: 2014 household survey

The significant and negative estimated coefficient of access to social grants (GRANTS) in the maize supply model suggests that households with access to social grants sell 6.14 tonnes less maize quantities in the market than those without. This result implies that access to social

grants, instead of helping households overcome the variable transaction costs, decreases incentives to sell more maize produce by the market participants. A plausible explanation for this result is that social grant recipient households are producing mostly for subsistence purposes, and enter the maize market aiming to raise a certain amount of income needed to maintain a desired consumption level. Therefore, increasing household income through social grants decreases the need to sell more maize produce in the market. This result applies to both the highly and lowly social grant dependent households, since the level of dependency on social grants (GRANTPROP) was not significant in the maize supply model. The results support evidence from descriptive and anecdotal reports (e.g., Aliber and Hart, 2009; Tshuma, 2012; Mabugu *et al.*, 2014) that have reported a potential disincentive effect of social grants on smallholder commercialisation.

Age (AGE) was positively related to the decision to participate in the market, implying that older farmers were more likely to participate in the market. This is because older farmers would have developed greater market contacts and trust that would allow them to trade at lower transaction costs. This result is contrary to *a priori* expectations and the majority of literature (e.g., Alene *et al.*, 2008; Geoffrey *et al.*, 2013; Musah *et al.*, 2014). It was expected that increasing age will be associated with decreasing chances of market participation, as older farmers are less receptive to new ideas and are more risk averse than younger farmers. The implication of the result is that the effect of increased contacts or networks dominate the risk aversion associated with older farmers, resulting in a positive relationship between age and market participation. Some studies in South Africa (Randela *et al.*, 2008; Maponya *et al.*, 2015) have also reported this positive relationship between age and market participation.

The negative estimated coefficient of gender (GENDER) on the maize marketed model implies that female-headed households sell 6.02 tonnes more maize quantities in the market than male-headed households. This result is inconsistent with expectations and a number of studies (e.g., Boughton *et al.*, 2007; Ouma *et al.*, 2010; Geoffrey *et al.*, 2013; Hlongwane *et al.*, 2014; Sebatta *et al.*, 2014; Mmbando *et al.*, 2015). The expectation was that male-headed households would sell more due to their advantages in bargaining, negotiating and enforcing contracts. The result, which is in line with a few studies such as Boniphace *et al.* (2014) and Zamasiya *et al.* (2014), suggests that female-headed households are not at risk of exclusion in the market for staples such as maize. While the female-headed households may have disadvantages in the high

value cash crops markets where men dominate (Makhura, 2001; Boughton *et al.*, 2007), the result indicates that female-headed households have advantages in the low value crop markets.

The results show that households headed by more educated heads (EDUCAT) were more likely to participate in the maize market. This result is consistent with *a priori* expectations and literature (e.g., Masuku *et al.*, 2001; Geoffrey *et al.*, 2013; Maponya *et al.*, 2015; Mmbando *et al.*, 2015). The explanation is that the more educated understand and interpret market information better, resulting in lower transaction costs. However, once the decision to participate in the market is made, education level had no significant impact. This implies that, while education helps reduce fixed transaction costs such as search costs, it has no significant impact on the proportional transaction costs such as transportation costs.

Increasing farm size (LANDSZE) was associated with higher chances of selling maize and as selling higher quantities of maize. This is because land is an important production factor that enables households to produce a surplus for the market. The result is consistent with many market participation studies (e.g., Makhura *et al.*, 2001; Lerman, 2004; Boughton *et al.*, 2007; Alene *et al.*, 2008; Nepal and Thapa, 2009; Jagwe *et al.*, 2010; Boniphace *et al.*, 2014; Osmani and Hossain, 2015) that have highlighted the critical role that access to land plays in motivating smallholder farmers to produce for the markets. Increasing asset value (ASSET) was also found to be associated with increased likelihood of market participation. This is in line with the literature (e.g., Barrett and Swallow, 2006; Boughton *et al.*, 2007; Reyes *et al.*, 2012), which have shown the importance of assets in enabling smallholder farmers to produce a surplus necessary for participating in markets as sellers. Wealthier households are more likely to undertake riskier activities such as market participation because of their capacity to bear risks.

The results demonstrate the importance of increasing production levels in market participation (MZOUTPUT). The households which produced more maize were more likely to participate in the market than households producing less maize output. After the decision to participate in the market was made, those with higher output were likely to sell more. The explanation is that, since market participation requires that the smallholder farmer produces a marketable surplus, those households with higher production levels are likely to have more than enough for family consumption. This result is consistent with the literature (e.g., Omiti *et al.*, 2009; Komarek, 2010; Bwalya *et al.*, 2013; Geoffrey *et al.*, 2013).

In agreement with *a priori* expectations informed by economic theory and the literature (e.g., Key *et al.*, 2000; Boughton *et al.*, 2007; Alene *et al.*, 2008; Jagwe *et al.*, 2010; Komarek, 2010; Ouma *et al.*, 2010; Mather *et al.*, 2013; Sebatta *et al.*, 2014; Mmbando *et al.*, 2015), the study found a positive relationship between the maize producer price (MZPRICE) and both the decision to sell maize and the quantity sold. This indicates that market prices provide incentives for households to participate and sell more maize in the market, implying rational economic behaviour by smallholder farmers. However, it must be noted that many smallholder farmers sell their produce right after harvest to satisfy their immediate cash requirements, and their capacity to wait and take advantage of higher prices is low (Alene *et al.*, 2008). As such, this result should be interpreted as indicating that smallholder farmers are responsive to price changes, at least in the short term.

The results show that access to extension (EXTENSION) was associated with increased chances of participating in the market. This result is consistent with the literature (Holloway *et al.*, 2005; Alene *et al.*, 2008; Zamasiya *et al.*, 2014). Extension officers remain the main sources of agricultural market information among rural households and contact with extension agents keeps the farmers updated with information regarding market locations, prices and potential buyers/sellers. Training (TRAINING) was found to have a positive impact on the decision to participate in the market, implying that focussed farmer training may increase the chances of households participating in the market. While group membership (ASSOC) was insignificant in the market participation model, it was significant in the maize supply model. This implies that group membership played a less significant role as a channel of information exchange, but a significant role as a means of sharing variable costs, such as transport costs, among the sampled households. This is consistent with previous studies (e.g., Alene *et al.*, 2008; Sebatta *et al.*, 2014; Mmbando *et al.*, 2015).

As expected, and in line with the literature (Bwalya *et al.*, 2013; Hlongwane *et al.*, 2014; Mmbando *et al.*, 2015), farmers who live further away from the markets (MKTDIST) had less chance of participating in the market than those who live nearer. This is because, to access market information, the smallholder farmer has to interact with market actors, as the market information published in formal channels such as newspapers is not very relevant to farmers in rural areas. Formal information sources mainly report national figures and the isolated nature of rural areas means that the local market situation could be very different from the national situation. As a result, the smallholder farmers have to physically go to the local market places

to gather such relevant information. The insignificant estimated information access variable (INFORM) confirms this to be the case in the study areas, as increasing diversity of information sources was not very useful, because the information may not be contextually relevant. Consequently, the farmers located further from the market incur higher search costs than those nearer to the market.

Once the farmer has decided to participate, increasing distance was associated with increasing quantity of maize produce sold. This indicates that the higher transport costs that the farmers who live further away incur make them strive to meet a certain supply threshold to make a profit. The farmers who live further away sell more to make the same amount of money as the ones who live closer, due to the additional transaction costs. This agrees with other studies (e.g., Boughton *et al.*, 2007), and contrary to others (Nepal and Thapa, 2009; Omiti *et al.*, 2009; Agwu *et al.*, 2012; Mmbando *et al.*, 2015). Households where the heads were employed in the non-farm sector (HHEMPLOY) were less likely to participate in the market than those where heads were unemployed. This may be because households where heads are employed depend on wages for income and only practise farming for subsistence. This result, just like in the previous chapter, is consistent with the 'recession push' hypothesis, which postulates that increasing access to non-farm employment decreases entrepreneurship, as people generally prefer to work in wage employment and are reluctant to expand the risky farming ventures to commercial levels. The results show that owners of non-farm businesses (BUSINESS) sold more in the market than non-business owners. This may be because the non-farm business owners have established more contacts or networks, resulting in declining transaction costs.

The significant district dummies show that farming households from both Umkhanyakude and Umzinyathi were more likely to participate in the market than those in Harry Gwala district. Smallholder farmers in Uthukela district were less likely to participate compared to the Harry Gwala smallholder farmers. As explained in the previous chapters, these significant district dummies imply that there are district-specific attributes that result in spatial variations in the political, social and agro-climatic environment of these districts which impact on market participation. These district dummies capture these variations that were not captured in the model.

A possible explanation of the higher maize participation rates in Umkhanyakude than in Harry Gwala districts is that the culture of selling maize seems to have been inculcated among smallholder farmers in Umkhanyakude, particularly in and around the town of Jozini. While

Harry Gwala district has a high potential for maize production, particularly in the Ubuhlebezwe local municipality, access to the market is a major problem, due to poor roads. For example, the main road joining one of the high potential smallholder maize producing areas of Hlokozi and the nearest main town, Ixopo, is mostly a gravel road, which becomes impassable during the rainy season.

A plausible explanation for the higher market participation rates in Umzinyathi district than in Harry Gwala is that, because the high temperatures and low rainfall make it difficult for many households to produce crops, there is a ready market for those who are able to produce a surplus from the surrounding communities. The lower maize market participation rates in the Uthukela district than in the Harry Gwala district may be because the rural areas in Uthukela are isolated and far from bigger urban centres. For those who participate in the market, the results show that farmers in Uthukela sell a higher volume of maize than those in Harry Gwala. The reason for this may be that, because of their location further from markets, those who sell have to sell in bulk to break-even.

To check the robustness of the estimated social grants impact parameters, this chapter used the PSM and GPS methods. Table 5.4 presents the PSM results on the impact of access to social grants on the probability of market participation, whereas Table 5.5 shows the impact of access to social grants on the level of market participation. Table 5.4 shows that households with access to social grants had a lower chance of participating in the market. Specifically, the results in Table 4.4 show that the social grant beneficiaries had about 20% less chance of participating in the market, compared to non-beneficiary households. The Rosenbaum (2002) bounds test showed that the result became insignificant at Γ=1.81, implying that the results in Table 5.4 can be undermined by a hidden bias of over 80%. This large percentage indicates that the PSM are relatively robust to hidden bias.

Table 5.4: The impact of access to social grants on the probability of market participation, PSM results

Matching method	Number of households		ATT	t-test
	Treatment	Control		
Nearest neighbour	473	49	-0.19 (0.11)	-1.68*
Kernel matching method	473	55	-0.21 (0.11)	-1.87*

Notes: ***, **, and * means significance at 1%, 5% and 10%, respectively

Source: Household survey

Table 5.5 shows that the social grant beneficiaries sold lower maize quantities in the market than non-beneficiary households. The PSM results support the conclusions made using the double-hurdle model that access to social grants has a negative impact on the level of market participation. These results were relatively robust to hidden bias, as the Rosenbaum (2002) sensitivity test indicated that the conclusion would change at Γ=1.96.

Table 5.5: The impact of access to social grants on the level of market participation, PSM results

Matching method	Number of households		ATT	t-test
	Treatment	Control		
Nearest neighbour	473	56	-0.213 (0.12)	-1.76*
Kernel matching method	473	59	-0.190 (0.10)	-1.90*

Notes: ***, **, and * means significance at 1%, 5% and 10%, respectively

Source: 2014 Household survey

The GPS approach was used to examine the impact of the level of dependency on social grants on the probability and level of market participation. The GPS method was implemented as discussed in Chapter 3, Sub-section 3.2.5.5, with the outcomes in this case being the probability and level of market participation. Figure 5.1 presents the graphs showing the average dose-response and the treatment functions and their respective 95% confidence intervals for the probability of market participation. The table of results is presented in Appendix H. Figure 5.1 indicates that the probability of market participation was not influenced by the level of dependency on social grants. The dose-response curve is generally flat in the region where the 95% confidence bands are very narrow, implying that there is generally no association between social grant-dependency levels and the probability of market participation. This result is inconsistent with the double-hurdle model results, which indicated that increasing dependency on social grants led to a decrease in the probability of market participation.

E[mzsell(0)]

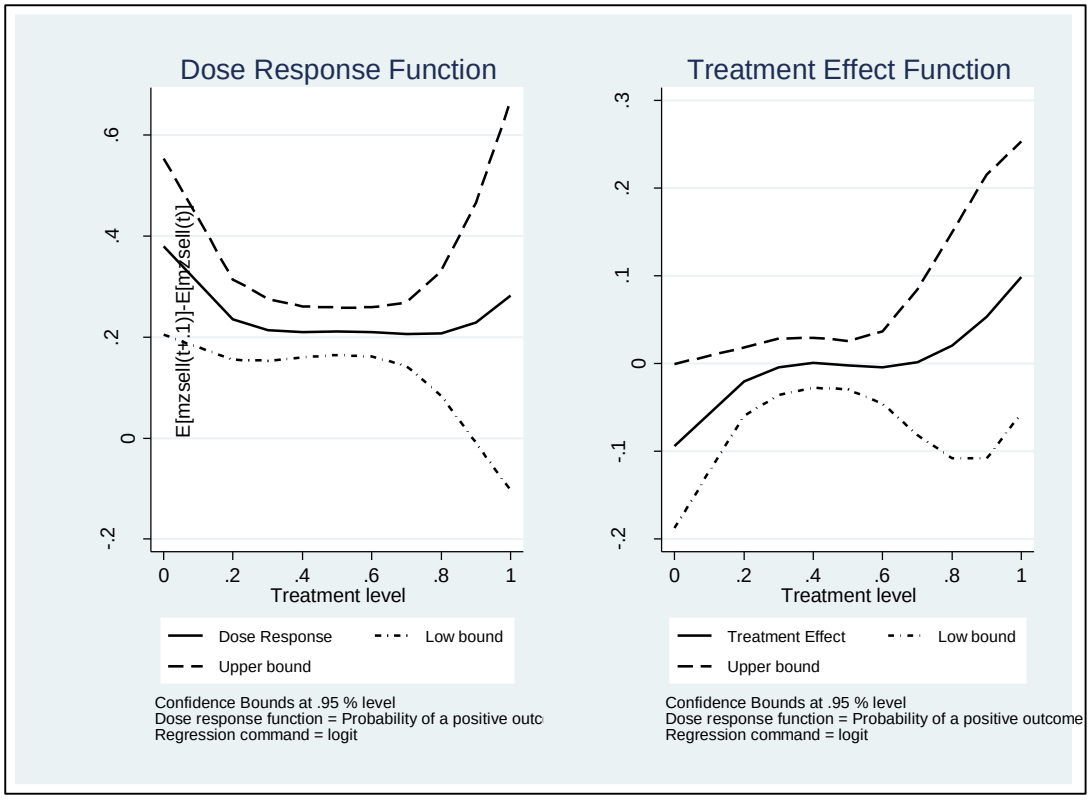

Figure 5.1: The average dose-response and treatment functions and 95% confidence bands for the probability of market participation

The GPS results of the impact of social grant-dependency on the level of market participation are shown in Figure 5.2 and Appendix I. The results show that increasing income from social grants is associated with decreasing quantities of maize sold. The confidence bands are very narrow, especially for the range of dosages between 10% and 80%, implying that the result is reasonably reliable. Therefore, it is concluded that increasing dependency on social grants results in reduced levels of market participation. This result is also is inconsistent with the double-hurdle model results.

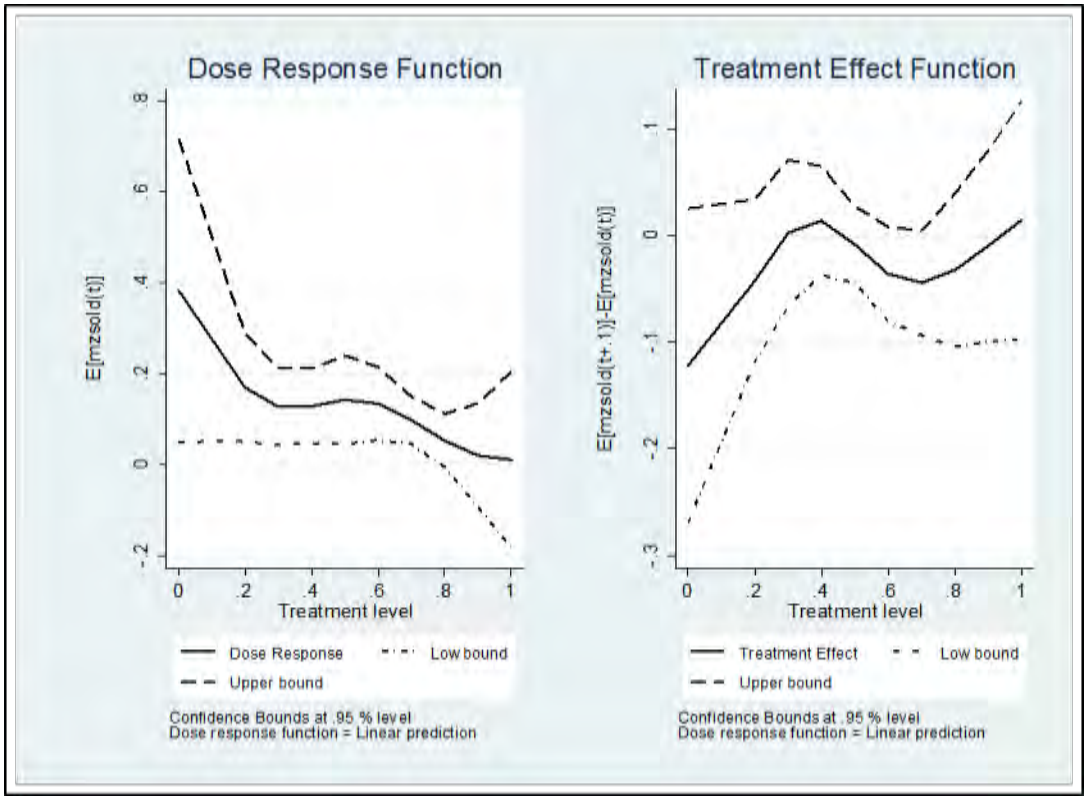

Figure 5.2: The average dose-response and treatment functions and 95% confidence bands for the level of market participation

The empirical results have generally indicated that both access to social grants and the level of dependency on social grants are negatively associated with market participation. Even though there were variations in different models, all the methods used had negative signs for these variables where they were significant. The next section presents the main conclusions of this chapter and their policy implications.

3.1 Conclusions and policy implications

The majority of the smallholder farming households are beneficiaries of social grants. The question addressed in this chapter pertains to the extent to which smallholder farmers rely on social grants for income and are disincentivised to participate in the agricultural markets as sellers. This chapter assessed the effects of access to, and level of dependency on, social grants on the incentives of smallholder maize producers to participate in the produce markets. The double-hurdle model was used to analyse a sample of 774 smallholder maize producers from four districts in KwaZulu-Natal province, South Africa. For robustness checks, results from the PSM and GPS were presented. The double-hurdle model results showed that the level of dependency on social grants was associated with decreased chances of maize market

participation. Households with access to social grants were likely to sell lower maize quantities compared to households with no access to social grants.

The conclusion is that the smallholder farmers who have access to, and depend more on, social grants are less likely to be market-oriented, as they are more likely to produce only for subsistence purposes and depend on social grants for income. The implication is that access to social grants has not helped households overcome the variable transaction costs, but instead reduced their incentives to commercialise their farming activities. The fact that social grant dependent households were more likely to produce only for subsistence purposes, and depend on social grants for income, suggests that social grants are spilling over to the undeserving household members, reducing recipient households' incentives to engage in income-generating farming activities. This has negative implications on the government's drive to increase the commercialisation levels of smallholder farmers and meet its target of establishing 300 000 additional market-oriented smallholder producers by 2020. While this study is not advocating the removal of social grants to poor households, it suggests the need to re-look at how these two interventions (social grants and smallholder commercialisation) may be synchronised so that they do not work in opposing ways.

The study results also suggest that female-headed households may be successfully included in the market for staples. Whereas there are concerns elsewhere that women are likely to remain subsistence farmers due to their exclusion from the market, this study indicates that there is potential of reversing that trend if women are encouraged to produce and sell staples such as maize. The results suggest that increased targeting of women for market participation may increase the impact of policy interventions that are aimed at improving market access. The study results also imply that policies aimed at reducing both fixed and variable transaction costs (such as improved road infrastructure and institutional support like extension, training, organising farmers into groups) should be prioritised to increase rates and levels of smallholder participation in maize markets.

References

Adenegan, K.O., Olorunsomo, S.O. and Nwauwa, L.O.E. 2013. Determinants of market orientation among smallholder cassava farmers in Nigeria. *Global Journal of Management and Business Research Finance* 13 (6):57-66.

Agwu, N.M., Anyanwu, C.I. and Mendie, E.I. 2012. Socio-economic determinants of commercialization among smallholder farmers in Abia State, Nigeria. *Greener Journal of Agricultural Sciences* 2 (8):392-397.

Akpalu, W., Hassan, R.M. and Ringler, C. 2010. Climate variability and maize yield in South Africa. IFPRI Research Brief 15-10. Washington, DC: International Food Policy Research Institute.

Alene, A.D., Manyong, V.M., Omanya, G., Mignouna, H.D., Bokanga, M. and Odhiambo, G. 2008. Smallholder market participation under transactions costs: Maize supply and fertilizer demand in Kenya. *Food Policy* 33 (4):318-328.

Aliber, M. and Hall, R. 2012. Support for smallholder farmers in South Africa: Challenges of scale and strategy. *Development Southern Africa* 29 (4):548-562.

Aliber, M. and Hart, T.G.B. 2009. Should subsistence agriculture be supported as a strategy to address rural food insecurity? *Agrekon* 48 (4):434-458.

Arinloye, D.-D.A.A., Pascucci, S., Linnemann, A.R., Coulibaly, O.N., Hagelaar, G. and Omta, O.S.W.F. 2015. Marketing channel selection by smallholder farmers. *Journal of Food Products Marketing* 21 (4):337-357.

Barrett, C.B. 2008. Smallholder market participation: Concepts and evidence from eastern and southern Africa. *Food Policy* 33:299-317.

Barrett, C.B. and Swallow, B.M. 2006. Fractal poverty traps. *World Development* 34 (1):1-15.

Biénabe, E. and Vermeulen, H. 2011. Improving smallholders' market participation: Insights from a business scheme for maize in Limpopo Province, South Africa. *Development Southern Africa* 28 (4):493-507.

Boniphace, N.S., Fengying, N. and Chen, F. 2014. An analysis of factors affecting smallholder rice farmers' level of sales and market participation in Tanzania: Evidence from national panel survey data 2010-2011. *Journal of Economics and Sustainable Development* 5 (23):185-204.

Boughton, D., Mather, D., Barrett, C.B., Benfica, R., Abdula, D., Tschirley, D. and Cunguara, B. 2007. Market participation by rural households in a low-income country: An asset-based approach applied to Mozambique. *Faith and Economics* 50:64-101.

Burke, W.J. 2009. Fitting and interpreting Cragg's tobit alternative using Stata. *The Stata Journal* 9 (4):584-592.

Bwalya, R., Mugisha, J. and Hyuha, T. 2013. Transaction costs and smallholder household access to maize markets in Zambia. *Journal of Development and Agricultural Economics* 8 (9):328-336.

Carter, M.R. and Barrett, C.B. 2006. The economics of poverty traps and persistent poverty: An assets-based approach. *Journal of Development Studies* 42 (2):178-199.

Chikazunga, D. 2013. Determinants of smallholder farmers' participation in modern food markets: The case of tomato supply chains in Limpopo. *In:* Greenberg, S. (ed.)

Smallholder and agro-food value chains in South Africa: Emerging practices, emerging challenges. Cape Town: Institute of Poverty, Land and Agrarian Studies (PLAAS).

Cragg, J.G. 1971. Some statistical models for limited dependent variables with application to the demand for durable goods. *Econometrica* 39 (5):829-844.

D'Haese, M., Vink, N., Nkunzimana, T., Van Damme, E., van Rooyen, J., Remaut, A.-M., Staelens, L. and D'Haese, L. 2013. Improving food security in the rural areas of KwaZulu-Natal province, South Africa: Too little, too slow. *Development Southern Africa* 30 (4-5):468-490.

DAFF. 2013. Strategic Plan for Smallholder Support (SPSS). Pretoria: Department of Agriculture, Forestry and Fisheries (DAFF).

de Janvry, A., Fafchamps, M. and Sadoulet, E. 1991. Peasant household behaviour with missing markets: Some paradoxes explained. *The Economic Journal* 101 (409):1400-1417.

DED. 2011. *The New Growth Path: Framework*. Pretoria: DED (Department of Economic Development). Available at: http://www.economic.gov.za/communications/publications/new-growth-path-series [Accessed 25 August 2015].

Dow, W. and Norton, E. 2003. Choosing between and interpreting the heckit and two-part models for corner solutions. *Health Services and Outcomes Research Methodology* 4 (1):5-18.

Eakins, J. 2014. An application of the double hurdle model to petrol and diesel household expenditures in Ireland. Surrey Energy Economics Discussion Series (SEEDS) 145. Surrey: University of Surrey.

Geoffrey, S.K., Hillary, B.K., Lawrence, K.K. and Mary, M.C. 2013. Determinants of market participation among small-scale pineapple farmers in Kericho county, Kenya. *Journal of Economics and Sustainable Development* 4 (19):59-66.

Goetz, S.J. 1992. A selectivity model of household food marketing behaviour in Sub-Saharan Africa. *American Journal of Agricultural Economics* 74 (2):444-452.

Greene, W.H. 2003. *Econometric Analysis*. 5th Edition. New Jersey: Prentice-Hall, Inc.

Hausman, J.A. 1978. Specification tests in econometrics. *Econometrica* 46 (6):1251-1271.

Hazell, P., Poulton, C., Wiggins, S. and Dorward, A. 2010. The future of small farms: Trajectories and policy priorities. *World Development* 38 (10):1349-1361.

Hlongwane, J.J., Ledwaba, L.J. and Belete, A. 2014. Analyzing the factors affecting market participation of maize farmers: A case study of small-scale farmers in greater Giyani local municipality of the Mopani district, Limpopo province. *African Journal of Agricultural Research* 9 (10):895-899.

Holloway, G., Barrett, C.B. and Ehui, S. 2005. Bayesian estimation of the double hurdle model in the presence of fixed costs. *Journal of International Agricultural Trade and Development* 1 (1):17-28.

Holloway, G., Nicholson, C., Delgado, C., Staal, S. and Ehui, S. 2000. Agroindustrialization through institutional innovation: Transactions costs, cooperatives and milk-market development in the East-African Highlands. *Agricultural Economics* 23 (3):279-288.

Jagwe, J., Machethe, C. and Ouma, E. 2010. Transaction costs and smallholder farmers' participation in banana markets in the Great Lakes Region of Burundi, Rwanda and the Democratic Republic of Congo. *African Journal of Agricultural and Resource Economics* 6 (1):302-317.

Jari, B. and Fraser, G.C.G. 2013. An analysis of institutional and technical factors influencing agricultural marketing amongst smallholder farmers in the Kat River Valley, Eastern Cape Province, South Africa. *African Journal of Agricultural Marketing* 1 (1):16-23.

Jayne, T.S., Mather, D. and Mghenyi, E. 2010. Principal challenges confronting smallholder agriculture in Sub-Saharan Africa. *World Development* 38 (10):1384-1398.

Jordaan, H., Grové, B. and Backeberg, G.R. 2014. Conceptual framework for value chain analysis for poverty alleviation among smallholder farmers. *Agrekon* 53 (1):1-25.

Key, N., Sadoulet, E. and de Janvry, A. 2000. Transactions costs and agricultural household supply response. *American Journal of Agricultural Economics* 82 (2):245-259.

Khumalo, L.D. 2013. Big business for small farmers: The case of Venda avocado growers. *In:* Greenberg, S. (ed.) *Smallholder and agro-food value chains in South Africa: Emerging practices, emerging challenges.* Cape Town: Institute of Poverty, Land and Agrarian Studies (PLAAS).

Komarek, A. 2010. The determinants of banana market commercialisation in Western Uganda. *African Journal of Agricultural Research* 5 (9):775-784.

Lerman, Z. 2004. Policies and institutions for commercialization of subsistence farms in transition countries. *Journal of Asian Economics* 15 (3):461-479.

Mabugu, R., Chitiga, M., Fofana, I., Abidoye, B. and Mbanda, V. 2014. Assessing the general equilibrium effects of social grants in South Africa. *Paper presented at the 17th Annual Conference on Global Economic Analysis "New Challenges in Food Policy, Trade and Economic Vulnerability"*, Dakar, Senegal, 18-20 June 2014.

Mabuza, M.L., Ortmann, G. and Wale, E. 2014. Effects of transaction costs on mushroom producers' choice of marketing channels: Implications for access to agricultural markets in Swaziland. *South African Journal of Economic and Management Sciences* 2:207-219.

Makhura, M.T. 2001. *Overcoming transactions costs barriers to market participation of smallholder farmers in the Northern Province of South Africa.* PhD thesis, University of Pretoria.

Makhura, M.T., Kirsten, J. and Delgado, C. 2001. Transaction cost and smallholder participation in the maize market in the Northern Province of South Africa. *Paper presented at the Seventh Eastern and Southern Africa Regional Maize Conference*, Nairobi, 11-15 February 2001.

Maponya, P., L.Venter, S., Modise, D., Van Den Heever, E., Kekana, V., Ngqandu, A., Ntanjana, N. and Pefile, A. 2015. Determinants of agricultural market participation in the Sarah Baartman District, Eastern Cape of South Africa. *Journal of Human Ecology* 50 (1):1-9.

Markelova, H., Meinzen-Dick, R., Hellin, J. and Dohrn, S. 2009. Collective action for smallholder market access. *Food Policy* 34:1-7.

Martey, E., Al-Hassan, R.M. and Kuwornu, J.K.M. 2012. Commercialization of smallholder agriculture in Ghana: A Tobit regression analysis. *African Journal of Agricultural Research* 7 (14):2131-2141.

Masuku, M.B., Makhura, M.T. and Rwelarmira, J.K. 2001. Factors affecting marketing decisions in the maize supply chain among smallholder farmers in Swaziland. *Agrekon* 40 (4):698-707.

Mather, D., Boughton, D. and Jayne, T.S. 2013. Explaining smallholder maize marketing in southern and eastern Africa: The roles of market access, technology and household resource endowments. *Food Policy* 43:248-266.

Mendoza, R.U. and Thelen, N. 2008. Innovations to make markets more inclusive for the poor. *Development Policy Review* 26 (4):427-458.

Minten, B., Randrianarison, L. and Swinnen, J.F.M. 2009. Global retail chains and poor farmers: Evidence from Madagascar. *World Development* 37 (11):1728-1741.

Mmbando, F.E., Wale, E.Z. and Baiyegunhi, L.J.S. 2015. Determinants of smallholder farmers' participation in maize and pigeonpea markets in Tanzania. *Agrekon* 54 (1):96-119.

Mukwevho, R. and Anim, F.D.K. 2014. Factors affecting small scale farmers in accessing markets: A case study of cabbage producers in the Vhembe District, Limpopo Province of South Africa. *Journal of Human Ecology* 48 (2):219-225.

Musah, A.B., Bonsu, O.-A.Y. and Seini, W. 2014. Market participation of smallholder maize farmers in the upper west region of Ghana. *African Journal of Agricultural Research* 9 (31):2427-2435.

Ndoro, J.T., Mudhara, M. and Chimonyo, M. 2014. Cattle commercialization in rural South Africa: Livelihood drivers and implications for livestock marketing extension. *Journal of Human Ecology* 45 (3):207-221.

Nepal, R. and Thapa, G.B. 2009. Determinants of agricultural commercialization and mechanization in the hinterland of a city in Nepal. *Applied Geography* 29 (3):377-389.

NPC. 2012. *Our future-make it work: National Development Plan 2030*. Pretoria: NPC (National Planning Commission). Available at: http://www.info.gov.za/issues/national-development-plan [Accessed 9 October 2013].

Omiti, J., Otieno, D., Nyanamba, T. and McCullough, E. 2009. Factors affecting the intensity of market participation by smallholder farmers: A case study of rural and peri-urban areas of Kenya. *African Journal of Agricultural and Resource Economics* 3 (1):57-82.

Ortmann, G.F. and King, R.P. 2010. Research on agri-food supply chains in Southern Africa involving small-scale farmers: Current status and future possibilities. *Agrekon* 49 (4):397-417.

Osmani, A.G. and Hossain, E. 2015. Market participation decision of smallholder farmers and its determinants in Bangladesh. *Economics of Agriculture* 62 (1):163-179.

Ouma, E., Jagwe, J., Obare, G.A. and Abele, S. 2010. Determinants of smallholder farmers' participation in banana markets in Central Africa: The role of transaction costs. *Agricultural Economics* 41 (2):111-122.

Piachaud, D. 2013. Social protection, redistribution and economic growth. *Development Southern Africa* 30 (1):24-38.

Poole, N.D., Chitundu, M. and Msoni, R. 2013. Commercialisation: A meta-approach for agricultural development among smallholder farmers in Africa? *Food Policy* 41 (0):155-165.

Poulton, C., Dorward, A. and Kydd, J. 2005. The future of small farms: New directions for services, institutions and intermediation. *Paper presented at the The Future of Small Farms Workshop*, Imperial College, Wye, UK, 26-29 June 2005.

Raleting, P.M. and Obi, A. 2015. An analysis of institutional factors influencing vegetable production amongst small-scale farmers in six vegetable projects of the Nkonkobe Local Municipality. *Journal of Agricultural Science* 7 (6):184-196.

Randela, R., Alemu, Z.G. and Groenewald, J.A. 2008. Factors enhancing market participation by small-scale cotton farmers. *Agrekon* 47 (4):451-469.

Reyes, B., Donovan, C., Bernsten, R. and Maredia, M. 2012. Market participation and sale of potatoes by smallholder farmers in the central highlands of Angola: A Double Hurdle approach. *Paper presented at the International Association of Agricultural Economists (IAAE) Triennial Conference*, Foz do Iguaçu, Brazil, 18-24 August, 2012.

Rocha, C., Burlandy, L. and Maluf, R. 2012. Small farms and sustainable rural development for food security: The Brazilian experience. *Development Southern Africa* 29 (4):519-529.

Rosenbaum, P.R. 2002. *Observational studies.* New York: Springer.

SASSA. 2014. *Fact sheet: Issue no 12 of 2014. A statistical summary of social grants in South Africa*. Pretoria: South Africa Social Security Agency (SASSA). Available at: http://www.sassa.gov.za/index.php/statistical-reports [Accessed 28 June 2015].

Sebatta, C., Mugisha, J., Katungi, E., Kashaaru, A. and Kyomugisha, H. 2014. Smallholder farmers' decision and level of participation in the potato market in Uganda. *Modern Economy* 5:895-906.

Senyolo, G.M., Chaminuka, P., Makhura, M.N. and Belete, A. 2009. Patterns of access and utilization of output markets by emerging farmers in South Africa: A Factor Analysis Approach. *African Journal of Agricultural Research* 4 (3):208-214.

Staal, S., Delgado, C. and Nicholson, C. 1997. Smallholder dairying under transactions costs in East Africa. *World Development* 25 (5):779-794.

Stats SA. 2012. GHS Series, volume IV, Food security and agriculture, 2002–2011: In-depth analysis of the General Household Survey data. Pretoria: Statistics South Africa.

Thamaga-Chitja, J. and Morojele, P. 2014. The context of smallholder farming in South Africa: Towards a livelihood asset building framework. *Journal of Human Ecology* 45 (2):147-155.

Tobin, J. 1958. Estimation of relationships for limited dependent variables. *Econometrica* 26:24-36.

Tshuma, M.C. 2012. A review of the poverty and food security issues in South Africa: Is agriculture the solution? *African Journal of Agricultural Research* 7 (28):4010-4020.

Ulriksen, M.S. 2012. How social security policies and economic transformation affect poverty and inequality: Lessons for South Africa. *Development Southern Africa* 29 (1):3-18.

van der Heijden, T. and Vink, N. 2013. Good for whom? Supermarkets and small farmers in South Africa: A critical review of current approaches to increasing access to modern markets. *Agrekon* 52 (1):68-86.

van Schalkwyk, H.D., Groenewald, J.A., Fraser, G.C.G., Obi, A. and van Tilburg, A. (eds.). 2012. *Unlocking markets to smallholders: Lessons from South Africa.* Wageningen: Wageningen Academic Publishers.

von Braun, J. 1995. Agricultural commercialization: Impacts on income and nutrition and implications for policy. *Food Policy* 20 (3):187-202.

White, H. and Killick, T. 2001. African poverty at the millennium, causes, complexities and challenges. Strategic Partnership with Africa. Washington D.C: World Bank.

Zamasiya, B., Mango, N., Nyikahadzoi, K. and Siziba, S. 2014. Determinants of soybean market participation by smallholder farmers in Zimbabwe. *Journal of Development and Agricultural Economics* 6 (2):49-58.

Zezza, A., Winters, P., Davis, B., Carletto, G., Covarrubias, K., Tasciotti, L. and Quiñones, E. 2011. Rural household access to assets and markets: A cross-country comparison. *The European Journal of Development Research* 23 (4):569-597.

Zhou, S., Minde, I.J. and Mtigwe, B. 2013. Smallholder agricultural commercialization for income growth and poverty alleviation in southern Africa: A review. *African Journal of Agricultural Research* 8 (22):2599-2608.

CHAPTER 6 THE IMPACT OF SOCIAL GRANTS ON FARM ENTREPRENEURSHIP AMONG RURAL HOUSEHOLDS IN KWAZULU-NATAL

4.0 Abstract

This chapter aimed to investigate the extent to which access to, and level of dependency on, social grants inhibit or enhance the development of farm entrepreneurship in the rural areas of the KwaZulu-Natal province, South Africa. A total of 513 rural households were randomly selected in the Umzinyathi, Uthukela and Harry Gwala districts. The data were analysed using the Bartlett factor score regression method. Descriptive analysis showed that there were low levels of entrepreneurship among the rural households, suggesting the need for deliberate efforts to stimulate entrepreneurship if the government goals of eradicating rural poverty are to be met. The empirical results indicated that, while access to social grants was statistically insignificant, the level of dependency on social grants negatively influenced farm entrepreneurship development. This implies that the disincentive effects are not dependent on access to social grants *per se*, but on the level of dependency on the social grants for income. The chapter concludes that social grants, especially in households where they are more important, are spilling-over to unintended household members, creating disincentive effects which inhibit entrepreneurial development among rural farming households. Given that the entrepreneurial competencies can be learned and changed, the chapter also identified the policy variables to enhance farm entrepreneurship. The chapter recommends that government should prioritise the provision of support services such as training, extension and credit support, in order to establish entrepreneurial rural households. A greater emphasis should be on identifying the gaps in the farmers' entrepreneurship skills set and then training the farmers according to their needs.

Keywords: farm entrepreneurship index, social grants, smallholder farming, rural areas, Bartlett factor score regression, KwaZulu-Natal

4.1 Introduction

South Africa is characterised by high unemployment and poverty levels (Stats SA, 2012; Herrington *et al.*, 2015). Job creation and poverty reduction are thus top of the country's national agenda (Fal *et al.*, 2011; NPC, 2012). However, the country's capacity to address the unemployment and poverty problems has been partly hamstrung by a relatively low level of entrepreneurial activity (van der Merwe and de Swardt, 2008; Agbenyegah, 2013). Even though South Africa's entrepreneurship performance, as measured by the Total Entrepreneurial Activity (TEA) index[4], has increased in the past several years, it is still very low when compared to other developing countries (Fal *et al.*, 2011; Dzansi *et al.*, 2015; Herrington *et al.*, 2015; Singer *et al.*, 2015). For example, whereas South Africa's TEA index has fluctuated below 10% since the mid-1990s, countries such as Brazil or Mexico have had TEAs that are thrice as large (Fal *et al.*, 2011; Herrington *et al.*, 2015). The low entrepreneurship performance amidst high unemployment rates implies that very few people in South Africa are starting businesses despite having no other option for work, i.e., necessity entrepreneurship is low (Herrington *et al.*, 2015).

Among other factors (such as insufficient financial assistance, lack of skills, unsupportive regulatory framework, etc.), negative entrepreneurial attitudes have been identified as the major cause of the low entrepreneurship levels in South Africa (van der Merwe and de Swardt, 2008; Agbenyegah, 2013; Herrington *et al.*, 2015). According to Herrington *et al.* (2015) and van der Merwe and de Swardt (2008), South Africans generally lack the entrepreneurial spirit that is crucial for entrepreneurship development. Herrington *et al.* (2015) implored South Africans to move away from the concept of seeking employment to one of creating employment for themselves and others. This is important, as countries with higher entrepreneurial initiative indices tend to experience lower unemployment levels (Audretsch, 2002; Herrington *et al.*, 2015; Nieuwenhuizen and Swanepoel, 2015).

In the rural areas, the importance of smallholder farming is such that entrepreneurship in farming should be prioritised. Several studies (e.g., McElwee, 2006; Vesala and Pyysiäinen, 2008; Chandramouli *et al.*, 2010; Khayri *et al.*, 2011; Díaz-Pichardo *et al.*, 2012) agree that the effectiveness of smallholder agriculture in reducing rural poverty and household food

[4] The Total Entrepreneurial Activity (TEA) index measures the percent of the active population who are entrepreneurs

insecurity can be enhanced if rural households become more entrepreneurial in their farming activities. Developing a business mind-set and entrepreneurship skills among rural farming households has several pros. Firstly, farm entrepreneurship can make farming a more attractive and profitable venture for rural youths (Tshuma, 2012; Demyen and Iulia, 2013; Bairwa *et al.*, 2014). Secondly, it makes smallholder agriculture become an important tool to reduce rural unemployment and thus control migration from rural to urban areas (Tshuma, 2012). Thirdly, developing entrepreneurship in smallholder agriculture can help support industrial development in rural areas through its forward and backward linkages (Bairwa *et al.*, 2014).

However, several factors can hinder the development of farm entrepreneurship. Subsidies, market regulation measures, fear of failure and certain personal attitudes and characteristics may influence, positively or negatively, entrepreneurship development (McElwee, 2006; North and Smallbone, 2006; de Wolf and Schoorlemmer, 2007; Chowdhury, 2008; Clark, 2009; Lee *et al.*, 2011; Kibler, 2012; Kahan, 2013; Seuneke *et al.*, 2013; Wennberg *et al.*, 2013; Gadi *et al.*, 2014; Herrington *et al.*, 2015). Moreover, Kahan (2013) argued that entrepreneurship development may be hindered by social systems, such as social grants in South Africa, that may create dependency and lack of confidence in one's own capacity to support livelihoods. Conceptualising and realising smallholder farming as a business comes with a multitude of challenges and constraints, most of which are entrenched in the way smallholder farmers think and decide.

As highlighted in previous chapters, South Africa has cash transfer-based social grants which reach several millions of people. In 2014, over 16 million benefited from social grants (SASSA, 2014). Since the social grants have become a major source of income and livelihood for most poor South Africans, especially in the rural areas (Tshuma, 2012), a relevant question to ask is whether social grants impede or catalyse the development of farm entrepreneurship. Despite the growing literature on rural or farm entrepreneurship (e.g., McElwee, 2005; Meccheri and Pelloni, 2006; de Wolf and Schoorlemmer, 2007; McElwee, 2008; Vesala, 2008; Clark, 2009; Ghiasy *et al.*, 2009; Hosseini *et al.*, 2009; McElwee and Bosworth, 2010; Nafukho and Muyia, 2010; Onyebinama and Onyebinama, 2010; Vesala and Vesala, 2010; Rajaei *et al.*, 2011; Baumgartner *et al.*, 2012; Díaz-Pichardo *et al.*, 2012; Rijkers and Costa, 2012; Pyysiäinen and Vesala, 2013; Rijkers and Söderbom, 2013), a few gaps can be identified.

Firstly, relatively few of the empirical studies on rural entrepreneurship (e.g., Freese *et al.*, 2002; Nafukho and Muyia, 2010; Onyebinama and Onyebinama, 2010; Rijkers and Costa,

2012; Rijkers and Söderbom, 2013; Gadi *et al.*, 2014; Nagler and Naudé, 2014) have focused on Africa, and even fewer (e.g., Mitchell, 2004; Ngorora and Mago, 2012; Agbenyegah, 2013) have focused on South Africa. As noted by Nagler and Naudé (2014) and Pato and Teixeira (2013), most empirical studies on entrepreneurship have focused on self-employment in urban areas. The limited empirical knowledge of rural entrepreneurship on the continent has resulted in rural entrepreneurship barely featuring in most poverty alleviation or entrepreneurship promotion strategies in Africa (Fox and Sohnesen, 2013; Pato and Teixeira, 2013; Nagler and Naudé, 2014). According to Nagler and Naudé (2014), the neglect of rural entrepreneurship is one of the major contributing factors to the limited success of rural development policies. There is, therefore, a need for greater empirical analysis of entrepreneurship in settings of poverty, such as Africa, in order to offer market-based solutions that can substantially and significantly reduce rural poverty (Robinson *et al.*, 2004; Bruton *et al.*, 2013).

Secondly, the subject of farm entrepreneurship has generally not been investigated in the rural smallholder farming context. The few studies that have been done on rural entrepreneurship development in Africa have mostly assessed non-farm small business development. As a result, the determinants of farm entrepreneurship among rural households are not well understood in Africa, in general, and in South Africa, in particular. Thirdly, the conceptual and empirical linkages between social grants and farm entrepreneurship among rural households have not been directly addressed in the literature. Even though a wide range of literature has explored the impact of social grants on different outcomes (e.g., poverty, labour participation, etc.) in South Africa (Woolard, 2003; Samson *et al.*, 2004; Armstrong and Burger, 2009), none of these previous studies, to the best knowledge of the present author, have directly investigated the possible disincentive impacts of social grants on rural households' farm entrepreneurship development.

This chapter, therefore, aimed to close these gaps by investigating the extent to which access to, and level of dependency on, social grants inhibit or enhance the development of farm entrepreneurship in the rural areas at the micro level, using primary data collected in KZN. The chapter also sought to understand and appraise the level of farm entrepreneurial capital among rural households, identifying other factors that influence farm entrepreneurship development. Policy-makers should be clear about where the farmers are along the entrepreneurial ladder so that they can design programmes that suit the farmers' needs, capacity and focus. Understanding the factors that promote or hinder entrepreneurship is also important, to inform

policy-makers of the aspects that need to be addressed for farm entrepreneurship to grow in the rural areas.

The novel contribution of this chapter is that, to the author's knowledge, it is the first to generate a contextualised farm entrepreneurship index for the rural areas of South Africa. Moreover, the study distinguishes itself from previous studies by not only linking social grants and farm entrepreneurship, but also in the way the social grant variable was captured. Social grants entered the model as a dummy variable and a proportion variable, showing the level of dependency on social grants. The motivation for this approach was given in the previous chapters.

The remainder of this chapter is organised into five sections. The next section describes farm entrepreneurship and discusses its conceptual link to social grants. The subsequent section briefly outlines the different approaches commonly used to understand entrepreneurship and then motivates the choice of the competency approach adopted in this study. Next, the chapter presents the research methodology, presenting briefly the data collection approach and the analytical techniques. The penultimate section of the chapter interprets and discusses the results, while the final section presents the main conclusions and policy implications of this chapter.

4.2 Farm entrepreneurship and its conceptual link to social grants

The term entrepreneurship has been used in varied ways in different contexts, resulting in multiple definitions and interpretations (Cole, 1968; Gray, 2002; Erik Hurst and Annamaria Lusardi, 2004; Schmitt-Rodermund, 2004; McElwee, 2005; de Wolf and Schoorlemmer, 2007; Williams, 2007; van der Merwe and de Swardt, 2008; Vesala and Pyysiäinen, 2008; Filion, 2011; Phelan and Sharpley, 2012; Phelan, 2014; Manyaka, 2015; OECD, 2015; Urban and Sefalafala, 2015; van der Lingen and van Niekerk, 2015). The history of the entrepreneurship concept and detailed bibliographies of studies that have defined entrepreneurship and operationalised it in different contexts has been provided by a number of studies (Nafukho and Muyia, 2010; Filion, 2011; Phelan, 2014). In summary, the multiple definitions of entrepreneurship highlight several key words or phrases, such as creativity, initiative, innovation, risk-taking, market orientation, opportunity exploitation, personality traits or new venture creation. A list of some of the most common elements used in the

definitions of the entrepreneur and the respective authors who introduced and/or included the elements is presented in Filion (2011).

Since there is no agreed-upon definition, Gray (2002) recommended that researchers should pick the definition that fits their contexts. Stearns (1996) agreed, adding that less focus should be put on the definitional debate. According to Stearns (1996) and Phelan (2014), it is enough for each study to offer its own definition, which it later operationalises through analysis. Generally, the entrepreneurship literature has largely been influenced by Schumpeter (1949), who viewed an entrepreneur as a person of ideas and action, an individual with the ability to inspire others and go beyond boundaries of structured situations. According to Schumpeter (1949), an entrepreneur is a catalyst of change and is instrumental in discovering new opportunities. This makes the entrepreneurial function unique from other functions such as management. Cole (1968) defined entrepreneurship as the purposeful activity to initiate, maintain and develop a profit-oriented business. In other words, an entrepreneur is one who perceives profit opportunities and initiates action to fulfil currently unsatisfied needs (Kirzner, 1985).

According to Filion (2011), a definition of an entrepreneur should include at least these six elements: innovation, opportunity recognition, risk, action, resource use and value addition. Filion (2011) defined an entrepreneur as an actor who innovates by recognising opportunities and makes moderately risky decisions that lead to actions requiring the efficient use of resources and contributing an added value. In agriculture, entrepreneurship has been defined as being about developing a market-oriented and profitable farm business (Shane and Venkataraman, 2000; de Wolf and Schoorlemmer, 2007; Bairwa *et al.*, 2014). A definition that was used in this study is that by Gray (2002), who defined an entrepreneur as an individual who manages an organisation or business with the intention of expanding it, and with the leadership and managerial skills necessary for achieving those goals. This definition is more appropriate to the smallholder farmers in the rural areas of South Africa, as it encompasses non-profitable forms of entrepreneurship (or forms of entrepreneurship that are temporarily unprofitable).

There are two distinctive parts to entrepreneurship, both of which are important (Pyysiäinen *et al.*, 2006; Kahan, 2013). The first category includes the skills that are required to effectively start and run a profitable business. The second category, which is not easy to define, speaks of the inner drive or desire to start and run a profitable business. It can be generally described as

entrepreneurial attitudes (Pyysiäinen *et al.*, 2006) or the entrepreneurial spirit (Nafukho and Muyia, 2010; Kahan, 2013). Social grants may hinder entrepreneurship development by creating a dependency syndrome (Devereux, 2013), which reduces the desire or drive to engage in business. Social grants may inhibit the psychological capital development and entrepreneurship spirit of the recipients by creating hopelessness and destroying self-confidence and resilience (Kahan, 2013). The new and growing psychological capital theory literature (Luthans and Youssef, 2004; Luthans *et al.*, 2006; Luthans *et al.*, 2007) highlights the importance of hope, confidence, optimism and resilience in an individual's economic performance. Dependency on social grants may reduce the incentives or motivation of farmers to engage in activities that may enhance their entrepreneurship skills. The next sub-section briefly discusses the different approaches that have been adopted in the literature to understand entrepreneurship.

4.3 Approaches to understanding farm entrepreneurship

There are several approaches in the literature that have been employed in attempts to understand entrepreneurship. These are, *inter alia*, the traits approach, the behavioural approach, the opportunity identification approach and the competency approach (Man *et al.*, 2002; Kobia and Sikalieh, 2010; Phelan, 2014). Drawing mainly from psychology, the traits approach focuses on the identification of specific personality traits of an entrepreneur that separates the entrepreneur from the wider population (Kobia and Sikalieh, 2010; Caliendo and Kritikos, 2012; Phelan, 2014). The behavioural approach focuses on what the entrepreneur does and not who the entrepreneur is, considering the set of activities and processes associated with the creation of a new venture (Phelan, 2014). The opportunity identification approach focuses on an individual's ability to exploit the entrepreneurial opportunities they face (Shane and Venkataraman, 2000; Shane, 2003).

The present study uses the competency approach to study the rural households' entrepreneurial characteristics. Even though the traits, behavioural and opportunity identification approaches are useful in understanding entrepreneurship, none of these approaches captures the true and overall picture (Kobia and Sikalieh, 2010; Phelan, 2014). Therefore, the competency approach has become an increasingly popular means of studying entrepreneurial characteristics (Man *et al.*, 2002; Bergevoet *et al.*, 2005; Man *et al.*, 2008; Vesala and Pyysiäinen, 2008; Phelan and Sharpley, 2012; Sánchez, 2012). The competency approach is readily applicable to firms that

are smaller in size and dominated by the entrepreneur (Man *et al.*, 2008), such as farms, and represent an appropriate framework for smallholder farmers in rural areas (Vesala and Pyysiäinen, 2008; Phelan and Sharpley, 2012).

The competency approach focuses centrally on the higher-level characteristics or competencies that an entrepreneur needs to be successful. Competencies are the ability to perform specific tasks, that is, they are the underlying knowledge, skills, abilities, personality traits and know-how that result in effective task fulfilment (Langbert, 2000; Bergevoet *et al.*, 2005). In particular, the competencies refer to activities such as identifying customer needs, scanning the environment, formulating strategies, bringing networks together, taking the initiative, introducing diversity and collaboration (Man *et al.*, 2002; Bairwa *et al.*, 2014; Phelan, 2014). Man *et al.* (2002) identified six key sub-categories of entrepreneurial competencies, which are the opportunity, relationship, conceptual, organising, strategic and commitment competencies.

These competencies can be developed by learning and experience and can be stimulated by changing the social and business environment and by directly influencing the farmer and his personality and capacities (Man *et al.*, 2002; de Wolf and Schoorlemmer, 2007; Bairwa *et al.*, 2014). Since these competencies are changeable and learnable, this allows for intervention in terms of development of entrepreneurship among rural farmers (Man *et al.*, 2002; Man *et al.*, 2008). The competency approach implies that farm entrepreneurship can be understood as a continuum, with more subsistence-oriented farmers, who generally lack these competencies, on the lower end and the market-oriented farmers on the upper end. The next section presents this chapter's research methodology.

4.4 Research methodology

4.4.1 Data

The data for this chapter were collected in the KwaZulu-Natal province, South Africa. While the same questionnaire was used to collect the data for all the chapters in this study, fewer households were asked the entrepreneurship module. The entrepreneurship questions were asked in only three of the four districts described in the previous chapter. This was because the entrepreneurship section of the questionnaire was more involved and complex. Not all of the enumerators were deemed competent enough to ask the entrepreneurship questions. A decision

was made by the researcher to only have the few capable enumerators ask questions relating to entrepreneurship, in order to get quality responses. The result is that only 513 of the total 984 sampled households were asked the entrepreneurship questions.

Questionnaire pre-testing, key informant interviews and focus group discussions were very important in collecting data for this chapter. During questionnaire pre-testing, ambiguities or difficulties with regards to question wording were noted and remedied. The pre-test respondents were asked to consider whether the entrepreneurial skills and competencies listed were appropriate, clear and comprehensive, following studies such as Man *et al.* (2008) and Phelan and Sharpley (2012). The results of the pre-test were used to rephrase some entrepreneurship questions, where it was felt their wording was not sufficiently clear or strong to differentiate between good and poor ratings. Key informant interviews and focus group discussions done during the pre-testing stage were also used to validate the results from the pre-test questionnaires.

In addition to the modules that were described in Chapter 2 and subsequent chapters, the questionnaire sought to capture the farmers' self-assessments of their entrepreneurship skills or competencies. The respondents were asked to rate - based on their own opinion - the extent to which they agreed that they possess a range of skills and competencies in relation to managing and operating their farming enterprises. This was done using a five-point Likert scale from 1 (strongly disagree), through to 5 (strongly agree). Likert scales with at least five categories are recommended, as they limit distortions in data scaling caused by ordinal data, leading to reasonably robust correlation coefficients (Finney and DiStefano, 2006; Garson, 2008; Lu and Thomas, 2008).

Self-assessment by the respondents of their own skills and competency levels is generally used in the entrepreneurship literature (e.g., Man *et al.*, 2002; van Auken *et al.*, 2006; Mulder *et al.*, 2007; van der Merwe and de Swardt, 2008; Vesala and Pyysiäinen, 2008; Lans *et al.*, 2010; Morgan *et al.*, 2010; Díaz-Pichardo *et al.*, 2012; Phelan and Sharpley, 2012; de Lauwere *et al.*, 2014; Wang and Jessup, 2014; Matchaba-Hove *et al.*, 2015). The use of self-assessed competencies is justified because farmers themselves have a better understanding of their own entrepreneurial capability and skills set (Rudmann, 2008; Vesala and Pyysiäinen, 2008; Lans, 2009; Morgan *et al.*, 2010). The farmer's viewpoint is important in studying entrepreneurship because farmers make their production and business decisions based on their perceptions (Morgan *et al.*, 2010). As explained by McElwee (2005), entrepreneurship in farming can be

best understood if the farmers are asked how they perceive themselves, i.e., the extent to which farmers see themselves as entrepreneurs.

The questionnaire included mostly the skills and competencies that are widely accepted in the literature, with a few skills and competencies added, modified or removed for those considered more relevant to the rural context, as informed by the results from questionnaire pre-testing. The discussions with the farmers and key informants indicated a number of competencies that are associated with an entrepreneur in the rural areas of KwaZulu-Natal. For example, the most common in the lists, among others, were market and profit orientation, ability to identify and pursue opportunities, doing things that no one has done (e.g., introducing a new crop into the area), doing things differently and the ability to network or build relationships (e.g., bringing in new buyers or investors). Hard work or commitment (being the first to arrive and the last to leave the fields), passion and willingness to learn were also considered important.

Competency assessment is a subjective process, which is both contextual and situational in nature (Hayton and McEvoy, 2006; Phelan and Sharpley, 2012; Alsos *et al.*, 2014). Generalisation should not be a priority but these assessments should always take account of the context as well as the individual they are applied to (Hayton and McEvoy, 2006; Phelan and Sharpley, 2012). The household was used as a unit of analysis because several studies (e.g., Ram *et al.*, 2000; Jervell, 2011; Alsos *et al.*, 2014) have shown that it is more relevant to focus on entrepreneurial households than on individual entrepreneurs. According to Alsos *et al.* (2014), taking the household as the unit of analysis helps to present a view of entrepreneurial development that emphasises the important role of household decision-making in entrepreneurial growth. A total of 24 entrepreneurship skills and competencies were identified and used to generate the latent entrepreneurship index.

4.4.2 Empirical model: The Bartlett factor score regression (FSR) model

This study used the Bartlett factor score regression (FSR) method, a single equation score-based latent variable regression, to achieve the chapter's objectives. Despite the fact that the parameter estimates obtained using latent variable scores are typically biased, as a result of the measurement error that is inherent in the prediction of a latent variable (Lewis and Linzer, 2005), these score-based regression methods are popular with researchers (Grice, 2001; Holbert and Stephenson, 2002; Osgood *et al.*, 2002; Lu and Thomas, 2008; Devlieger *et al.*, 2015).

Their popularity is due to the fact that single equation regressions are more intuitive and less complicated when compared to the structural equation modeling (SEM) approach (Skrondal and Laake, 2001; Croon, 2002; Lu *et al.*, 2005; Lu and Thomas, 2008; DiStefano *et al.*, 2009; Lu *et al.*, 2011; Devlieger *et al.*, 2015). Whereas mis-specification errors in one part of an equation system can spread to the whole system in SEM, this does not happen in single equation estimation (Croon, 2002; Lu and Thomas, 2008).

Recent developments in single equation estimation have resulted in situations where the bias when regressing factor scores can be avoided (Skrondal and Laake, 2001) or reduced (Croon, 2002). Skrondal and Laake (2001) showed that a combination of Bartlett and regression FSRs, which is termed the 'bias avoiding' method (Lu and Thomas, 2008; Devlieger *et al.*, 2015), results in consistent parameter estimates in certain situations. As a result, the Bartlett FSR was chosen because it produces unbiased estimates when the factor scores are used as the dependent variable, as was the case in this chapter (Skrondal and Laake, 2001; Lu and Thomas, 2008; Devlieger *et al.*, 2015). The Bartlett FSR method consisted of two steps: (1) the farm entrepreneurship index was generated using principal component analysis (PCA); and (2) the computed farm entrepreneurship index was used as a dependent variable in a linear regression. The next sub-section describes how PCA was used to generate the index, while the following sub-section discusses the linear regression model.

4.4.2.1 Principal component analysis (PCA)

The first step of the Bartlett FSR involved generating the farm entrepreneurship index using PCA. Entrepreneurship is generally measured using an index (Lichtenstein and Lyons, 2001; Smith *et al.*, 2007; Ács and Szerb, 2010; Marcotte, 2012; Phelan, 2014) at the national or individual level. PCA has been used extensively to construct different indexes by researchers (e.g., Filmer and Pritchett, 2001; Manyong *et al.*, 2006; Vyass and Kumaranayake, 2006; OECD, 2008; van der Merwe and de Swardt, 2008; Achia *et al.*, 2010; Howe *et al.*, 2012; Muchara *et al.*, 2014; Sinyolo *et al.*, 2014b). Following these studies, PCA was used to create a multi-criteria farm entrepreneurship index, by merging the entrepreneurship indicators and determining the appropriate weights.

From an initial set of n correlated variables, PCA creates uncorrelated components, where each component is a linear, weighted combination of the initial variables (Jolliffe, 2002; Armeanu

and Lache, 2008; Norman and Streiner, 2008). For example, from a set of variables X_1 through to X_n;

$$PC_1 = a_{11}X_1 + a_{12}X_2 + \ldots + a_{1n}X_n$$
$$PC_2 = a_{21}X_1 + a_{22}X_2 + \ldots + a_{2n}X_n$$
$$\vdots$$
$$PC_m = a_{m1}X_1 + a_{m2}X_2 + \ldots + a_{mn}X_n \quad (6.1)$$

Where: a_{mn} represents the weight for the m^{th} principal component (PC_m) and the n^{th} variable.

The weights for each principal component are given by the eigenvectors of the covariance or correlation matrix. The covariance matrix is used if the original data is measured in reasonably similar units or comparable scales (Morrison, 2005; Vyass and Kumaranayake, 2006). Conversely, the correlation matrix is preferred when the variables are measured in different units or scales (Morrison, 2005). The variance (λ) for each principal component is given by the eigenvalue of the corresponding eigenvector. The components are ordered so that the first principal component (PC_1) explains the largest possible amount of variation in the original data, subject to the constraint that:

$$a_{11}^2 + a_{12}^2 + \ldots + a_{1n}^2 = 1 \quad (6.2)$$

The second component (PC_2) explains additional but less variation than the first component and is uncorrelated with the first component (PC_1), subject to the same constraint. Subsequent components are uncorrelated with previous components, while explaining smaller and smaller proportions of the variation of the original variables. The higher the degree of correlation among the original variables in the data, the fewer the components required to capture common information (Morrison, 2005). PCA works best when variables are correlated, but also when the distribution of variables varies across cases (Vyass and Kumaranayake, 2006). Use of PCA is predicated upon the assumption that data are continuous. This assumption was violated in this study by using ordinal variables. To correct the statistical error of using ordinal variables in a PCA analysis, polychoric correlations, instead of the Pearson correlations, were calculated and the resulting correlation matrix used in the PCA analysis (Basto and Pereira, 2012; Howe *et al.*, 2012).

There were 24 correlated entrepreneurship skills and competencies that were identified and used to generate the entrepreneurship index in this study. Variables with low standard deviations carried low weights, while those with high standard deviations carried high weights

from the PCA (Howe *et al*., 2012). The entrepreneurship factor scores were computed using the Bartlett predictor (Bartlett, 1937). This approach is more suitable when the factor scores are used as a dependent variable since it produces unbiased estimates. Only the factor scores of PC_1 were used to construct the entrepreneurship index, since the aim was to create a single measure of the entrepreneurship. PC_1 was then used as a dependent variable in the ordinary least squares (OLS) model, as explained in the next sub-section.

4.4.2.2 Ordinary least squares (OLS) regression and description of variables used in the model

The second step of the Bartlett FSR to investigate the impact of access to, and level of dependency on, social grants on farm entrepreneurship involved estimating the following equation using OLS:

$$E^*_i = \beta x_i + \delta_1 G_i + \delta_2 GD_i + \varepsilon_i \quad (6.3)$$

Where: E^*_i is the latent entrepreneurship index of household *i*; x_i is a vector of household characteristics; G_i is a dummy variable showing whether or not a household has access to social grants; GD_i is the proportion of household income from social grants; x_i is a vector of household characteristics, β's and δ are parameters to be estimated and ε_i is the residual term.

Eq. 6.3 was also estimated using a 2-limit Tobit model (Maddala, 1983; Wooldridge, 2002; Greene, 2003) for comparison purposes, as suggested by Hoff (2007). The Tobit model is appropriate because the PCA generated entrepreneurship index can be regarded as a corner solution, being bound on its upper and lower limits. There were a few observations at the upper (n=2) and lower (n=50) limits of the entrepreneurship index. The Tobit model is commonly used to deal with boundary values, especially in the context of fractional response variables (See, for example, Hoff, 2007; Ramalho *et al.*, 2010; Ramalho *et al.*, 2011; Murteira and Ramalho, 2013 for discussions). Manyong *et al.* (2006) and Muchara *et al.* (2014) used the Tobit model to deal with PCA generated indexes.

As explained in the previous chapters, Eq. 6.3 produces an unbiased estimate of the impact parameter δ_1 only if δ_1 is uncorrelated with ε_i (Greene, 2003). Since social grants are not randomly distributed but a targeted and means tested intervention, it was suspected that there would be a correlation between δ_1 and ε_i. However, this was tested using the two-step procedure by Heckman (1979), as explained in Chapter 3, Section 3.2.4.3, and there was no evidence of

selectivity bias. The Hausman test (Hausman, 1978) was done to test for potential endogeneity of the level of dependency on social grants in the model. This is because more entrepreneurial farmers are likely to have more farm income, and increased farm income would result in decreased levels of dependency on social grants. The Hausman test was implemented as explained in the previous chapters. Since entrepreneurship is influenced by variables such as the individual's experience, training, education, family background and other demographic variables (Man *et al.*, 2002; Rudmann, 2008; McElwee and Bosworth, 2010; Díaz-Pichardo *et al.*, 2012; Seuneke *et al.*, 2013), these were also included in the model.

Tables 6.1 present the means of the demographics and socio-economic characteristics of the 513 households that were analysed in this chapter. There were very minor differences between the descriptive figures presented in the tables and those presented in Chapter 3 for the 984 households. Only the main points are therefore summarised, as the data was described in detail in the previous chapters. Table 6.1 shows that the households head averaged 57 years in age and that 47% of the households were headed by females. The household heads attained low levels of education, averaging about five years of formal school education. The households were big in size and had access to about 2 ha of arable land. Table 6.1 also shows that the households owned small numbers of livestock size and had moderate assets. Over 90% of the 513 households had access to social grants, with an average of three social grants beneficiaries per household. The social grants contributed almost 50% of the households' incomes, more than four times the 11% contribution of farming. The survey results also indicate poor access to markets and support services such as extension and credit.

Table 6.1: Description of variables used in the OLS model

Variable code	Variable name and description	Mean	SD
AGE	Household head age (Years)	57	13
GENDER	Household head gender (1=Male)	0.47	-
EDUCAT	Household head education level (Years of schooling)	4.54	4.11
MARRIED	Household head marital status (1=Married)	0.46	-
HHSIZE	Household size (Numbers)	6.52	2.99
LANDSZE	Land size household has access to (ha)	1.90	4.47
TLU	Livestock size per household (TLUs)	2.35	5.93
ASSETS	Value of assets (Rands)	79011	43862
FARMEXP	Farming experience (Years)	19.08	14.09
GRANTS	Access to social grants (1=Yes)	0.92	-
GRANTBEN	Grant beneficiaries per household	3.18	1.81
TOTINC	Annual total household income (Rands)	45706	28331
GRANTINC	Annual income from grants (Rands)	21178	14569
FARMINC	Annual income from farm activities (Rands)	5097	6528
OTHERINC	Annual income from other off-farm activities (Rands)	19431	21251
GRANTPROP	Proportion of income from social grants	0.47	0.23
FARMPROP	Proportion of income from farming activities	0.11	0.07
GRANTUSE	Use social grant money in farming activities	0.78	-
GRANTUSE%	Proportion of social grants money used in farming	0.30	0.24
RAINFALL	Perceived rainfall (1=Good)	0.76	-
SOILQUAL	Perceived soil quality (1=Good)	0.55	-
TENURE	Secured land tenure (1=Yes)	0.32	-
TILLAGE	Tillage access (1=Yes)	0.38	-
MARKET	Market access (1=Yes)	0.20	
ASSOC	Farmer association member (1=Yes)	0.39	-
CREDIT	Access to credit (1=Yes)	0.33	-
EXTENSION	Access to extension (1=Yes)	0.38	-
TRAINING	Access to agricultural training (1=Yes)	0.43	-
COMUNIC	Access to communication infrastructure (1=Yes)	0.30	-
IRRIGAT	Access to water for watering crops (1=Yes)	0.35	-
ROADDIST	Distance to the nearest all-weather road (km)	2.93	10.14
HHEMPLOY	Household head off-farm employment (1=Yes)	0.18	-
BUSINESS	Small off-farm business ownership (1=Yes)	0.03	-
HGWALA	Harry Gwala district (1=Harry Gwala)	0.48	-
UMZINYAT	Umzinyathi district (1=Umzinyathi)	0.15	-
UTHUKELA	Uthukela district (1=Uthukela)	0.37	-

***Notes**: n=513*

***Source**:* 2014 household survey

4.5 Results and discussions

4.5.1 Descriptive statistics of the entrepreneurship competencies and skills

Table 6.2 presents the summary statistics of the entrepreneurship competencies and skills that were considered in this study.

Table 6.2: Frequencies of the entrepreneurial competencies and skills responses

Entrepreneurship competency or skills	**The extent of agreement that respondent possess competency**				
	Strongly disagree (%)	**Disagree (%)**	**Neutral (%)**	**Agree (%)**	**Strongly agree (%)**
Market orientation	20	13	15	33	19
Profit orientation	25	18	17	26	14
Negotiation and persuasiveness	26	18	16	27	13
Business passion	30	18	17	21	14
Creativity and innovation	21	11	16	32	20
Risk taking	22	19	27	25	7
Opportunity recognition	37	26	20	12	5
Strategy formulation	23	17	22	25	13
Environmental scanning	26	19	21	25	9
General awareness	21	12	20	34	13
Long-term or sustainability orientation	30	24	23	17	6
Growth orientation	23	22	24	18	13
Long and irregular hours	24	20	19	26	11
Motivation and ambition	20	14	18	30	18
Initiative	16	12	15	33	24
Flexibility and willingness to adapt	13	8	11	36	31
Co-operation and networking	16	15	20	30	20
Communication clarity	16	16	19	31	18
Vision clarity	14	11	15	37	23
Goal setting	13	7	19	33	28
Competitiveness and results orientation	13	10	17	36	24
Willingness to learn new things	12	10	18	36	24
Accountability	15	15	15	33	22
Emotional coping	12	11	12	34	31

***Notes**: n=513*

***Source**:* 2014 household survey

Table 6.2 indicates low levels of farm entrepreneurship, as the percentages of those who agreed or strongly agreed that they possess the entrepreneurial competencies were barely over 60%

for all the competencies. The table shows that while over 70% of the respondents agreed that they were market-oriented, only 32% felt that they were risk-takers, with more than 40% disagreeing (19%) or strongly disagreeing (22%) that they are risk-takers. Whereas the majority of households indicated that they are flexible and easily adapt, are able to set clear goals and visions, are competitive and cope very well emotionally with circumstance, fewer households felt that they are able to discern market trends in order to exploit market opportunities or are long-term or sustainability or growth oriented. The results indicate that just about 50% of the respondents agreed or strongly agreed that they were profits driven, creative or innovative, co-operated well with others or good negotiators.

4.5.2 Generating the entrepreneurship index using simple addition

As an initial step in generating the entrepreneurship index, and for comparison purposes, a simple entrepreneurship score was generated by adding the individual scores of the 24 competencies. The advantages of this sum score method is that it is relatively easy to calculate, straightforward to interpret and preserves the variation in the original data (DiStefano *et al.*, 2009). Since a five point Likert scale was used, taking 1 for the lowest score and 5 for the highest score, the composite score from the sum score method ranged from 24 to 120. The total composite score of 24 indicates a household that strongly felt that they did not possess any of the 24 competencies, that is, a household that is not entrepreneurial. A score of 120 indicates households that strongly felt that they possessed all the 24 competencies that were listed, implying that they are highly entrepreneurial.

Table 6.3 presents the entrepreneurial scores of the sampled households. Analysis of the simple entrepreneurship score showed that 10% of the households had the lowest possible score of 24, while only 0.4% of the households (2 households) had a perfect 120 score. Fifty-seven percent of the households scored greater than the average score of 72, while only 10% of the households had scores higher than 100. The table indicates that there are low levels of farm entrepreneurship in the rural areas of KZN.

Table 6.3: Entrepreneurial scores of the sampled households

Entrepreneurial score	Freq.	Percentage
24	50	10
120	2	0.4
> 72	292	57
> 100	51	10

Notes: n=513

Source: 2014 household survey

Further descriptive analysis was done to assess the relationship between the simple entrepreneurship score and ownership of non-farm small businesses. The analysis indicated that households who owned non-farm small businesses had higher entrepreneurship scores (mean 87) than those with no non-farm businesses (mean=74). The t-test (t=-2.00, p=0.047) indicated that the two means were significantly different. The fact that non-farm business owners had higher scores implies that the score is valid as an entrepreneurship measure, because ownership of non-farm business, as a form of diversification, is a proxy to indicate a household's entrepreneurial abilities (Erik Hurst and Annamaria Lusardi, 2004; Haugen and Vik, 2008; Clark, 2009; McElwee and Bosworth, 2010). In the next subsection, the entrepreneurship index was generated using PCA.

4.5.3 Generating the entrepreneurship index using principal component analysis

The major disadvantage of the sum score method described above is that it assigns equal weights to all 24 competencies. However, the components of the entrepreneurship index are expected to have different influences (Ács and Szerb, 2010), implying that assigning equal weights is incorrect. To avoid the arbitrary selection of weights, PCA was used to merge the entrepreneurship indicators and determine the appropriate weights.

The correlation matrix, presented in Appendix J, indicated moderate to higher degrees of correlation among the entrepreneurship variables in the data. All the correlation coefficients were greater than 0.3, showing that the correlation matrix satisfies the basic requirement for a successful factor extraction (Tabachnick and Fidell, 2001; Norman and Streiner, 2008). The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.96, greater than the 0.8 that is considered reasonable (Antony and Rao, 2007; Norman and Streiner, 2008). The high KMO measure indicates that patterns of correlations are compact and that factor analysis should yield

reliable factors (Field, 2005). The Bartlett's test of sphericity was highly significant ($\chi 2=11271$, $p<0.001$), indicating that it is highly unlikely that the correlation matrix was obtained from a population with zero correlation. The above tests indicate that a valid principal component analysis can be performed.

Three principal components (PCs) that had Eigen values greater than one were retained using the Kaiser criterion (Field, 2005), explaining about 70% of the variance in the data. The factor loadings of at least 0.5 were considered significant, and are presented in bold in Table 6.4. The first PC (PC_1) explained 58% of the variation and was strongly correlated with all the 24 original variables. This suggests that these 24 criteria vary together, such that when one increases, the remaining ones also increase. This result was expected, as it implies that an entrepreneurial rural household is one that is characterised by all the entrepreneurship skills and competencies. As explained in Man *et al.* (2002), an entrepreneur needs to hold a balance of different competencies and an emphasis on only a few is not enough to ensure business success. The Cronbach's Alpha for the multi-item index was 0.96, which is higher than the acceptable value of 0.7 (Man *et al.*, 2008; Kader *et al.*, 2009; Agbenyegah, 2013). This indicates a high level of internal consistency for the scale, implying that the 24 questions all reliably measure the same latent entrepreneurship variable.

None of the entrepreneurship skills and competencies were dominant in PC_2 and PC_3, and no economic meaning could be attached to these PCs. Therefore, PC_1 was used to generate the entrepreneurship index because it explained the highest variation and it was the only component that made economic sense. The correlation between the two indexes, one from simple adding and PC_1 was almost 1, indicating that PC_1 captures entrepreneurship well.

Table 6.4: Generation of the entrepreneurship index: PCA results

Variables	Principal components		
	PC_1	PC_2	PC_3
Market orientation	**0.773**	0.433	-0.103
Profit orientation	**0.759**	0.447	-0.022
Negotiation and persuasiveness	**0.730**	0.463	0.037
Business passion	**0.715**	-0.043	0.295
Creativity and innovation	**0.732**	0.060	0.321
Risk taking	**0.589**	0.291	-0.106
Opportunity recognition	**0.765**	-0.109	0.259
Strategy formulation	**0.776**	-0.173	0.344
Environmental scanning	**0.754**	0.263	0.118
General awareness	**0.758**	0.024	-0.026
Long-term or sustainability orientation	**0.800**	0.223	0.051
Growth orientation	**0.688**	-0.331	0.331
Long and irregular hours	**0.806**	-0.207	0.122
Motivation and ambition	**0.797**	-0.248	-0.092
Initiative	**0.807**	-0.052	-0.160
Flexibility and willingness to adapt	**0.813**	-0.029	-0.181
Co-operation and networking	**0.720**	-0.453	-0.068
Communication clarity	**0.745**	-0.314	-0.265
Vision clarity	**0.776**	0.129	0.273
Goal setting	**0.780**	-0.124	-0.365
Competitiveness and results orientation	**0.767**	0.106	-0.469
Willingness to learn new things	**0.785**	-0.244	-0.191
Accountability	**0.804**	-0.270	-0.049
Emotional coping	**0.819**	0.205	0.002
Eigen value	13.95	1.59	1.15
% of variance	58.11	6.63	4.79
Cumulative % of variance	58.11	64.74	69.53

Notes: n=513

Source*:* 2014 household survey

The next sub-section empirically investigates the relationship between social grants and entrepreneurship.

4.5.4 The impact of access to, and level of dependency on, social grants on farm entrepreneurship

Table 6.5 presents the results on the impact of access to, and dependency on, social grants on farm entrepreneurship (second stage of the Bartlett FSR model), estimated using OLS and the Tobit model. The dependent variable was the entrepreneurship index, generated using PCA. The highly significant F value indicates that the OLS model fits the data well. This implies that, collectively, the independent variables significantly influenced farm entrepreneurship. Multicollinearity was not a problem, as the variance inflation factors (VIF) ranged between 1.08 and 2.43 and averaged 1.47. Since no evidence of selectivity bias was detected using Heckman's two-step procedure, the OLS model results in Table 6.4 do not suffer from sample selection bias, even without adding the IMR.

The Hausman test found no evidence of endogeneity between social grant-dependency (GRANTPROP) and entrepreneurship at the conventional 10% significance level. The Tobit results, presented in Table 6.5, are very similar (in terms of qualitative conclusions that can be drawn) to the OLS results, implying the robustness of the estimated results and that censoring is not a problem. There are only some slight differences in the magnitudes and statistical significance of the estimates. The OLS and Tobit results converge where there is limited censoring of values (Wilsont and Tisdell, 2002). Henceforth, interpretations apply to the OLS results.

The results in Table 6.5 show that estimated coefficient of access to social grants (GRANTS) was positive, but insignificant at the conventional 10% level. In contrast, the results indicate a negative relationship between level of dependency on social grants (GRANTPROP) and farm entrepreneurship. This result suggests that increasing level of dependency on social grants may have created disincentive effects which inhibit entrepreneurial development among the rural farming households. While this result is consistent with other studies in South Africa (e.g., Bertrand *et al.*, 2003; Samson *et al.*, 2004; Abel, 2013), which have found negative relationships between social grants and households' economic activities, it highlights the fact that the incentives/disincentive issue is not about access, but the level of dependency on social grants.

Table 6.5: The impact of access to, and dependency on, social grants on farm entrepreneurship, OLS and Tobit results

Variables	OLS model		Tobit model	
	Coeff.	**Std. Err.**	**Coeff.**	**Std. Err.**
GRANTS	0.034	0.134	0.046	0.168
GRANTPROP	-0.265*	0.160	-0.340*	0.185
AGE	-0.011***	0.003	-0.012***	0.004
GENDER	-0.164***	0.068	-0.183**	0.086
EDUCAT	-0.015	0.010	-0.017	0.011
MARRIED	-0.075	0.072	-0.117	0.088
HHSIZE	-0.027***	0.010	-0.033***	0.013
LANDSZE	0.256***	0.030	0.312***	0.044
TLU	0.018***	0.005	0.043***	0.012
ASSETS	0.008	0.036	0.005	0.046
RAINFALL	-0.097	0.086	-0.133	0.116
SOILQUAL	-0.063	0.059	-0.059	0.077
TENURE	0.193***	0.065	0.241***	0.082
TILLAGE	0.023	0.072	0.055	0.095
MARKET	0.307***	0.078	0.420***	0.104
ASSOC	0.110	0.090	0.172	0.110
CREDIT	0.141**	0.066	0.174**	0.077
EXTENSION	0.192***	0.064	0.230***	0.080
TRAINING	0.304***	0.082	0.394***	0.110
ROADDIST	-0.005*	0.003	-0.008**	0.004
COMMUNIC	0.213	0.183	0.259	0.212
FARMEXP	0.005**	0.002	0.007***	0.003
IRRIGAT	0.138**	0.062	0.209***	0.078
HHEMPLOY	0.095	0.086	0.147	0.107
UMZINYAT	-0.058	0.112	-0.129	0.131
UTHUKELA	-0.084	0.080	-0.123	0.100
CONSTANT	-0.047	0.438	1.168	0.812
/sigma			0.775	0.041
F(26, 480)	9.33***		5.78***	
R^2/ Pseudo R^2	0.34		0.16	
N	513		513	
uncensored			441	
left-censored			50 (Min <=-2.04)	
right-censored			2 (Max>=1.86)	
Test of selection bias: IMR=-0.08; p=0.65				
Hausman test: F=1.12, p=0.29				
Multicollinearity tests: Mean VIF=1.47; Max VIF=2.43; Min VIF=1.08				

Notes: ***, **, and * means significant at 1%, 5%, and 10% levels, respectively.

***Source**:* 2014 household survey

The disincentives effects have negative implications on the government's drive to increase production and commercialisation levels of smallholder farmers. This points to the need to link social grants to economic activities such as farming in order to meet the government's broader job creation and rural development targets. Researchers such as Zembe-Mkabile *et al.* (2015) have suggested that the effectiveness of cash transfer programmes in developing countries depends, in large part, on their linkage to other anti-poverty measures. Given that the other major alternatives to social grants, such as the Expanded Public Works Programme (EPWP), have failed to reduce rural poverty or unemployment (McCord, 2003; McCutcheon and Parkins, 2009; Zembe-Mkabile *et al.*, 2015), the need for policy priority towards developing farm entrepreneurship in the rural areas cannot be overemphasised.

The negative estimated coefficient of age (AGE) means that there is a negative association between entrepreneurship and age. A unit increase in age results in a decrease in the entrepreneurship index of 0.01 points. This implies that younger rural farmers are more entrepreneurial compared to older farmers. This result is consistent with previous literature (e.g., Man *et al.*, 2008; Rudmann, 2008; McElwee and Bosworth, 2010). As explained by Rudmann (2008), this is because younger farmers are more ambitious, flexible and open to new ideas than older farmers. Younger farmers have the drive and propensity to start businesses, and in general, entrepreneurs tend to become less entrepreneurial with age, with older business owners generally less growth-oriented and less likely to invest more and start new businesses.

Although age was negatively associated with entrepreneurship, additional years of farming experience (FARMEXP) was positively related with entrepreneurship. This is in line with other studies (e.g., de Wolf and Schoorlemmer, 2007; Seuneke *et al.*, 2013) that have reported that farmers develop their entrepreneurship skills through learning-by-doing. In other words, an entrepreneur becomes more competent with additional years of experience (Man *et al.*, 2008). The insignificance of education level (EDUCAT) in the model reinforces the result that farmers rely on trial-and-error to develop their entrepreneurship. The result indicates that when it comes to entrepreneurship development in smallholder agriculture, it is farming experience that counts more than one's education level. Several studies (Reardon *et al.*, 2006; Bayene, 2008; Nagler and Naudé, 2014) have reported that schooling is relatively more important for finding non-farm wage employment than for entrepreneurship development in Africa.

Contrary to expectations, female-headed households were found to be more entrepreneurial in agriculture than male-headed households (GENDER). The results indicate that male-headed

households have an entrepreneurship index that is 0.16 points lower than that of female-headed households. This is unexpected, as conventional theory points towards men having more capital (social, human, psychological, financial and physical) (Yang and An, 2002; Mallick and Rafi, 2010; Rijkers and Costa, 2012) that should enhance their entrepreneurship development. The result, which is contrary to studies such as Bauernschuster *et al.* (2010), but in line with other studies such as Bock (2004), may be indicative of the lack of options for women outside farming, meaning that women are more committed to farming than their male counterparts. In other words, women make more effort to try and make smallholder farming work for them as they do not have many alternatives, i.e., necessity farm entrepreneurship. As reported by Mitchell (2004), most women entrepreneurs in South Africa become entrepreneurs because circumstances push them.

The results also indicate that bigger households are less likely to be entrepreneurial, compared to smaller households (HHSIZE). This could be because bigger families have bigger demands for their own consumption. Bigger families are thus less likely to produce a surplus and are less likely to be market-oriented compared to smaller families. The other explanation of this result is that bigger households are less dependent on farming, compared to smaller households, as their bigger families demand that they instead engage in other economic activities. This is because, even though farming can support a certain number of household members, it becomes imperative that bigger households look to other sectors, as the farm may not be able to sustain them.

Land size (LANDSZE) was positively associated with entrepreneurship. In line with the literature (e.g., Bergevoet *et al.*, 2005; Chandramouli *et al.*, 2010; Singh, 2013; de Lauwere *et al.*, 2014), this result indicates that farmers with bigger land sizes have more risk-bearing ability compared to farmers with smaller pieces of land. Access to more land allows the households to produce more and raises the possibility of producing a surplus. The results also show that livestock size (TLU) was positively associated with entrepreneurship. This is because those with larger livestock sizes are better equipped to take more risk than those with smaller livestock sizes. Livestock offers the rural households a fall-back position, in case their investments do not pay off as expected. Table 6.4 indicates that perceived land tenure security (TENURE) was positively related with entrepreneurship. Farmers with secure land tenure have greater incentive to undertake risky investments in productive inputs and technology, since this

implies their ability to maintain long-term use over their land. This result is consistent with studies on the role of land tenure on investments (e.g., Brasselle *et al.*, 2002; Fenske, 2011).

The results show a positive association between access to markets (MARKET) and entrepreneurship. Market access implies less transaction costs and speaks of opportunities of making good profits out of farming activities. It is these prospects that encourage farmers to be more adventurous in their farming activities. Discussions with the farmers indicated that the reason why they resort to subsistence farming was because they fail to sell their produce due to lack of markets. A guaranteed market is thus one of the most pressing needs that should be addressed to stimulate entrepreneurship among the rural farming households. The results also show that access to credit (CREDIT) was positively related with entrepreneurship. Access to credit support shapes the ability of rural households to invest for the long-term and make calculated decisions for risky income flows, thus fostering entrepreneurship development.

The results highlight the importance of extension access (EXTENSION) in smallholder farming. The households with contact with extension officers gain access to information on new technologies or markets, which is important in successful farm entrepreneurship. This result is in line with the literature (Hosseini *et al.*, 2009). As reported in Kahan (2013), extension is key in stimulating rural farm entrepreneurship and efforts to improve rural entrepreneurship should seek to make effective use of the extension officers. Access to training (TRAINING) was associated with increasing farm entrepreneurship, since relevant training improves farmers' entrepreneurship skills. While most of the farmers in the rural areas depend on trial-and-error, this result implies that entrepreneurship can be improved by providing relevant training. This agrees with the literature (e.g., Man *et al.*, 2002; Bergevoet *et al.*, 2005; de Wolf and Schoorlemmer, 2007; Man *et al.*, 2008), which reported that entrepreneurship can be developed by focussed training.

As expected, access to irrigation (IRRIGAT) had a positive estimated coefficient in the model. Access to irrigation decreases the risk of crop losses, increases the prospects for multiple cropping, adopting high value crops and crop diversification. Those with access to reliable water are likely to be more entrepreneurial than those with no access. This result is consistent with a number of studies (e.g., Tesfaye *et al.*, 2008; Bacha *et al.*, 2011; Kuwornu and Owusu, 2012; Singh, 2013; Sinyolo *et al.*, 2014a), which have shown the importance of secure water access in ensuring smallholder farming success. Chandramouli *et al.* (2010) found that irrigators had significantly higher entrepreneurial scores when compared to non-irrigators in

Karnataka, India, implying that there are significant differences in the entrepreneurial behaviour of farmers in irrigated and dryland areas.

The negative estimated coefficient for distance to the nearest all-weather road (ROADDIST) highlights the importance of good infrastructural support in spurring entrepreneurship development among rural households. The result implies that households that are located further away from good roads are less likely to be as entrepreneurial as households that are near good roads. This is because poor roads act as barriers to accessing markets, information or other important facilities. This result supports conclusions by other studies (e.g., Aliber and Hart, 2009; Aliber and Hall, 2012), who have highlighted the importance of the provision of generic support and infrastructure to create conducive environments for smallholder agriculture in the rural areas of South Africa.

The PSM was also estimated to provide further robustness checks on the estimated access to social grants coefficient. The results are presented in Table 6.6. In contrast to Table 6.5 which found an insignificant estimated coefficient of access to social grants on farm entrepreneurship, the PSM results show that access to social grants had a positive impact on farm entrepreneurship. The improved result using PSM is because it uses only matched sub-samples, resulting in more reliable estimates. This result is fairly robust, as the Rosenbaum (2002) bounds test indicated that it would take a bias that would more than triple the odds of becoming a social grant recipient to change the conclusion (Γ=3.4).

Table 6.6: The impact of access to social grants on farm entrepreneurship, PSM results

Matching method	Number of households		ATT	t-test
	Treatment	Control		
Nearest neighbour	467	33	0.51 (0.31)	1.66*
Kernel matching method	467	36	0.38 (0.22)	1.74*

Notes: * means significance at 10%

Source: 2014 household survey

The results in Table 6.6 suggest that access to social grants plays a positive role in farm entrepreneurship development. The explanation of this result is that the guaranteed and regular monthly income from social grants allows rural households to take more risks in their farming businesses. This agrees with Samson (2009), who explained that social grants provide a coping mechanism for the poor, supporting a minimal level of subsistence and allowing them to take a chance on riskier ventures that are likely to result in a higher income. Other reports (e.g.,

DSD *et al.*, 2012) have also indicated that income from social grants has been used by households to improve their human capital (e.g., paying to attend courses to improve their skills), which allows households to improve their entrepreneurial competencies.

The results of the GPS approach on the impact of social grant-dependency on farm entrepreneurship are presented in Figure 6.1 and Appendix K. The results show that increasing dosages of less than 20% are associated with increasing farm entrepreneurship. However, increasing levels of dependency on social grants above 20% result in decreasing farm entrepreneurship. This supports the conclusions made above that access to social grants have a positive impact on farm entrepreneurship. However, high levels of dependency on social grants hinder farm entrepreneurship development.

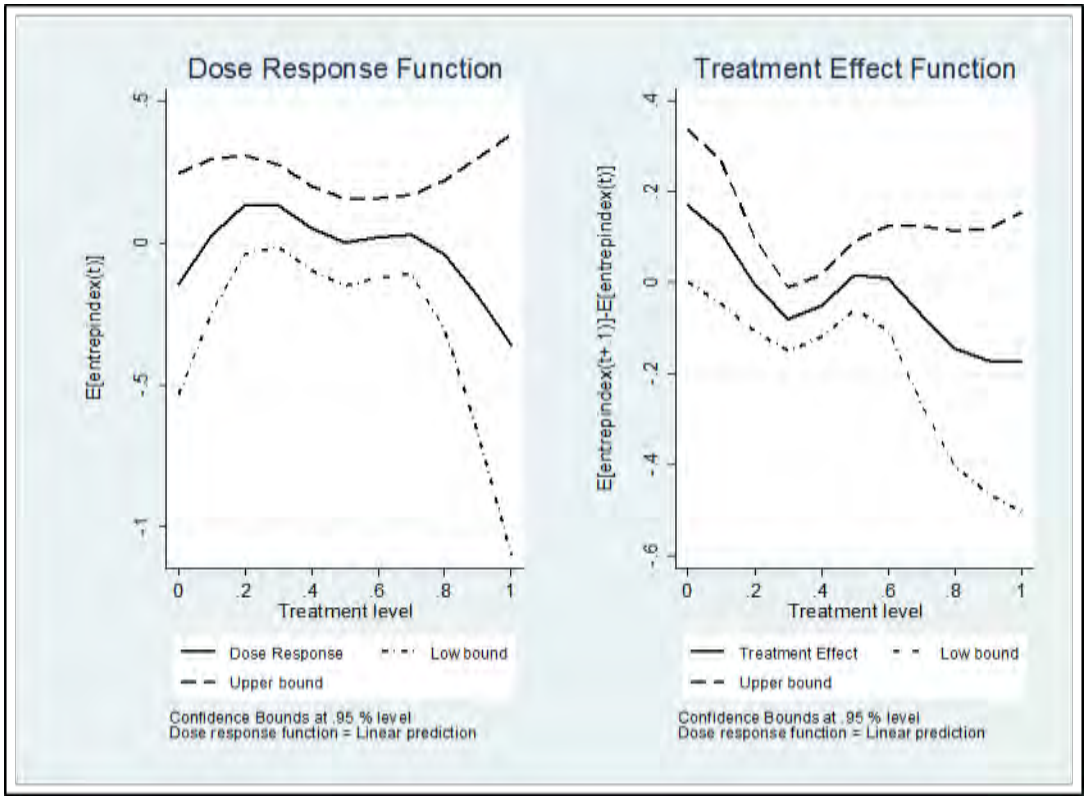

Figure 6.1: The average dose-response and treatment functions and 95% confidence bands for the farm entrepreneurship level

4.6 Conclusions and policy implications

Developing farm entrepreneurship is key to achieving the rural poverty reduction and development goals in South Africa. The concern that social grants, which have emerged as the main income source of many rural households, may inhibit the growth of farm entrepreneurship among rural households needs to be investigated. This chapter's objective has been to empirically investigate rural farm entrepreneurship and its linkage to social grants in South Africa, a topic that has not been adequately investigated hitherto. The present study has indicated that, generally, the level of farm entrepreneurship among rural households in KwaZulu-Natal is low. This means that meeting the government's rural objectives requires that the business-as-usual approach should be discarded in favour of a deliberate and holistic approach that involves creating a conducive policy environment for the development of a business mind-set among rural households.

The chapter concludes that, while access to social grants may improve farm entrepreneurship, increasing levels of dependency on social grants impede farm entrepreneurship. The chapter shows that the incentive or disincentive effects are not just about access, but the relative importance of social grants on household income. The results indicate that social grants have the potential to go beyond addressing the immediate needs of poor households and contribute to building the entrepreneurial capital of the rural households at low dosages. This suggests that policy options for promoting farm entrepreneurship need not compete with social grants, but rather complement each other. This result suggests that it is the relatively high amounts of income from social grants that create disincentive effects which inhibit entrepreneurial development among rural farming households. This suggests that policy options for promoting farm entrepreneurship should take into cognisance the negative effect of social grant dependency.

Given that the entrepreneurial competencies are changeable, the study has identified the policy variables that need to be considered to develop farm entrepreneurship. The study has highlighted the importance of government support (credit, extension, tillage, market and training) in enhancing farm entrepreneurship, implying that the government's desire to develop farm entrepreneurship among the rural areas requires that priority be given to these support services. A greater emphasis should be on giving the rural farmers relevant and focussed entrepreneurship skills training, as well as market support. Training should be informed by the skills that are lacking among rural households and should build on the farmers' indigenous

knowledge and experience, starting at the level of understanding the farmers are at. An important consideration in providing the training, or any other intervention, for that matter, is the heterogeneity of the farmers. Since the farm entrepreneurs are heterogeneous, not homogeneous, interventions such as training will have differing outcomes to the different farm entrepreneurs. This calls for efforts for interventions to be targeted to farmers on an individual basis.

Support to develop rural entrepreneurship should be gender sensitive. Since the study has shown that women make up the majority of the farmers, and are more entrepreneurial than their male counterparts, it is important that support is tailored to reach these enterprising women for greater rural entrepreneurship development. These interventions should bear in mind the patriarchal nature of the rural areas, and should not only target beneficiaries who control assets such as land. This disempowers women, because, even though they are the farmers, the land usually belongs to men. In line with other studies, the study highlights the importance of generic support and infrastructure in creating an enabling atmosphere for the success of smallholder agriculture. Access to good roads, for instance, allows farmers to be connected to information and markets relatively easily. This helps them to be innovative and entrepreneurial.

References

Abel, M. 2013. Unintended labour supply effects of cash transfer programmes: Evidence from South Africa's old age pension. Cape Town: University of Cape Town.

Achia, T.N.O., Wangombe, A. and Khadioli, N. 2010. A logistic regression model to identify key determinants of poverty using Demographic and Health Survey data. *European Journal of Social Sciences* 13 (1):38-45.

Ács, Z.J. and Szerb, L. 2010. The Global Entrepreneurship Index (GEINDEX). *Foundations and Trends in Entrepreneurship* 5 (5):341-435.

Agbenyegah, A. 2013. *Challenges facing rural entrepreneurship in selected areas in South Africa.* PhD Thesis, North-West University.

Aliber, M. and Hall, R. 2012. Support for smallholder farmers in South Africa: Challenges of scale and strategy. *Development Southern Africa* 29 (4):548-562.

Aliber, M. and Hart, T.G.B. 2009. Should subsistence agriculture be supported as a strategy to address rural food insecurity? *Agrekon* 48 (4):434-458.

Alsos, G.A., Carter, S. and Ljunggren, E. 2014. Kinship and business: How entrepreneurial households facilitate business growth. *Entrepreneurship & Regional Development* 26 (1-2):97-122.

Antony, G.M. and Rao, K.V. 2007. A composite index to explain variations in poverty, health, nutritional status and standard of living: Use of multivariate statistical methods. *Public Health* 121:578-587.

Armeanu, D. and Lache, L. 2008. Application of the model of principal components analysis on Romanian insurance market. *Theoretical and Applied Economics* 6 (6):11-20.

Armstrong, P. and Burger, C. 2009. Poverty, inequality and the role of social grants: An analysis using decomposition techniques. Stellenbosch Economic Working Papers15/09. Cape Town: University of Stellenbosch.

Audretsch, D.B. 2002. *Entrepreneurship: Determinants and policy in a European-US comparison.* Boston, MA: Kluwer Academic.

Bacha, D., Namara, R., Bogale, A. and Tesfaye, A. 2011. Impact of small-scale irrigation on household poverty: Empirical evidence from the Ambo District in Ethiopia. *Irrigation and Drainage* 60:1-10.

Bairwa, S.L., Lakra, K., Kushwaha, S., Meena, L.K. and Kumar, P. 2014. Agripreneurship development as a tool to upliftment of agriculture. *International Journal of Scientific and Research Publications* 4 (3):1-4.

Bartlett, M.S. 1937. The statistical conception of mental factors. *British Journal of Psychology: General Section* 28:97-104.

Basto, M. and Pereira, J.M. 2012. An SPSS R-menu for ordinal factor analysis. *Journal of Statistical Software* 46 (4):1-29.

Bauernschuster, S., Falck, O. and Heblich, S. 2010. Social capital access and entrepreneurship. *Journal of Economic Behavior & Organization* 76 (3):821-833.

Baumgartner, D., Schulz, T. and Seidl, I. 2012. Quantifying entrepreneurship and its impact on local economic performance: A spatial assessment in rural Switzerland. *Entrepreneurship & Regional Development* 25 (3-4):222-250.

Bayene, A. 2008. Determinants of off-farm participation decision of farm households in Ethiopia. *Agrekon* 47 (1):140-161.

Bergevoet, R.H.M., Giesen, G.W.J., Saatkamp, H.W., van Woerkum, C.M.J. and Huirne, R.B.M. 2005. Improving entrepreneurship in farming: The impact of a training programme in Dutch dairy farming. *Paper presented at the 15th Congress - Developing entrepreneurship abilities to feed the world in a sustainable way*, Sao Paulo, Brazil, August 2005.

Bertrand, M., Mullainathan, S. and Miller, D. 2003. Public policy and extended families: Evidence from pensions in South Africa. *World Bank Economic Review* 17 (1):27-50.

Bock, B.B. 2004. Fitting in and multi-tasking: Dutch farm women's strategies in rural entrepreneurship. *Sociologia Ruralis* 44:245-260.

Brasselle, A.-S., Gaspart, F. and Platteau, J.-P. 2002. Land tenure security and investment incentives: Puzzling evidence from Burkina Faso. *Journal of Development Economics* 67:373-418.

Bruton, G.D., Ketchen Jr, D.J. and Ireland, R.D. 2013. Entrepreneurship as a solution to poverty. *Journal of Business Venturing* 28 (6):683-689.

Caliendo, M. and Kritikos, A. 2012. Searching for the entrepreneurial personality: New evidence and avenues for further research. *Journal of Economic Psychology* 33 (2):319-324.

Chandramouli, P., Meti, S.K., Hirevenkangoudar, L.V. and Hanchinal, S.N. 2010. Comparative analysis of entrepreneurial behaviour of farmers in irrigated and dry land areas of Raichur District of Karnataka. *Karnataka Journal of Agricultural Sciences* 20 (2):320-222.

Chowdhury, M.J.A. 2008. Does the participation in the microcredit programs contribute to the development of women entrepreneurship at the household level? Experience from Bangladesh. *Paper presented at the UNU-WIDER Project Workshop on Entrepreneurship and Economic Development*, Helsinki, 21-23 August 2008.

Clark, J. 2009. Entrepreneurship and diversification on English farms: Identifying business enterprise characteristics and change processes. *Entrepreneurship & Regional Development* 21 (2):213-236.

Cole, A.H. 1968. Introductory remarks. *The American Economic Review* 58 (2):60-63.

Croon, M. 2002. Using predicted latent scores in general latent structure models. *In:* Marcoulides, G.A. and Moustaki, I. (eds.) *Latent variable and latent structure models.* Mahwah, NJ: Lawrence Erlbaum Associates.

de Lauwere, C., Malak-Rawlikowska, A., Stalgienė, A., Klopčič, M. and Kuipers, A. 2014. Competencies and agricultural entrepreneurship of dairy farmers in Poland, Lithuania and Slovenia. *In:* Kuipers, A., Rozstalnyy, A. and Keane, G. (eds.) *Cattle husbandry in Eastern Europe and China.* Wageningen: Wageningen Academic Publishers.

de Wolf, P. and Schoorlemmer, H. (eds.). 2007. *Exploring the significance of entrepreneurship in agriculture.* Frick, Switzerland: Research Institute of Organic Agriculture.

Demyen, S. and Iulia, N. 2013. Efficient management of small and medium sized enterprises for a sustainable development of rural entrepreneurship. *Lucrař Şt inţifice* 15 (2):205-211.

Devereux, S. 2013. Trajectories of social protection in Africa. *Development Southern Africa* 30 (1):13-23.

Devlieger, I., Mayer, A. and Rosseel, Y. 2015. Hypothesis testing using factor score regression: A comparison of four methods. *Educational and Psychological Measurement* xx (online):1-30.

Díaz-Pichardo, R., Cantú-González, C., López-Hernández, P. and McElwee, G. 2012. From farmers to entrepreneurs: The importance of collaborative behaviour. *The Journal of Entrepreneurship* 21 (1):91-116.

DiStefano, C., Zhu, M. and Mîndrilă, D. 2009. Understanding and using factor scores: Considerations for the applied researcher. *Practical Assessment, Research & Evaluation* 14 (20):1-11.

DSD, SASSA and UNICEF. 2012. The South African Child Support Grant impact assessment: Evidence from a survey of children, adolescents and their households. Pretoria: UNICEF South Africa.

Dzansi, D.Y., Rambe, P. and Coleman, W.J. 2015. Enhancing new venture creation success in South Africa: A project management perspective. *Problems and Perspectives in Management* 13 (2):418-426.

Erik Hurst and Annamaria Lusardi 2004. Liquidity constraints, household wealth, and entrepreneurship. *Journal of Political Economy* 112 (2):319-347.

Fal, M., Daniels, R., Williams, A. and Bantobetse, R. (eds.). 2011. *The state of entrepreneurship in South Africa: The key archetypes of an entrepreneurial culture. White paper, deliberations and key findings.* Bryanston: Endeavor South Africa.

Fenske, J. 2011. Land tenure and investment incentives: Evidence from West Africa. *Journal of Development Economics* 95::137–156.

Field, A. 2005. *Discovering statistics using SPSS.* London: Sage.

Filion, L.J. 2011. Defining the entrepreneur. *In:* Dana, L.-P. (ed.) *World encyclopedia of entrepreneurship.* Cheltenham, UK and Northampton, MA, USA: Edward Elgar.

Filmer, D. and Pritchett, L.H. 2001. Estimating wealth effect without expenditure data-or tears: An application to educational enrollments in states of India. *Demography* 38 (1):115-132.

Finney, S.J. and DiStefano, C. 2006. Nonnormal and categorical data in structural equation modeling. *In:* Hancock, G.R. and Mueller, R.O. (eds.) *Structural equation modeling: A second course.* Greenwich, CT: Information Age.

Fox, L. and Sohnesen, T. 2013. Household enterprises in Mozambique: Key to poverty reduction but not on the development agenda? Policy Research Working Paper 6570. Washington DC: The World Bank.

Freese, M., Brantjes, A. and Hoorn, R. 2002. Psychological success factors of small scale businesses in Namibia: The role of strategy process, entrepreneurial orientation and the environment. *Journal of Development entrepreneurship* 7 (3):259-282.

Gadi, P.D., Danladi, D.C. and Bagobiri, E. 2014. Comparative analysis of rural and urban start-up entrepreneurs in Nigeria. *Global Journal of Human-Social Science* 14 (1):28-38.

Garson, G.D. 2008. *Factor analysis: Statnotes from North Carolina State University Public Administration Program*. Available at: http://www2.chass.ncsu.edu/garson/pa765/factor.htm [Accessed 4 February 2013].

Ghiasy, F.G., Hosseini, S.J.F., Malekmohammadi, I. and Hosseini, S.M. 2009. Factors influencing the entrepreneurship in Iran's agricultural cooperatives. *Australian Journal of Basic and Applied Sciences* 3 (2):1170-1176.

Gray, C. 2002. Entrepreneurship, resistance to change and growth in small firms. *Journal of Small Business and Enterprise Development* 9 (1):61-72.

Greene, W.H. 2003. *Econometric Analysis.* 5th Edition. New Jersey: Prentice-Hall, Inc.

Grice, J.W. 2001. Computing and evaluating factor scores. *Psychological Methods* 6:430-450.

Haugen, M.S. and Vik, J. 2008. Farmers as entrepreneurs: The case of farm-based tourism. *Entrepreneurship and Small Business* 6 (3):321-336.

Hausman, J.A. 1978. Specification tests in econometrics. *Econometrica* 46 (6):1251-1271.

Hayton, J.C. and McEvoy, G.M. 2006. Guest editors' note. *Human Resource Management* 45 (3):291-294.

Heckman, J.J. 1979. Sample selection bias as specification error. *Econometrica* 47 (1):153-162.

Herrington, M., Kew, J. and Kew, P. 2015. *GEM (Global Entrepreneurship Monitor) South Africa Report 2014. South Africa: The crossroads – a goldmine or a time bomb?* Available at: http://www.gemconsortium.org/country-profile/108 [Accessed 1 December 2015].

Hoff, A. 2007. Second stage DEA: Comparison of approaches for modelling the DEA score. *European Journal of Operational Research* 181 (1):425-435.

Holbert, R.L. and Stephenson, M.T. 2002. Structural equation modeling in the communication sciences. *Human Communication Research* 28:531-551.

Hosseini, S.J.F., Mirdamadi, S.M. and Nejad, G.R.H.H. 2009. Extension and education factors influencing the success of entrepreneurship among rural women in northern Iran. *Research Journal of Biological Sciences* 4 (9):967-973.

Howe, L.D., Galobardes, B., Matijasevich, A., Gordon, D., Johnston, D., Onwujekwe, O., Patel, R., Webb, E.A., Lawlor, D.A. and Hargreaves, J.R. 2012. Measuring socio-economic position for epidemiological studies in low- and middle-income countries: A methods of measurement in epidemiology paper. *International Journal of Epidemiology* 41:871-886.

Jervell, A.M. 2011. The family farm as a premise for entrepreneurship. *In:* Alsos, G.A., Carter, S., Ljunggren, E. and Welter, F. (eds.) *The handbook of research on entrepreneurship in agriculture and rural development.* Cheltenham: Edward Elgar.

Jolliffe, I.T. 2002. *Principal component analysis. 2nd edition.* New York: Springer-Verlag.

Kader, R.A., Bin Mohamad, M.R. and Che Ibrahim, A.A.H. 2009. Success factors for small rural entrepreneurs under the One-District-One-Industry Programme in Malaysia. *Contemporary Management Research* 5 (2):147-162.

Kahan, D. 2013. Farm management extension guide: Entrepreneurship in farming. Rome: Food and Agriculture Organization of the United Nations (FAO).

Khayri, S., Yaghoubi, J. and Yazdanpanah, M. 2011. Investigating barriers to enhance entrepreneurship in agricultural higher education from the perspective of graduate students. *Procedia - Social and Behavioral Sciences* 15:2818-2822.

Kibler, E. 2012. Formation of entrepreneurial intentions in a regional context. *Entrepreneurship & Regional Development* 25 (3-4):293-323.

Kirzner, I.M. 1985. *Discovery and the capitalist process.* Chicago, IL: University of Chicago Press.

Kobia, M. and Sikalieh, D. 2010. Towards a search for the meaning of entrepreneurship. *Journal of European Industrial Training* 34 (2):110-112.

Kuwornu, J.K.M. and Owusu, E.S. 2012. Irrigation access and per capita consumption in farm households: Evidence from Ghana. *Journal of Development and Agricultural Economics* 4 (3):78-92.

Langbert, M. 2000. Professors, managers, and human resource education. *Human Resource Management* 39:65-78.

Lans, T. 2009. *Entrepreneurial competence in agriculture: Characterization, identification, development and the role of the work environment.* PhD Thesis, Wageningen University.

Lans, T., Biemans, H., Mulder, M. and Verstegen, J. 2010. Self-awareness of mastery and improvability in small business in the agrifood sector. *Human Resource Development Quarterly* 21 (2):147-168.

Lee, L., Wong, P.K., Foo, M.D. and Leung, A. 2011. Entrepreneurial intentions: The influence of organizational and individual factors. *Journal of Business Venturing* 26 (1):124-136.

Lewis, J.B. and Linzer, D.A. 2005. Estimating regression models in which the dependent variable is based on estimates. *Political Analysis* 13:345-364.

Lichtenstein, G.A. and Lyons, T.S. 2001. The Entrepreneurial Development System: Transforming business talent and community economies. *Economic Development Quarterly* 15 (3):3-20.

Lu, I.R.R., Kwan, E., Thomas, D.R. and Cedzynski, M. 2011. Two new methods for estimating structural equation models: An illustration and a comparison with two established methods. *International Journal of Research in Marketing* 28 (3):258-268.

Lu, I.R.R. and Thomas, D.R. 2008. Avoiding and correcting bias in score-based latent variable regression with discrete manifest items. *Structural Equation Modeling: A Multidisciplinary Journal* 15 (3):462-490.

Lu, I.R.R., Thomas, D.R. and Zumbo, B.D. 2005. Embedding IRT in structural equation models: A comparison with regression based on IRT scores. *Structural Equation Modeling: A Multidisciplinary Journal* 12 (2):263-277.

Luthans, F., Avey, J.B., Avolio, B.J., Norman, S.M. and Combs, G.M. 2006. Psychological capital development: Toward a micro-intervention. *Journal of Organizational Behaviour* 27:387-393.

Luthans, F., Avolio, B.J., Avey, J.B. and Norman, S.M. 2007. Positive psychological capital: Measurement and relationship with performance and satisfaction. *Personnel Psychology* 60:541-572.

Luthans, F. and Youssef, C.M. 2004. Human, social, and now positive psychological capital management: Investing in people for competitive advantage. *Organizational Dynamics* 33 (2):143-160.

Maddala, G.S. 1983. *Limited-dependent and qualitative variables in economics.* New York: Cambridge University Press.

Mallick, D. and Rafi, M. 2010. Are female-headed households more food insecure? Evidence from Bangladesh. *World Development* 38 (4):593-605.

Man, T.W.Y., Lau, T. and Chan, K.F. 2002. The competitiveness of small and medium enterprises: A conceptualization with focus on entrepreneurial competencies. *Journal of Business Venturing* 17:123-142.

Man, T.W.Y., Lau, T. and Snape, E. 2008. Entrepreneurial competencies and the performance of small and medium enterprises: An investigation through a framework of competitiveness. *Journal of Small Business and Entrepreneurship* 21 (3):257-276.

Manyaka, S.J. 2015. Social entrepreneurship: A solution for transforming the disadvantaged community of Nellmapius. *HTS Teologiese Studies/ Theological Studies* 71 (3):1-7.

Manyong, V.M., Okike, I. and Williams, T.O. 2006. Effective dimensionality and factors affecting crop-livestock integration in West African savannas: A combination of principal component analysis and Tobit approaches. *Agricultural Economics* 35 (2):145-155.

Marcotte, C. 2012. Measuring entrepreneurship at the country level: A review and research agenda. *Entrepreneurship & Regional Development* 25 (3-4):174-194.

Matchaba-Hove, T., Farrington, S. and Sharp, G. 2015. The entrepreneurial orientation – performance relationship: A South African small business perspective. *SAJESBM* 7:36-68.

McCord, A. 2003. An overview of the performance and potential of public works programmes in South Africa. Cape Town: SALDRU, Department of Economics, University of Cape Town.

McCutcheon, R.T. and Parkins, F.L.M. 2009. *South Africa's expanded public works programme: A case study in government sponsored employment creation and poverty alleviation focusing upon the infrastructure component. Rhetoric, reality and*

opportunities foregone. Available at: http://www.robert-mccutcheon.com/resources/Newcastle%20CofFEE%2009%20RM%20FTP%20Paper%20as%20Published%20Dec09.pdf [Accessed 13 October 2015].

McElwee, G. 2005. *Developing entrepreneurial skills of farmers: A Literature review of entrepreneurship in agriculture*. Brussels: European Union-Entrepreneurial Skills of Farmers (EU-ESoF). Available at: http://www.esofarmers.org/fileadmin/documents-esofarmers/ESoFliteraturereview_000.pdf [Accessed 17 April 2014].

McElwee, G. 2006. Farmers as entrepreneurs: Developing competitive skills. *Journal of Developmental Entrepreneurship* 11 (3):187-206.

McElwee, G. 2008. A taxonomy of entrepreneurial farmers. *International Journal of Entrepreneurship and Small Business* 6 (3):465-478.

McElwee, G. and Bosworth, G. 2010. Exploring the strategic skills of farmers across a typology of farm diversification approaches. *Journal of Farm Management* 13 (12):819-838.

Meccheri, N. and Pelloni, G. 2006. Rural entrepreneurs and institutional assistance: An empirical study from mountainous Italy. *Entrepreneurship & Regional Development* 18 (5):371-392.

Mitchell, B.C. 2004. Motives of entrepreneurs: A case study of South Africa. *Journal of Entrepreneurship* 13 (2):167-183.

Morgan, S.L., Marsden, T., Miele, M. and Morley, A. 2010. Agricultural multifunctionality and farmers' entrepreneurial skills: A study of Tuscan and Welsh farmers. *Journal of Rural Studies* 26 (2):116-129.

Morrison, D.F. 2005. *Multivariate statistical methods.* 4th Edition. United States of America: Duxberry Press.

Muchara, B., Ortmann, G., Wale, E. and Mudhara, M. 2014. Collective action and participation in irrigation water management: A case study of Mooi River Irrigation Scheme in KwaZulu-Natal Province, South Africa. *Water SA* 40 (4):699-708.

Mulder, M., Lans, T., Verstegen, J., Biemans, H. and Meijer, Y. 2007. Competence development of entrepreneurs in innovative horticulture. *Journal of Workplace Learning* 19 (1):32-44.

Murteira, J.M.R. and Ramalho, J.J.S. 2013. Regression analysis of multivariate fractional data. *Econometric Reviews*:1-38.

Nafukho, F.M. and Muyia, M.A.H. 2010. Entrepreneurship and socioeconomic development in Africa: A reality or myth? *Journal of European Industrial Training* 34 (2):96-109.

Nagler, P. and Naudé, W. 2014. Non-farm entrepreneurship in rural Africa: Patterns and determinants. IZA DP No. 8008. Bonn, Germany: The Institute for the Study of Labor (IZA).

Ngorora, G.P.K. and Mago, S. 2012. Challenges of rural entrepreneurship in South Africa: Insights from Nkonkobe municipal area in the Eastern Cape province. *International Journal of Information Technology and Business Management* 16 (1):1-11.

Nieuwenhuizen, C. and Swanepoel, E. 2015. Comparison of the entrepreneurial intent of master's business students in developing countries: South Africa and Poland. *Acta Commercii* 15 (1):1-10.

Norman, G.R. and Streiner, D.L. 2008. *Biostatistics: The Bare Essentials.* Shelton: PAMPH.

North, D. and Smallbone, D. 2006. Developing entrepreneurship and enterprise in Europe's peripheral rural areas: Some issues facing policy-makers. *European Planning Studies* 14 (1):41-60.

NPC. 2012. *Our future-make it work: National Development Plan 2030*. Pretoria: NPC (National Planning Commission). Available at: http://www.info.gov.za/issues/national-development-plan [Accessed 9 October 2013].

OECD 2008. *Handbook on constructing composite indicators: Methodology and user guide.* Ispra, Italy: OECD (Organisation for Economic Co-operation and Development).

OECD. 2015. Entrepreneurship at a Glance 2015. Paris: OECD Publishing.

Onyebinama, U.A.U. and Onyebinama, I.C. 2010. Extension education and entrepreneurship development in Nigerian agriculture. *Agricultural Journal* 5 (2):63-69.

Osgood, D.W., McMorris, B.J. and Potenza, M.T. 2002. Analyzing multiple-item measures of crime and deviance: Item response theory scaling. *Journal of Quantitative Criminology* 18:267-296.

Pato, M.L. and Teixeira, A.A.C. 2013. Twenty years of rural entrepreneurship: A bibliometric survey. FEP Working paper 516. Porto: University of Porto.

Phelan, C. 2014. *Understanding the farmer: An analysis of the entrepreneurial competencies required for diversification to farm tourism.* PhD, University of Central Lancashire.

Phelan, C. and Sharpley, R. 2012. Exploring entrepreneurial skills and competencies in farm tourism. *Local Economy* 27 (2):103-118.

Pyysiäinen, J., Anderson, A., McElwee, G. and Vesala, K.M. 2006. Developing the entrepreneurial skills of farmers: Some myths explored. *International Journal of Entrepreneurial Behaviour and Research* 12 (1):21-39.

Pyysiäinen, J. and Vesala, K.M. 2013. Activating farmers: Uses of entrepreneurship discourse in the rhetoric of policy implementers. *Discourse and Communication* 7 (1):55-73.

Rajaei, Y., Yaghoubi, J. and Donyaei, H. 2011. Assessing effective factors in development of entrepreneurship in agricultural cooperatives of Zanjan province. *Procedia - Social and Behavioral Sciences* 15:1521-1525.

Ram, M., Abbas, T., Jones, T., Sanghera, B., Barlow, G. and Jones, T. 2000. Making the link: Households and small business activity in a multi-ethnic context. *Community, Work and Family* 4 (3):327-348.

Ramalho, E., Ramalho, J.S. and Henriques, P. 2010. Fractional regression models for second stage DEA efficiency analyses. *Journal of Productivity Analysis* 34 (3):239-255.

Ramalho, E.A., Ramalho, J.J.S. and Murteira, J.M.R. 2011. Alternative estimating and testing empirical strategies for fractional regression models. *Journal of Economic Surveys* 25 (1):19-68.

Reardon, T., Berdegue, J., Barrett, C. and Stamoulis, K. 2006. *Household income diversification into rural non-farm activities*. Baltimore: Johns Hopkins University Press.

Rijkers, B. and Costa, R. 2012. Gender and rural non-farm entrepreneurship. *World Development* 40 (12):2411-2426.

Rijkers, B. and Söderbom, M. 2013. The effects of risk and shocks on non-farm enterprise development in rural Ethiopia. *World Development* 45:119-136.

Robinson, K.L., Dassie, W. and Christy, R.D. 2004. Entrepreneurship and small business development as a rural development strategy. *Southern Rural Sociology* 20 (2):1-23.

Rosenbaum, P.R. 2002. *Observational studies.* New York: Springer.

Rudmann, C. (ed.) 2008. *Entrepreneurial skills and their role in enhancing the relative independence of farmers. Results and recommendations from the research project Developing Entrepreneurial Skills of Farmers.* Frick, Switzerland: Research Institute of Organic Agriculture.

Samson, M. 2009. Social cash transfers and employment: A note on empirical linkages in developing countries. Paris: The Organisation for Economic Co-operation and Development (OECD).

Samson, M., Lee, U., Ndlebe, A., Quene, K.M., van Niekerk, I., Gandhi, V., Harigaya, T. and Abrahams, C. 2004. The social and economic impact of South Africa's social security system. Summary Report. Cape Town: Economic Policy Research Institute.

Sánchez, J. 2012. The influence of entrepreneurial competencies on small firm performance. *Revista Latinoamericana de Psicología* 44 (2):167-177.

SASSA. 2014. *Fact sheet: Issue no 12 of 2014. A statistical summary of social grants in South Africa*. Pretoria: South Africa Social Security Agency (SASSA). Available at: http://www.sassa.gov.za/index.php/statistical-reports [Accessed 28 June 2015].

Schmitt-Rodermund, E. 2004. Pathways to successful entrepreneurship: Parenting, personality, early entrepreneurial competence, and interests. *Journal of Vocational Behavior* 65 (3):498-518.

Schumpeter, J.A. 1949. *The theory of economic development : An inquiry into profits, capital, credit, interest, and the business cycle.* Cambridge: Harvard University Press.

Seuneke, P., Lans, T. and Wiskerke, J.S.C. 2013. Moving beyond entrepreneurial skills: Key factors driving entrepreneurial learning in multifunctional agriculture. *Journal of Rural Studies* 32:208-219.

Shane, S. 2003. *A general theory of entrepreneurship: The individual-opportunity nexus.* Cheltenham: Edward Elgar.

Shane, S. and Venkataraman, S. 2000. The promise of entrepreneurship as a field of research. *Academy of Management Review* 25 (1):217-226.

Singer, S., Amoros, J.E. and Moska, D. 2015. *Global Entrepreneurship Monitor (GEM) 2014 Global Report*. Available at: gemconsortium.org/docs/download/3616 [Accessed 1 December 2015].

Singh, A.P. 2013. Factors influencing entrepreneurship among farming community in Uttar Pradesh. *Journal of Arts, Science and Commerce* 4 (3):116-121.

Sinyolo, S., Mudhara, M. and Wale, E. 2014a. The impact of smallholder irrigation on household welfare: The case of Tugela Ferry irrigation scheme in KwaZulu-Natal, South Africa. *Water SA* 40 (1):145-156.

Sinyolo, S., Mudhara, M. and Wale, E. 2014b. Water security and rural household food security: Empirical evidence from the Mzinyathi district in South Africa. *Food Security* 6 (3):483-499.

Skrondal, A. and Laake, P. 2001. Regression among factor scores. *Psychometrika* 66:563-576.

Smith, W.L., Schallenkamp, K. and Eichholz, D.E. 2007. Entrepreneurial skills assessment: An exploratory study. *International Journal of Management and Enterprise Development* 4 (2):179-201.

Stats SA. 2012. GHS Series, volume IV, Food security and agriculture, 2002–2011: In-depth analysis of the General Household Survey data. Pretoria: Statistics South Africa.

Stearns, T. 1996. Entrepreneurship and new firm development: A definitional introduction. *Journal of Business Research* 36:1-4.

Tabachnick, B.G. and Fidell, L.S. 2001. *Using multivariate analysis.* Boston: Allyn and Bacon.

Tesfaye, A., Bogale, A., Namara, R.E. and Bacha, D. 2008. The impact of small-scale irrigation on household food security: The case of Filtino and Godino irrigation schemes in Ethiopia. *Irrigation Drainage Systems* 22 (2):145-158.

Tshuma, M.C. 2012. A review of the poverty and food security issues in South Africa: Is agriculture the solution? *African Journal of Agricultural Research* 7 (28):4010-4020.

Urban, B. and Sefalafala, M.R. 2015. The influence of entrepreneurial intensity and capabilities on internationalisation and firm performance. *SAJEMS* 18 (2):260-276.

van Auken, H., Fry, F.L. and Stephens, P. 2006. The influence of role models on entrepreneurial intentions. *Journal of Developmental Entrepreneurship* 11 (2):157-167.

van der Lingen, E. and van Niekerk, G. 2015. Entrepreneurship traits of Science, Engineering and Technology (SET) students. *SAJESBM* 7:117-144.

van der Merwe, S. and de Swardt, G. 2008. Small business owner-managers' perceptions of entrepreneurship in the Emfuleni district. *SAJEMS* 11 (4):449-464.

Vesala, H.T. and Vesala, K.M. 2010. Entrepreneurs and producers: Identities of Finnish farmers in 2001 and 2006. *Journal of Rural Studies* 26 (1):21-30.

Vesala, K.M. 2008. A theoretical and methodological approach to the study of the assessment and development of entrepreneurial skills in the farm context. *In:* Vesala, K.M. and Pyysiäinen, J. (eds.) *Understanding entrepreneurial skills in the farm context.* Frick, CH: Research Institute of Organic Agriculture FiBL.

Vesala, K.M. and Pyysiäinen, J. (eds.). 2008. *Understanding entrepreneurial skills in the farm context.* Frick, Switzerland: Research Institute of Organic Agriculture.

Vyass, S. and Kumaranayake, L. 2006. Constructing socioeconomic status indexes: How to use Principal Component Analysis. *Health Policy and Planning* 21 (6):459-468.

Wang, X. and Jessup, L.M. 2014. A review and synthesis of entrepreneurship research: Towards an integrative model of dependent variables. *Journal of Entrepreneurship* 23 (2):163-199.

Wennberg, K., Pathak, S. and Autio, E. 2013. How culture moulds the effects of self-efficacy and fear of failure on entrepreneurship. *Entrepreneurship & Regional Development* 25 (9-10):756-780.

Williams, C.C. 2007. The nature of entrepreneurship in the informal sector: Evidence from England. *Journal of Developmental Entrepreneurship* 12 (2):239-254.

Wilsont, C. and Tisdell, C. 2002. OLS and Tobit estimates: When is substitution defensible operationally? Working Paper No.15. Brisbane: The University of Queensland.

Woolard, I. 2003. Social assistance grants, poverty and economic growth in South Africa. *Paper presented at the TIPS/DPRU Forum 2003: The Challenge of Growth and Poverty: The South African Economy Since Democracy*, Johannesburg, 8-10 September 2003.

Wooldridge, J.M. 2002. *Econometric Analysis of Cross Section and Panel Data.* MIT Press.

Yang, D.T. and An, M.Y. 2002. Human capital, entrepreneurship, and farm household earnings. *Journal of Development Economics* 68 (1):65-88.

Zembe-Mkabile, W., Surender, R., Sanders, D., Jackson, D. and Doherty, T. 2015. The experience of cash transfers in alleviating childhood poverty in South Africa: Mothers' experiences of the Child Support Grant. *Global Public Health* 10 (7):834-851.

CHAPTER 7 CONCLUSIONS, IMPLICATIONS FOR POLICY AND FUTURE RESEARCH DIRECTIONS

7.1 Recap of the purpose of the study

Against the background that the South African government has prioritised the expansion of the smallholder sector as part of its broader job creation and rural development strategies, and that concerns have been raised that social grants might have created disincentives to farm, this study aimed to provide in-depth evidence of the incentive/disincentive impact of social grants on smallholder farming activities. While a wide range of literature explored various dimensions of the impact of social grants, literature exploring the potential linkages between social grants and smallholder farming activities in South Africa is scarce. Only anecdotes and descriptive reports are available and these have reported that rural households are neglecting smallholder farming due to their reliance on social grants. According to these reports, rural households put small amounts of land under cultivation and do so for subsistence purposes, as they rely on social grants for income.

However, this link between social grants and smallholder farming activity should be taken with a pinch of salt, since these reports have not been based on robust econometric analysis. This is because these reports might be just about the simultaneous existence of social grants and declining smallholder farming activity, which does not necessarily mean that one caused the other. Therefore, this study aimed at addressing the potential disincentive effects of social grants, using econometric analysis. The success of the government's rural poverty reduction and job creation strategies depends upon the extent to which rural households have the incentives and motivation to farm, adopt modern farming techniques and commercialise their farming activities. Given that most of the rural households are beneficiaries of social grants, it is important that policy-makers have reliable evidence with regards to the extent to which these two interventions are working together or in opposite ways, so that they can intervene appropriately.

7.2 Conclusions and implications for policy

This study aimed to assess the impact of social grants on different dimensions of smallholder farming activities, by capturing social grants in two ways: access to social grants and the level of dependency on social grants. The study indicated that social grants have a wide coverage, benefiting most of the rural households that were interviewed. The results also indicated that the social grants are well-targeted, benefiting mostly the poor, who have fewer alternative livelihood options. The study revealed high levels of poverty and unemployment among the household members in the rural areas of KZN, indicating a shortage of economic opportunities in these areas. While this underscores the importance of smallholder farming as a livelihood option, the results indicated low levels of land area cultivation, reduced participation by unemployed household members in smallholder farming activities and low levels of farm entrepreneurship. The question answered in this study is whether these outcomes are as a result of the households' access to, or level of dependency on, social grants.

By-and-large, the results indicated that the disincentive effects of social grants are not just about access, but about the level of dependency on the social grants. The results of this study imply that there is value in introducing the dummy and the continuous variables to capture the impacts of social grants, as the influence of the two variables varied for the different outcomes studied. In general, the results were largely consistent with the disincentive hypothesis, suggesting that access to, and dependency on, social grants have negative effects on smallholder farming activities. The results indicated that the rural households who depended more on social grants had fewer of their members participating in smallholder farming; used less chemical fertilisers; were less entrepreneurial and less likely to be market-oriented. Although access to social grants had a positive effect on the level of chemical fertiliser use and farm entrepreneurship, it had negative effects on the proportion of household members that engage in smallholder farming activities and market participation levels.

These findings generally bolster recent concerns about potential unintended effects of the current social grant system and raise considerable doubt about whether the potential of smallholder farming can be adequately harnessed without addressing the social grant disincentives. The results imply that social grants are spilling over to unintended household members, creating a dependency syndrome among the recipient households. Given that social grants were found to be benefit mostly the poor households, the fact that these households have less incentives and motivation to farm, or invest in or commercialise their farming activities,

means that they have less chance of breaking out of the vicious cycle of poverty. While social grants may reduce extreme poverty, they are not enough to pull households out of poverty on their own, especially in the context of the sharing of social grants income with unintended household members. This points to the need to link social grants to economic activities such as farming in order to meet the government's broader job creation and rural development targets. Given that the other major alternatives to social grants (such as the EPWP) have failed to reduce rural poverty or unemployment, policies should prioritise reducing the disincentive effects and making smallholder farming successful in rural areas.

While the results were consistent with the descriptive statistics and anecdotal evidence which showed that social grants recipient households were more likely to be subsistence-oriented, this study found no evidence of a negative causal impact of social grants on the proportion of land area cultivated. This result implies that the descriptive reports that had indicated that rural households in South Africa no longer cultivate much of their land because they receive social grants, is not supported by econometric results. It is argued that these reports are based on the simultaneous existence of social grants and declining land under cultivation, rather than on a demonstrable causality. Instead, the study identified several other constraints that policy-makers should focus on to improve the proportion of cultivated land in the rural areas. This study, therefore, demonstrates the importance of controlling for confounding effects when evaluating the disincentive effects of social grants. The distinction between correlations and causality should always be borne in mind when making such statistical inferences.

The results also imply that the potential complementarity between social grants and smallholder farming has not materialised in South Africa. Even though there is evidence that social grants ease the constraints associated with job search in the non-farm sector, the results of this study, suggest that social grants have barely relaxed the financial constraints of the farmers, as it does in the job sector. With limited credit access in the rural areas, there is a need for a strategy that allows for social grants to relax the financial constraints of the farmers. Given that social grants are now viewed as a livelihood promotion measure, the study recommends that strategies to synchronise the objectives of social grants and smallholder farming be sought, so that the potential complementarity between the two interventions materialise.

The study has also indicated the importance of expectations of success in motivating rural households to participate and commercialise their smallholder farming activities. In particular, the results indicated the importance of access to institutional and/or organisational support

(such as extension, training or associations), as well as infrastructural support (such as good roads or irrigation) in creating conducive environments that motivate the households to engage in different smallholder farming activities. The study also revealed that, even though the production side (incentives to cultivate or use modern technology) of smallholder farming was gender neutral, the marketing side was not. Female-headed households were found to more likely to participate in the market and had higher farm entrepreneurship levels. The study revealed the need to find strategies, such as introducing subsidies and focussed training, to encourage rural households to invest part of their social grants in smallholder farming activities.

7.3 Policy recommendations

To address the disincentive effects of social grants and ensure successful smallholder production and commercialisation, this study recommends a holistic approach that addresses both the social grants side as well as the smallholder farming side. In other words, policy-makers should aim to find strategies of reducing social grant dependency and disincentive effects, while simultaneously creating a conducive environment to improve the attractiveness, viability and success of smallholder farming. Specifically, the study recommends the following:

a. Harmonise the objectives of social grants and smallholder farming in the rural areas

Since social grants are important in addressing the immediate basic needs poor, the study recommends that they should continue, but that their objectives be harmonised with those of other anti-poverty options such as farming. The policy should promote the investment of some of income from social grants in micro-enterprises, such as smallholder farming, to generate a high multiplier effect. This applies especially to social grants such as the OAG that pay significant amounts of money. Given that credit access is limited in the rural areas, this can allow for social grants to relax the financial constraints of the farmers.

b. Making smallholder agriculture more viable and attractive

The study recommends policy priority towards creating a conducive environment for smallholder success (such as introducing irrigation or improving input supply services) in order for the unemployed rural people to participate in smallholder farming, improve land area

cultivation, adopt modern technologies and increase their entrepreneurship and market participation levels. In particular, the results of the study indicate the need for policy priority towards organising farmers into groups for marketing and providing support services such as training and extension provisions. A greater emphasis should be on giving the rural farmers relevant and focussed agricultural skills training, as informed by the skills needs of the farmers. The training should build on the farmers' indigenous knowledge and experience, starting at the level of understanding the farmers are at.

The trainings, which can be done or facilitated by the extension officers, should include encouragement of rural households to save and invest part of their social grant income on small businesses such as smallholder farming. The trainings should also encourage farmers to market their produce and cover marketing issues, so that more farmers have an incentive to participate in the market.

c. Targeting female-headed households

Government interventions should target women for better chances of success in achieving the government's commercialisation targets. Not only is smallholder farming dominated by female-headed households, but this study revealed their higher chances of market participation and greater entrepreneurship levels.

7.4 Study limitations and suggested areas of further research

While this study is an improvement on the descriptive statistics linking social grants and smallholder farming outcomes in South Africa, its major limitation is that it has depended on cross-sectional data. Therefore, it is suggested that future research be conducted using panel data. The use of panel data would provide more robust impact estimates and a clearer demonstrable causality. The other limitation of the study is that the impact of social grants has been examined on a few smallholder farming outcomes. For example, market participation only included maize markets, while technology adoption only involved chemical fertilisers. It is recommended that future studies be done linking social grants to other crops, as well as other technologies, to get a clearer picture of how social grants affect households' incentives to commercialise or adopt modern farming techniques. The study has also not investigated the effect of social grant dependency on market orientation (production decisions based on market signals). In other words, are social grants beneficiary households allocating their production

resources in a manner that indicates less interest in commercialisation? The impact of social grants on market orientation, as well as how market orientation leads to market participation, should be explored in further research. Lastly, the data analysed in this study was from only one province in South Africa. Even though it has been indicated that the data is relatively comparable to that in other rural areas across the country, the data is not nationally representative. It is recommended that a more nationally representative study be conducted to provide further evidence.

APPENDICES

Appendix A: Questionnaire

Introduction

My name is _____. I am from the University of KwaZulu-Natal. The university is conducting research in KwaZulu-Natal that is looking **at the impact of social grants on rural households' entrepreneurship, marketing and incentives to invest in agricultural activities in KwaZulu-Natal**. There are no wrong and right answers to these questions. I would like to assure you that all the information provided here will be treated as **STRICTLY CONFIDENTIAL**, and will be used for academic purposes only. Interview will take about 45 minutes.

Identification

Interviewer name		Date of interview	
Name of key respondent		Respondent tel.	
District		Local municipality	

Codes: District 1=Harry Gwala 2=Umzinyathi 3=Uthukela
Local municipality 1=Ubuhlebezwe 2=Msinga 3=Imbabazane 4=Bergville

Section A: Household demographics

A1. What is the total number of your household members? Please complete table below (*Record household head* details in the first row*).

Household member ID	Position in the household	Age	Gender	Marital status	Education level (*Specify, e.g. Grade 5*)	Main occupation

Household position	Gender	Marital status	Main occupation
1 Household head* 2 Spouse 3 Daughter /son 4 Other (specify e.g., cousin) ……	1=Male 0=Female	1=Single 2=Married 3=Divorced 4=Widowed	1=Fulltime farmer 6=Student 2=Regular salaried job 7=Retired 3=Temporary job 8=Other (specify) 4=Unemployed 5=Self employed

A2 What is the total number of your household members**?		
A3 How many of the household members are adults (15 years old or more)?		
A4 How many of the household members are children (less than 15 years old)?		
A5 How many of the adult household members cannot work because of chronic sickness or old age?		
A6 How many of the household members are employed?	Permanently employed	
	Temporarily employed	
A7 What is the household's main religion? No religion=0 Traditional=1 Christian=2 Other (Specify)…=3		

* *Household head refers to the de facto household head that stays in the household for 4 or more days per week*
** *Please include only those who stay in the household for 3 or more days per week*

Section B: Farming activities and land holding

B1 Are you involved in any crop or livestock farming activity? 1=Yes 0= No	
B2 If Yes in B1, Is the head of the household involved in farming full-time? 1=Yes 0= No	
B3 Is any other member of the household involved in farming activities? 1=Yes 0= No	

B4 How many household members help with or are involved in farming regularly? (*Complete table below on the number of days these members helped in farming activities in the last 30 days*).	
Household member ID	Number of days involved in farming activities in the last 30 days

B5 If Yes in B1, what farming activities is your household involved in and what is the main purpose of the farming activity? (*Complete table below*)

Farming activity	Tick	Experience (number of years)	Main purpose: 1=Main source of food 2=Extra source of food 3=Main source of income 4= Extra source of income 5=Leisure activity / hobby 6=Other (specify)
Crop production			
Vegetable production			
Community gardens			
Livestock production			
Other (specify)			

B6 What is the total size of land the household has access to?	Irrigated land	ha
	Dry-land	ha
B7 How do you feel about your land size? 1=Too small 2=Just right 3=Too large		
B8 How many hectares of the land the household has access to were cultivated since August 2013?	Irrigated land	ha
	Dry-land	ha
B9 Rate the quality of your land for crop production 0=Poor 1=Average 2=Good		
B10 How did you acquire the land and what was the size in hectares?	Allocated by Inkosi	ha
	Inherited	ha
	Leasing/ renting	ha
	Bought	ha
	Other (*Specify*)…….	ha
B11 Are you satisfied with the present tenure security of your land? Yes=1 No=0		
B12 Are you permitted to sell or rent your piece of land? Yes=1 No=0		
B13 If No in B12, do you think people should be able to sell or rent their land to others? Yes=1 No=0		
B14 How do you feel about the rainfall distribution for crop production since August 2013? 0= Very Poor 1=Poor 2= Average 3=Good 4=Very good		

Section C: Crop production and marketing system

C1 Did you grow any crops in the past summer season (August 2013-March 2014)? Yes=1 No=0

C2 If Yes in C1, please indicate your cropping and marketing activities in the past summer (rainy) season by completing Tables C2A and C2B. Specify units for ALL quantities e.g., kg or ton, buckets.

Table C2A

Crop name	Area planted (ha)	Water source*	Quantity harvested	Quantity sold	Sell price per unit	Main market outlet sold**	Market distance from farm (km)
Maize							
Tomatoes							
Potatoes							
Spinach							
Cabbage							
Beans							
Onions							
Butternut							

Other (Specify)							
	Water source codes* 1=Rain fed 2=Irrigation 3=Both			Market outlet codes** 1=Local shop 2=Shops in town 3=Neighbours 4=Contractors 5=Hawkers 6=Other (specify)			

Table C2B

Crop name	Quantity consumed	Quantity purchased	Purchase price per unit	Market outlet purchased*	Distance where bought farm (km)
Maize					
Tomatoes					
Potatoes					
Spinach					
Cabbage					
Beans					
Onions					
Butternut					
Other (Specify)					
Market outlet codes* 1=Local shop 2=Shops in town 3=Neighbours 4=Contractor 5=Hawkers 6=Other (specify)					

C3 Did you grow any crops in the past winter (April 2014-July 2014)? Yes=1 No=0

C4 If Yes in C3, please indicate your cropping and marketing activities in the past winter (dry) season by completing Tables C4A and C4B. Specify units for ALL quantities e.g., kg or ton, buckets.

Table C4A

Crop name	Area planted (ha)	Water source*	Quantity harvested	Quantity sold	Sell price per unit	Market outlet sold**	Market distance from farm (km)
Maize							
Tomatoes							
Potatoes							
Spinach							
Cabbage							
Beans							
Onions							
Butternut							
Other(Specify)							
		Water source codes* 1=Rain fed 2=Irrigation 3=Both		Market outlet codes** 1=Local shop 2=Shops in town 3=Neighbours 4=Contractor 5=Hawkers 6=Other (specify)			

Table C4B

Crop name	Quantity consumed	Quantity purchased	Purchase price per unit	Market outlet purchased*	Market distance from farm (km)
Maize					
Tomatoes					
Potatoes					
Spinach					
Cabbage					
Beans					
Onions					

Butternut					
Other (Specify)					
Market outlet codes* 1=Local shop 2=Shops in town 3=Neighbours 4=Contractor 5=Hawkers 6=Other (specify)					

C5 Have you ever failed to sell your produce due to lack of market? 0=No 1=Yes	
C6 If Yes on C5, how often do you fail to sell your farm produce due to lack of market? Sometimes=1 Always=2	
C7 Which crop do you mostly fail to sell due to lack of market? *Please state*	

C8 Which market outlet do you prefer most? (*Tick the most preferred*)

Local informal shop		Neighbours	
Larger shops in town		Hawkers	
Contractor			

C9 Please indicate the level to which the following reasons influence your market outlet preference as mentioned in C8. Codes: Strongly disagree=1 Disagree=2 Neutral=3 Agree=4 Strongly agree=5

Reason	**Level**	**Reason**	**Level**
I obtain higher prices		It is near	
I incur lower marketing costs		It is less risky than other alternatives	
I obtain more market information		It is the only marketing channel available to me	
I have established networks or contacts		It is more convenient than others	

C10 Generally, how would you rate your level of market access? 0=Poor 1=Average 2=Good	

Section D: Inputs use and technology adoption

D1 Did you use any fertilizer since August 2013? Yes=1 No=0		
D2 If yes on D1, which type of fertilizer did you use in your field in the last 12 months? Organic fertilizer=1 Inorganic fertilizer=2 Both=3		
D3 If you used any inorganic fertilizer, what were the sources of the inorganic fertiliser and how many kg's did you get from the source?	Bought	kg
	Government	kg
	NGO	kg
	Other (specify)	kg
D4 If you bought inorganic fertilizer, how much was its price per 50 kg?		R
D5 Do you think the price of fertilizer is high, low or average? 1=Low 2=Average 3=High		
D6 If bought, where did you buy your fertilizer mainly? 1=Small informal agro-dealers 2=Large agro-dealers 3=Hawkers or vendors 4=Other farmers 5=Other (specify)……..		
D7 What is the distance to the fertilizer collection point?		km

D8 Did you use any improved seeds varieties for your crops since August 2013? Yes=1 No=0	

D9 If Yes in D8, please complete table below

Crop name	**Use of improved seed variety (hybrid) Yes=1 No=0**	**Quantity used**	**Main source**	**Quantity purchased ***	**Purchase price per unit**	**Main outlet where seed bought**
Maize						
Tomatoes						
Potatoes						
Spinach						
Cabbage						
Beans						

Onions						
Butternut						
Other (Specify)						
		Main source 1=Bought 2=Government 3=NGO 4=Other (specify)		*specify units, e.g., kg	Market outlet 1=Small informal agro-dealers 2=Large agro-dealers 3=Hawkers or vendors 4=Other farmers 5=Other (specify)……	

D10 Did you hire any labour for your farming activities since August 2013? 0=No 1=Yes		
D11 If Yes in D10, for how many labour days did you hire them?	Permanent	
	Temporary	
D12 How did you control pests or diseases in your field since August 2013? 0=None 1=Cultural control 2=Chemical control 3=Both		
D13 If you used chemical control methods, what were the sources of the pesticides and how much quantities did you get from the source? (Please specify units, e.g., *ml*)	Bought	
	Government	
	NGO	
	Other (specify)	
D14 If you bought pesticides, how much was its price per 500 ml?		R
D15 Do you think the price of pesticides is high, low or average? 1=Low 2=Average 3=High		
D16 If bought, where did you buy your pesticides mainly? 1=Small informal agro-dealers 2=Large agro-dealers 3=Hawkers or vendors 4=Other farmers 5=Other (specify)……..		

D17 How do you control weeds in your field? 0=None 1=Weeding 2=Apply herbicides 3=Both		
D18 If you used herbicides, what were the sources of the herbicides and how much did you get from the source? (Please specify units, e.g., *ml*)	Bought	
	Government	
	NGO	
	Other (specify)	
D19 If you bought herbicides, how much was its price per unit?		R
D20 Do you think the price of herbicides is high, low or average? 1=Low 2=Average 3=High		
D21 If bought, where did you buy your herbicides mainly? 1=Small informal agro-dealers 2=Large agro-dealers 3=Hawkers or vendors 4=Other farmers 5=Other (specify)……..		

D22 If not using any of the improved inputs above, what are the reasons for not using the inputs (Tick appropriate reasons for each inputs)?

Reasons	**Seed**	**Fertiliser**	**Pesticides**	**Herbicides**
Too expensive				
Not profitable				
None supplied				
Transport challenges				
Others (specify)				

D23 Did you use these agricultural technologies since August 2013? (*Complete table below*)

Technology	**Adopted**	**Source of knowledge**
Soil conservation techniques		
Pest management practices		
Crop rotation		
Mulching		
Irrigation		
	0=No 1=Yes	1=Extension officer 2= Other farmers 3=Media such as radio, tv, etc. 4=Other (specify)

Section E: Livestock and asset ownership

E1 Please indicate your livestock production and marketing activities by completing the table below

Livestock type	**Goat**	**Cattle**	**Sheep**	**Chicken**	**Ducks/goose**	**Donkey**	**Pigs**	**Other (specify)**
Number owned today								
Money spent on feeds, chemicals, vet services, etc., since August 2013								
Number sold since August 2013								
Total amount from sales since August 2013 (Rands)								
Main market livestock sold*								
Number slaughtered for family purpose (consumption or ritual) since August 2013								
Number given to others as gifts, fines, etc., since August 2013								

*Main market codes: *1=Local butchery 2=Supermarket 3=Neighbours 4=Hawkers 5=Other (specify)*

E2 What is the main purpose or function for keeping livestock 1=Sales 2=Consumption 3=Wealth 4=Draught power 5=Cultural reasons 6=Other	

E3 How much of each of the following animal products were harvested and how much was sold since August 2013? (*Complete table below*)

	Quantity produced (Specify units)	Quantity sold (Specify units)	Money from sales
Milk and milk products			
Eggs			
Hides			
Other (specify)			

E4 Do you own the following assets? (*Indicate number owned in the appropriate box, zero if not owned. Also indicate the average price you would charge if you were to sell the asset*)

Asset	**No.**	**Asset value**	**Asset**	**No.**	**Asset value**	**Asset**	**No.**	**Asset value**
Block, tile house			Car			Cell phone		
Block, zinc house			Motor- cycle			TV		
Round, thatch house			Bicycle			Radio		
Round pole and mud or shack house			Tractor			Mouldboard plough		
Tap			Wheel- barrow			Knapsack sprayer		
Borehole			Spades			Tractors		
Protected well			Hoes			Ripper		
Water tank			Telephone			Disc harrows		
Trailers			Rotary slashers			Disc plough		

Cultivators			Fertilizer spreaders			Ridgers		
Harvesters			Other (Specify)			Wheat drills		
Other (Specify)			Other (Specify)			Other (Specify)		

Section F: Access to grants

F1 Are any of your household members receiving government grants? Yes=1 No=0		
F2 If yes on F1, how many are on the:	Old age grant?	
	Child support grant?	
	Disability grant?	
	Foster child grant?	
	Care Dependency grant?	
F3 Do you pool income from social grants with other income sources in the household? Yes=1 No=0		
F4 Do you use some of your grant money to buy agricultural inputs? Yes=1 No=0		
F5 If Yes on F4, how often do you do that? 1=Sometimes 2=Always		
F6 If Yes on F4, what percentage of the grant money do you normally use for agricultural purposes?		%

F8 Do you think the grant has improved your household welfare? 0=Not at all 1=Somewhat 2=Absolutely	

G Other income sources and expenditure patterns

G1 What were the other sources of your household income since August 2013? (*Indicate approximately how much each source contributed and how often*).

Source of household income	**Amount per given time**	**How often? (e.g. monthly)**	**Number of times in the past 12 months**	**Total amount**
Remittances				
Arts and craft				
Permanent employment				
Temporary/casual employment				
Hawking/petty trading				
Other (specify)				

G2 How much money was spent on food items since August 2013?	R
G3 How much money was spent on non-food items since August 2013?	R
G4 Taking all means* into consideration, how would you describe your household food consumption since August 2013? 1=Frequent food shortages throughout the year 2=Occasional food shortages 3=No food shortages, no surplus 4=Food surplus	

**All means include: own production + food purchases + help from different sources + food hunted from forest, lakes, etc.*

G4 How do you judge your household's poverty status in relation to other households in the area 0=Very poor 1=Poor 2=Average 3=Rich 4=Very rich	

Section H Institutions and support services

H1 Please indicate if you are a member of these groups and your level of decision making

Group	**Yes=1 No=0**	**Level of decision making Low=1 Moderate=2 High=3**
Farmer association		
Marketing co-operative or group		
Savings group (stokvel)		

Water user association		
WARD		
Other (specify)		

H2 If you are a member of a marketing co-operative, do you think membership has improved your market access? Yes=1 No=0	

H3 Did you use any credit or loan facility since August 2013? Yes=1 No=0	
H4 If yes in H3, what was the main source of the credit/loan? Relative or friend=1 Money lender=2 Savings club (stokvel)=3 Input supplier=4 Financial institution=5 (Specify name of financial institution……) Output buyer =6 Other=7(Specify……)	
H5 What was the purpose of the loan/credit? Family emergency=1 Agricultural purposes=2 Both=3 Other (specify……)=4	
H6 Were you able to pay back the loan/credit in time? Yes=1 No=0	
H7 Did you receive funding or any other sources of credit support from government since August 2013? Yes=1 No=0	
H8 If yes in H7, how often do you receive the funding or credit for farming activities? Never=0 Sometimes=1 Always=2	
H9 Did you have any contact with extension officer since August 2013? Yes=1 No=0	
H10 If yes in H9, how often did you contact extension officers? Never=0 Sometimes=1 Always=2	
H11 If yes on H9, did you invite the extension officer? Yes=1 No=0	
H12 Are the extension officers from: 1=Government/ parastatal? 2=Non-governmental organisation (NGO)? 3=Private company?	
H13 What is the distance to the extension office?	km
H14 Did you or a member of your household receive any training from government or any other organization? Yes=1 No=0	
H15 If yes on H14, please specify the training provided……	
H16 How would you describe the usefulness of the training received in farming? Not useful at all=1 somewhat useful=2 Useful=3 Very useful=4	

H17 Do you use the following sources of agricultural information?

Source of information	**Yes=1 No=0**	**Source of information**	**Yes=1 No=0**
Extension workers		Internet	
Radio/television		Other farmers	
Newspaper		Other (specify)…….	
Cell phones/SMS		Other (specify)…….	

H18 What is your main source of farming information 0=None 1=Radio/television 2=Extension officer 3=Cell phone/SMS 4=Internet 5=Newspaper 6=Other farmers 7=Other (specify)…….	
H19 Do you understand the information disseminated by the main information source in H18? Not at all=0 Somewhat=1 Absolutely=2	

H20 What is the distance from your farm to the nearest all-weather road?	km

H21 Do you agree with the following statements with regards to infrastructure in your area? Strongly disagree=1 Disagree=2 Neutral=3 Agree=4 Strongly agree=5

Statement	**Level**
In general, the road network in the area is good	
In general, the water distribution network is in good condition	
In general, the infrastructure at the market is good	
In general, the infrastructure at the input suppliers is of good quality	

Section I: Farmer entrepreneurship

I1 Please rate the extent to which you agree with the following statements pertaining to the way you view your farm. Strongly disagree=1 Disagree=2 Neutral=3 Agree=4 Strongly agree=5

1. I view my farm as a business	
2. I am market-oriented and produce for the market	
3. I view my farm as a means of earning profits	
4. I am more interested in profits than just food production	
5. I am passionate about my farm business	
6. I take calculated risks to make my farm profitable	
7. I take huge risks, sometimes risking personal assets and security	
8. I am constantly looking for new opportunities to grow my farming business	
9. I have a clear vision of how my farm business will grow	
10. I always look for better, more efficient and profitable ways to do things	
11. I am able to recognise market gaps and exploit market opportunities	
12. I always try new crops and cultivars, better animals, and alternative technologies to increase productivity, diversify production and reduce risk	
13. I manage my farming business as a long-term venture with a view to making it sustainable	
14. My production decisions are based on what is possible, not just what I need	
15. I work long and irregular hours to meet demands	
16. I am highly motivated and ambitious	
17. I always view change as an opportunity	
18. I am very flexible and always willing to adapt	
19. I always take responsibility for solving problems that I face	
20. I always cooperate with others, I network and utilise contacts effectively	
21. I possess persuasive communication and negotiation skills	
22. I have the ability to set goals, reach them and set new ones	
23. I am very competitive	
24. I am always willing to learn new things	

I3 Please consider your own abilities against each of the skills listed below and indicate your own level of skill against each. Codes: 1=Very low 2=Low 3=Medium 4=High 5=Very high

1. Financial: Managing financial resources, budgeting	
2. Organisational skills: Day to day administrative affairs, managing yourself and time	
3. Supervision: Manage/ supervise employees and their needs (incl. training/ recruitment)	
4. Marketing/ Sales: Identifying and reaching customers/ distribution channels	
5. Customer service: Handling service expectations and dealing with problems	
6. Small business regulations: risk assessment, legislation	
7. Goal setting: Ability to set goals, reach them and set new ones	
8. Environmental scanning: Recognise market gap, exploit market opportunity	
9. Business concept: Business and strategic planning	
10. Critical thinking: The ability to think critically	
11. Networking: Co-operation with others, networking and utilising contacts	
12. Negotiation: Persuasive communication and negotiation skills	
13. Accountability: Ability to take responsibility for solving a problem	
14. Emotional coping: emotional ability to cope with a problem	
15. Self-awareness: Ability to reflect and introspective	

Concluding remarks

Final general comments…… ……

END

Siyabonga/Thank you

Appendix B: Impact of level of dependency on social grant on the proportion of land area cultivated, PSM results

Matching method	Number of households		ATT	t-test
	Treatment	Control		
Nearest neighbour	349	202	0.015 (0.036)	0.416
Kernel matching method	349	473	0.023 (0.027)	0.864

***Notes*:** ***, **, and * means significance at 1%, 5% and 10%, respectively

***Source*:** Household survey

Appendix C: The impact of level of dependency on social grants on the proportion of land area cultivated, GPS method results

Treatment level	Dose response function		Treatment effect function	
	Dose response	Std. err	Treatment effect	Std. err
0	0.65	0.03	-0.0002	0.02
0.1	0.66	0.02	0.02	0.01
0.2	0.68	0.02	0.02	0.01
0.3	0.71	0.02	0.02	0.01
0.4	0.72	0.02	0.0001	0.01
0.5	0.72	0.02	-0.01	0.01
0.6	0.71	0.02	-0.02	0.02
0.7	0.69	0.03	-0.02	0.03
0.8	0.67	0.06	0.00	0.03
0.9	0.67	0.08	0.01	0.04
1	0.65	0.03	0.00	0.02

Notes: treatment level means the contribution of social grants to total household income.

***Source*:** 2014 household survey

Appendix D: Impact of level of dependency on social grants on the proportion of household members who participate in farming activities, PSM results

Matching method	Number of households		ATT	t-test
	Treatment	Control		
Nearest neighbour	349	202	-0.063 (0.031)	2.03**
Kernel matching method	349	473	-0.074 (0.023)	3.21***

Notes: ***, **, and * means significance at 1%, 5% and 10%, respectively

Source: 2014 household survey

Appendix E: The impact of level of dependency on social grants on the household members who participate in farming activities, GPS method results

Treatment level	Dose response function		Treatment effect function	
	Dose response	Std. err	Treatment effect	Std. err
0	0.52	0.03	0.03	0.02
0.1	0.55	0.02	0.01	0.01
0.2	0.56	0.02	-0.01	0.01
0.3	0.55	0.02	-0.03	0.01
0.4	0.52	0.01	-0.03	0.01
0.5	0.49	0.01	-0.004	0.01
0.6	0.49	0.01	0.02	0.01
0.7	0.51	0.02	0.03	0.02
0.8	0.54	0.03	0.03	0.03
0.9	0.57	0.06	0.01	0.03
1	0.58	0.08	-0.01	0.03

Notes: treatment level means the contribution of social grants to total household income.

Source: 2014 household survey

Appendix F: The impact of level of dependency on social grants on the probability of chemical fertiliser adoption, GPS method results

Treatment level	Dose response function		Treatment effect function	
	Dose response	Std. err	Treatment effect	Std. err
0	0.37	0.07	0.03	0.04
0.1	0.40	0.06	0.04	0.03
0.2	0.44	0.05	0.03	0.02
0.3	0.48	0.04	0.03	0.02
0.4	0.50	0.04	0.02	0.02
0.5	0.52	0.03	-0.0004	0.02
0.6	0.52	0.03	-0.02	0.02
0.7	0.49	0.04	-0.04	0.04
0.8	0.45	0.06	-0.05	0.06
0.9	0.40	0.10	-0.04	0.06
1	0.36	0.15	-0.03	0.06

Notes: treatment level means the contribution of social grants to total household income.

***Source*:** 2014 Household survey

Appendix G: The impact of level of dependency on social grants on the intensity of chemical fertiliser use, GPS method results

Treatment level	Dose response function		Treatment effect function	
	Dose response	Std. err	Treatment effect	Std. err
0	19.06	6.50	5.06	4.56
0.1	24.12	4.72	6.28	3.31
0.2	30.40	4.88	4.65	1.84
0.3	35.05	4.75	1.90	2.42
0.4	36.95	4.23	0.23	2.11
0.5	37.18	4.19	-1.35	2.18
0.6	35.83	3.97	-4.58	2.28
0.7	31.25	3.61	-7.73	4.04
0.8	23.52	4.54	-7.97	6.15
0.9	15.55	9.37	-5.42	7.52
1	10.13	16.21	-2.32	9.01

Notes: treatment level means the contribution of social grants to total household income.

Source: 2014 household survey

Appendix H: The impact of level of dependency on social grants on the probability of market participation, GPS method results

Treatment level	Dose response function		Treatment effect function	
	Dose response	Std. err	Treatment effect	Std. err
0	19.06	6.50	5.06	4.56
0.1	24.12	4.72	6.28	3.31
0.2	30.40	4.88	4.65	1.84
0.3	35.05	4.75	1.90	2.42
0.4	36.95	4.23	0.23	2.11
0.5	37.18	4.19	-1.35	2.18
0.6	35.83	3.97	-4.58	2.28
0.7	31.25	3.61	-7.73	4.04
0.8	23.52	4.54	-7.97	6.15
0.9	15.55	9.37	-5.42	7.52
1	10.13	16.21	-2.32	9.01

Notes: treatment level means the contribution of social grants to total household income.

Source: 2014 household survey

Appendix I: The impact of level of dependency on social grants on the level of market participation, GPS method results

Treatment level	Dose response function		Treatment effect function	
	Dose response	Std. err	Treatment effect	Std. err
0	0.38	0.09	-0.09	0.05
0.1	0.23	0.04	-0.02	0.02
0.2	0.21	0.03	-0.004	0.02
0.3	0.21	0.03	0.001	0.01
0.4	0.21	0.02	-0.002	0.01
0.5	0.21	0.02	-0.004	0.02
0.6	0.21	0.03	0.002	0.04
0.7	0.21	0.06	0.02	0.07
0.8	0.23	0.12	0.05	0.08
0.9	0.28	0.20	0.10	0.08
1	0.38	0.09	-0.09	0.05

Notes: treatment level means the contribution of social grants to total household income.

Source: 2014 household survey

Appendix J: Correlation matrix of the entrepreneurship competencies

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	1.0																							
2	0.8	1.0																						
3	0.7	0.8	1.0																					
4	0.7	0.7	0.8	1.0																				
5	0.5	0.5	0.6	0.6	1.0																			
6	0.6	0.6	0.6	0.6	0.7	1.0																		
7	0.5	0.5	0.4	0.5	0.3	0.5	1.0																	
8	0.6	0.5	0.5	0.5	0.5	0.6	0.5	1.0																
9	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.7	1.0															
10	0.6	0.5	0.5	0.5	0.5	0.6	0.4	0.7	0.7	1.0														
11	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.6	0.7	0.6	1.0													
12	0.6	0.6	0.5	0.5	0.4	0.5	0.5	0.6	0.5	0.6	0.6	1.0												
13	0.7	0.7	0.7	0.7	0.5	0.6	0.4	0.6	0.7	0.6	0.6	0.7	1.0											
14	0.5	0.4	0.4	0.4	0.5	0.6	0.3	0.5	0.5	0.7	0.4	0.6	0.5	1.0										
15	0.6	0.5	0.5	0.5	0.6	0.6	0.4	0.6	0.6	0.6	0.5	0.6	0.6	0.7	1.0									
16	0.6	0.5	0.5	0.5	0.6	0.5	0.4	0.6	0.5	0.6	0.5	0.5	0.6	0.5	0.8	1.0								
17	0.6	0.6	0.6	0.5	0.4	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.6	0.5	0.6	0.7	1.0							
18	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.6	0.6	0.8	1.0						
19	0.6	0.5	0.5	0.5	0.6	0.5	0.4	0.6	0.6	0.7	0.5	0.5	0.6	0.6	0.7	0.7	0.7	0.7	1.0					
20	0.5	0.4	0.4	0.3	0.6	0.5	0.3	0.5	0.5	0.6	0.4	0.5	0.4	0.6	0.6	0.7	0.6	0.5	0.7	1.0				
21	0.6	0.5	0.4	0.4	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.7	0.6	0.6	0.6	0.8	1.0			
22	0.6	0.6	0.6	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.6	0.7	0.6	0.7	0.6	0.6	0.7	1.0		
23	0.6	0.6	0.6	0.6	0.4	0.4	0.5	0.5	0.6	0.4	0.6	0.6	0.6	0.3	0.5	0.6	0.6	0.7	0.6	0.5	0.6	0.8	1.0	
24	0.6	0.5	0.5	0.5	0.5	0.5	0.3	0.6	0.5	0.6	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.6	0.6	0.7	0.7	1.0

Appendix K: The impact of level of dependency on social grants on farm entrepreneurship, GPS method results

Treatment level	Dose response function		Treatment effect function	
	Dose response	Std. err	Treatment effect	Std. err
0	-0.14	0.20	0.17	0.09
0.1	0.03	0.14	0.11	0.08
0.2	0.14	0.09	-0.004	0.05
0.3	0.13	0.07	-0.08	0.04
0.4	0.05	0.08	-0.05	0.04
0.5	0.002	0.08	0.02	0.04
0.6	0.02	0.07	0.01	0.06
0.7	0.03	0.07	-0.07	0.10
0.8	-0.04	0.13	-0.14	0.13
0.9	-0.19	0.25	-0.17	0.15
1	-0.36	0.38	-0.17	0.17

Notes: treatment level means the contribution of social grants to total household income.

Source: 2014 household survey