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To what extent does dependence on social grants affect smallholder farmers' incentives to farm? Evidence from KwaZulu-Natal, South Africa

Sikhulumile Sinyolo*
Discipline of Agricultural Economics, University of KwaZulu-Natal, Pietermaritzburg, South Africa. E-mail: sksinyolo@gmail.com

Maxwell Mudhara
Discipline of Agricultural Economics, University of KwaZulu-Natal, Pietermaritzburg, South Africa. E-mail: Mudhara@ukzn.ac.za

Edilegnaw Wale
Discipline of Agricultural Economics, University of KwaZulu-Natal, Pietermaritzburg, South Africa. E-mail: WaleE@ukzn.ac.za

*Corresponding author

Abstract

This study aimed to investigate the incentive/disincentive impacts of social grants on the proportion of land area cultivated by rural households. The study relied on a sample of 984 households from KwaZulu-Natal (KZN), South Africa. The results showed no association between social grants and proportion of land area cultivated by farmers. This has two implications. Firstly, it suggests that the disincentive hypothesis should not be accepted. Secondly, it implies that the potential complementarity between social grants and smallholder farming has not materialised. Given that social grants are now seen as strategies to promote rural livelihoods in South Africa, the study recommends that the objectives of social grants and smallholder farming be synchronised so that the potential complementarity between the two interventions may materialise. The study identified several other constraints that policy makers should focus on to increase the proportion of land area cultivated by smallholder farmers.

Key words: social grants; smallholder farming; logit transformation; Papke and Wooldridge model; KwaZulu-Natal

1. Introduction

While there is general consensus on the need to reduce poverty and food insecurity in Africa, there is considerable debate on the effectiveness of social transfers (such as food aid, social grants, etc.) 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 beneficiaries' behaviour. Even though assisting individuals to meet basic needs when they otherwise could not do so on their own is desirable, the concern is that these social transfers may affect people's social and economic behaviour negatively and entrench a culture of dependency and entitlement (Devereux 2001; Barrett & Maxwell 2005; Barrett 2006). The undesirable dependency culture occurs when assistance provision undermines the incentives of the poor to participate in economic activities (e.g. farming) (Lentz *et al*. 2005; Barrett 2006).

Several studies (e.g. Abdulai *et al*. 2005; Mabuza *et al*. 2009; Tadesse & Shively 2009; Sharaunga & Wale 2013) have investigated the potential disincentive impacts of food aid on farming activities in Africa. However, the results have by and large been mixed. On the one hand, some studies (e.g. Tadesse & Shively 2009; Sharaunga & Wale 2013) have found evidence that food aid has created disincentive effects, while, on other hand, other studies (e.g. Abdulai *et al*. 2005; Mabuza *et al*. 2009) found little evidence of disincentive effects. While the connection between food aid and agriculture has been investigated extensively in Africa, there is a dearth of literature that assesses the potential linkage between social grants and agricultural production at the household level. This is the situation despite 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 & Cull 2009; Handa *et al*. 2012; Ulriksen 2013).

Social grants are very important in South Africa, where they benefited over 16 million poor people monthly in 2014 (SASSA 2014). Despite targeting specific vulnerable groups (such as the young, old or chronically sick), social grants generally benefit households as a whole (Klasen & Woolard 2008; Abel 2013). The concern, therefore, is that the households receiving social grants may become dependent on the income from the social grants, rather than engage in economic activities. There is some evidence of the impact of social grants on the South African non-farm employment sector. However, this evidence is also inconclusive. On the one hand, some studies (e.g. Bertrand *et al*. 2003; Samson *et al*. 2004; Abel 2013) found a negative relationship between access to social grants and households' economic activities. These studies, in line with conventional economic theory, argue that social grants, as unearned income, create disincentives to undertake economic activities and earn a living. On the other hand, several other studies (e.g. Posel *et al*. 2006; Williams 2007; Ardington *et al*. 2009; 2013) found that additional income from social grants had a positive impact on economic activities by easing the household's financial constraints.

While previous studies in South Africa have focused on the incentives for social grant beneficiary households to engage in non-farm job opportunities (e.g. Bertrand *et al*. 2003; Samson *et al*. 2004; Posel *et al*. 2006; Abel 2013; Ardington *et al*. 2013; Ardington & Hofmeyr 2014), the incentives to engage in farming have not been addressed adequately. Given South Africa's high unemployment rate and limited prospects for labour absorption in the non-farm sector (Aliber & Hall 2012), the incentives to work cannot be fully captured by just looking at the non-farm sector while ignoring the farming sector. This is especially so since the government has prioritised the expansion of the farming sector as part of its broader job-creation strategy (DED 2011).

Except for some anecdotal evidence and descriptive statistics (e.g. White & Killick 2001; Aliber & Hart 2009; Aliber & Hall 2012), there has been little focus on the connection between social grants and smallholder farming in South Africa. This study therefore aimed to contribute to the meagre literature on the impact of social grants by investigating the extent to which dependence on social grants affects rural households' incentives to farm in the province of KwaZulu-Natal (KZN). Whereas most studies have simply focused on the impact of only one or a few of the social grants, this study accounts for all types of social grants by using the proportion of income from all social grants to household income as a response variable.

2. Research methodology

2.1 Study area and data description

The study was conducted in the KZN province of South Africa. The rural areas of KZN are characterised by high levels of poverty and a lack of economic opportunities. As such, social grants and smallholder farming play important roles in the livelihoods of rural dwellers. Despite its huge

agricultural potential, current production levels in KZN are very low (KZNDAE 2012). In particular, there is much uncultivated land in the province's rural areas.

The data for this study was collected between June and November 2014, using a pre-tested structured questionnaire. The questionnaire was administered by trained enumerators who could speak the local isiZulu language. A multistage sampling technique was adopted. Firstly, four districts, namely Harry Gwala, Umkhanyakude, Umzinyathi and Uthukela, were purposively chosen out of the 11 districts in KZN because they have a significant number of rural communities engaged in farming activities. Secondly, 984 households in the rural areas of the four districts were selected randomly. The lists of farmers were obtained from the respective district extension offices.

2.2 Theoretical framework, variables and data description

This study is based on microeconomic theory, which postulates that transfers generate income effects that may discourage recipients from working, since these effects increase the recipients' welfare (Binger & Hoffman 1998; Barrett 2006). The theoretical rationale is that, as household income rises, the additional benefit to the household from working for further income falls, which dampens work incentives (Binger & Hoffman 1998). Recipients hence reduce work effort simply because even hard-working people prefer more leisure to less (Barrett 2006; Sharaunga & Wale 2013). As such, access to social grants can potentially reduce farmers' incentives to put more land under cultivation, since they can maintain their utility level through the unearned income.

The incentive to farm was captured by the proportion of land area cultivated by a household in the season preceding the survey. The proportion of cultivated land, instead of total agricultural production, was preferred, since it is the decision that better reflects farmers' incentives or disincentives to cultivate their land (Sharaunga & Wale 2013). This situation exists because agricultural production is affected by other technical inputs, as well as natural factors, all of which cannot be controlled for in a stochastic model. As such, attributing lower agricultural production to the disincentive effects of social grants would be inaccurate, to the extent that other non-controlled technical inputs constrain production and natural factors are random (Sharaunga & Wale 2013). Livestock farming was accounted for by including livestock size as one of the explanatory variables in the model.

To generate the proportion of cultivated land, the previous season's cultivated land was divided by the total farm land area to which the household had access, either through allocation, inheritance or lease. This variable excluded land that was not cultivated for rational agronomic and/or economic reasons, such as fallowing. In this study, the influence of social grants was captured by using two variables: a dummy variable showing whether or not a household had access to social grants, and a proportion variable showing the contribution of social grants to total household income. The proportion variable captured the level of household dependence on social grants.

Table 1 presents the socio-economic characteristics of the sampled households. The table indicates that the farming household heads were the older generation, since the younger generation preferred the more lucrative ventures in the non-farm sectors. This result is consistent with other studies in South Africa (e.g. Aliber & Hart 2009; Sinyolo *et al*. 2014a) that have reported this apparent disdain of the youth for agriculture. The table indicates that 47% of the households were male headed. The fact that female-headed households dominate smallholder farming activities in South Africa is consistent with the prevalent stereotype of agriculture, also reported by other studies (e.g. Feynes & Meyer 2003; Aliber & Hart 2009). The table also indicates that household heads revealed low levels of education.

The results show that 84% of the households had access to social grants. On average, each household had about three social grant beneficiaries, highlighting the importance of social grants among rural households in view of a household size of seven. Table 1 indicates that the child support grant was the most common per household, followed by the old age grant. 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). The results also show that 78% of the households used the social grant income for farming purposes. These households indicated that they spend, on average, 30% of their social grant money on agricultural activities. Several studies (e.g. Samson *et al*. 2008; Neves *et al*. 2009; Midgley 2013) have also confirmed that most rural households used part of their social grant income to fund agricultural activities and other microbusiness.

On average, social grants contribute 38% to household income, more than the contribution of farming. This is in line with what has been reported by other studies (e.g. Eastwood *et al*. 2006), namely that social grants have become one of the main sources of income for rural households, having overtaken the contribution of smallholder agriculture. However, Table 1 indicates that rural households get most of their income from other off-farm and/or non-farm economic activities, such as wages, arts and crafts, etc.

The farmers had access to about 2 ha of land, most of which was allocated to them by traditional leaders. The second largest source of land was inheritance. The results indicate that the households sourced a sizable extent of land through renting, leasing or buying. Thirty-seven percent (37%) of the households felt that their access to land was insecure. Table 1 highlights that 59% of the land had been cultivated in the previous season. The table further shows that 37% of the households hired people for their farming activities. As expected, the majority of farmers perceived their soils to be fertile and rainfall to be good. KZN is characterised by good soils and positive rainfall patterns (KZNDAE 2012). The results show that 47% of households had access to tractors or draught power for tillage services.

Generally, the households had poor access to markets, training, extension and credit. A few household heads (20%) had off-farm employment. The results show low levels of non-farm entrepreneurship among the interviewed households, since only 8% of them owned some form of non-farm micro-business, such as weaving, handicrafts, tuck shops, etc. A higher proportion (46%) of the households practised irrigation. Some irrigators were members of smallholder irrigation schemes, while others watered their crops using cans and hosepipes.

2.2 Empirical methods

2.2.1 Logit transformation

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

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

This procedure, however, is only directly appropriate when the response variable values are strictly within the unit interval, i.e. it cannot be used directly if Y takes on the boundary values of zero and one (Papke & Wooldridge 1996; Baum 2008). Since a large number of households in this study either

did not cultivate their land at all (88 households), or cultivated all their land (298 households), the boundary values were substituted with close approximations, following Wale (2010).

Table 1: Household descriptive variables and their means (n = 984)

Variable code	Variable name and description	Mean	SD
AGE	Household head age (Years)	56	13
GENDER	Household head gender (1 = Male)	0.47	-
MARRIED	Household head marital status (1 = Married)	0.46	-
EDUCAT	Household head education level (Years of schooling)	4.67	4.17
HHSIZE	Household size (Numbers)	7.04	3.60
GRANTACCESS	Access to social grants (1 = Yes)	0.84	-
GRANTUSE	Use social grant money to finance farming activities (1 = Yes)	0.78	-
GRANTUSE%	Proportion of social grant income spent on farming activities	0.30	0.24
GRANTBEN	Number of social grant beneficiaries per household	3.18	1.81
CSG	Number of child support grant beneficiaries per household	2.28	1.81
OAP	Number of old age pension beneficiaries per household	0.67	0.70
DG	Number of disability grant beneficiaries per household	0.15	0.41
FCG	Number of foster care grant beneficiaries per household	0.08	0.43
CDG	Number of care dependency grant beneficiaries per household	0.01	0.15
LANDSZE	Land size to which household has access (ha)	1.90	4.47
LANDCULT	Land cultivated (ha)	0.91	1.35
LANDALLOC	Land allocated (ha)	0.85	1.52
LANDINHERIT	Land inherited (ha)	0.57	1.12
LANDRENTED	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
LIVESTOCK	Livestock size per household (TLUs)	3.53	17.40
ASSETS	Value of assets (Rand)	82 105	38 937
TOTINC	Total annual household income (Rand)	46 757	32 707
GRANTINC	Annual income from grants (Rand)	16 916	15 877
FARMINC	Annual income from farm activities (Rand)	6 553	12 438
OTHERINC	Annual income from other non-farm activities (Rand)	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
ROADDIST	Distance to the nearest all-weather road (km)	17.75	39.93
FARMEXP	Household head farming experience (Years)	18.70	13.28
LABOUR	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	-
EMPLOYED	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	-

Source: 2014 household survey

2.2.2 The Papke and Wooldridge model

The logit transformation approach described above has two main drawbacks. Firstly, it would not be straightforward to recover the 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 referred to as 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. Moreover, there is no need to use ad hoc transformations to handle data at the extreme values of zero and one (Papke & Wooldridge 1996). For detailed discussions of this model, interested readers may consult Papke and Wooldridge (1996). The PW model was estimated in Stata, following Baum (2008).

2.2.3 Estimation and selection bias issues

Evaluating the impact of access to and dependence on social grants on the proportion of land area cultivated involved the estimation of the following equation:

$$Y^*_i = \beta x_i + \delta_1 G_i + \delta_2 GD_i + \varepsilon_i \quad (2)$$

where Y^*_i is the proportion of the response variable after the 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; the βs and δs 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 social grants, 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 (*x*'s) are believed to affect the selection (Khandker *et al*. 2010). However, assuming that social grants are random is untenable, since they are targeted to households with assets and income values below certain thresholds (Patel *et al*. 2012). Moreover, assuming that selection to a national voluntary programme, such as social grants, is affected only by observables and is unrelated to unobserved factors that themselves a□ect the outcomes, is hard to sustain (Agüero *et al*. 2007).

Therefore, this study corrected for the selection on unobservables through Heckman's two-step procedure (Heckman 1979). This correction procedure involves (1) generating the inverse Mills ratio (IMR) by using access to social grants as the dependent variable in the participation equation; and (2) adding IMR to equation (2) and estimating the equation using OLS. A non-significant coefficient of IMR indicates that there is no self-selection bias. Moreover, the Hausman test (Hausman 1978) was done to test for the potential endogeneity of dependence on social grants (GD_i) in the model. The test was done because the proportion of land area cultivated may affect dependence on social grants, since increased cultivated land can lead to increased output and farm income. Increased farm income would result in decreased dependence on social grants, ceteris paribus.

3. Empirical results and discussion

Table 2 presents the results of the logit transformation and the PW models. The insignificant IMR term in both models indicates that there was no selection bias problem. The results from both models are largely similar, implying that they are robust. Only access to extension and credit vary in statistical significance in the two models. As such, the interpretations that follow apply to both models, although emphasis is placed on the PW results due to its advantages.

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

Table 2: The impact of social grants on the proportion of land cultivated

Variables	Logit transformation model		PW model	
	Coefficient	Standard Error	Coefficient	Standard Error
GRANTACCESS	-0.033	0.329	-0.105	0.201
GRANTPROP	0.562	0.470	0.447	0.302
AGE	-0.007	0.008	-0.004	0.005
GENDER	-0.096	0.206	-0.002	0.126
EDUCAT	-0.028	0.024	-0.017	0.015
MARRIED	0.229	0.197	0.091	0.119
HHSIZE	-0.060**	0.024	-0.038***	0.015
LANDSZE	-0.484***	0.081	-0.394***	0.054
RAINFALL	-0.080	0.229	-0.124	0.138
SOILQUAL	0.394**	0.176	0.247**	0.112
TENURE	0.240	0.186	0.183	0.119
TILLAGE	-0.112	0.169	-0.026	0.107
MARKET	0.382*	0.205	0.318**	0.137
LIVESTOCK	-0.002	0.002	-0.002	0.002
ASSETS	-0.150	0.121	-0.098	0.078
ASSOC	0.384*	0.210	0.305**	0.137
CREDIT	0.314*	0.187	0.190	0.120
EXTENSION	-0.200	0.177	0.206*	0.113
TRAINING	0.612***	0.202	0.368***	0.127
ROADDIST	-0.002	0.003	-0.001	0.002
FARMEXP	0.015**	0.007	0.009*	0.005
IRRIGAT	-0.056	0.184	0.033	0.116
EMPLOYED	0.336	0.254	0.262	0.169
BUSINESS	-1.035***	0.354	-0.886***	0.229
UMZINYAT	-1.078***	0.273	-0.708***	0.161
UTHUKELA	1.659***	0.210	1.272***	0.177
UMKHANYA	-1.649***	0.356	-0.937***	0.205
CONSTANT	1.993	1.404	1.259	0.918
IMR	1.14	0.771	0.707	1.01
R^2	0.21		Deviance = 640	
N	977		Pearson = 539	
F(27, 949)	14.71***		AIC = 1.08	
Mean VIF	1.38		N = 977	
Hausman test	(F = 1.43, p = 0.23)		Mean VIF = 1.33	
Ramsey RESET test (F = 1.78, p = 0.15)			Hausman test (F = 2.18, p = 0.13)	

Notes: ***, ** and * mean significance at 1%, 5% and 10% respectively
Source: 2014 household survey

The fact that access to social grants does not positively influence proportion of land cultivated indicates that the potential complementarity between social grants and smallholder farming has not materialised in South Africa. Studies such as those by Devereux (2002) and Mabugu *et al*. (2013) have reported that social grants are no longer considered only as livelihood-protection interventions, but also as livelihood-promotion measures. The expectation is that social grants would promote livelihoods and enhance economic activity by easing the financial constraints – the so-called 'irrigation function' of social security (Woolard 2003). This enables a sustainable improvement in

living standards (Woolard 2003; Mabugu *et al*. 2013). In the non-farm sector, the complementarity between social grants and employment has been reported in several studies (e.g. Posel *et al*. 2006; Williams 2007; Ardington *et al*. 2009; 2013). The results of this study, however, suggest that social grants have not relaxed the financial constraints of farmers.

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

The significant district dummies capture the political, social and agro-climatic variations in these areas that have an influence on farming incentives but were not captured in the model. The results show that rural households in the Umzinyathi and Umkhanyakude districts cultivate a smaller proportion of their land than those in the Harry Gwala district. The Harry Gwala district has higher agro-ecological potential than both the Umzinyathi and Umkhanyakude districts due to an abundance of high-quality soils, a 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 those in the semi-arid districts. The table also indicates that farmers in the Uthukela district cultivated a larger proportion of their land than those in the Harry Gwala district. While both the Uthukela and Harry Gwala districts are regarded as higher potential agricultural areas, the difference may be due to differing levels of politically derived agricultural support for smallholder farming activities in the Uthukela district. Smallholder farming is prioritised and promoted in the Uthukela district, with local political representatives showing keen interest and attending farmer meetings. On the other hand, the level of interest and/or participation in farmer meetings by local political representatives in the Harry Gwala district is lower.

As expected, perceived soil fertility (SOILQUAL) was positively associated with an increased proportion of cultivated land. This occurs because putting more land under cultivation comes at a cost, such that only those farmers with good land quality and expecting a better yield would put more land under cultivation than those with poor soils. Also, farmers with access to good soils face less 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, ceteris paribus. The positive estimated coefficient of market access (MARKET) demonstrated its importance in motivating rural households to increase their farming activities. Households with better access to markets cultivated a higher proportion of their land than those with poor market access. This result is consistent with other studies in South Africa (e.g. Kirsten & Sartorius 2002; Van der Heijden & Vink 2013) that have highlighted the important role played by access to markets in the success of smallholder farming. Market access implies an opportunity to make good profits out of farming activities, and these prospects encourage farmers to put more of their land under cultivation.

The results also show that members of farmer associations (ASSOC) put more land under cultivation than non-members. This happens because the pooling of resources and the sharing of knowledge and experiences through association membership may help individual farmers. The positive role of farmer organisations in the success of smallholder farming has been reported by several studies (e.g. Hellin *et al*. 2009; Markelova *et al*. 2009; HLPE 2013; Sinyolo *et al*. 2014b). The significant estimate of credit access (CREDIT) highlights the importance of credit support to the success of smallholder

producers, as already reported by other studies (Louw 2013; Rahman & Smolak 2014). Access to credit reduces the liquidity problem that usually affects farmers during the planting season, and it 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 farming revenues, which subsequently act as incentives for farmers to put more land under cultivation. As such, the provision of credit should be at the centre of any effort to improve smallholder production, since agricultural production in South Africa has been credit-driven for decades.

Access to agricultural training (TRAINING) was associated with a larger proportion of cultivated land, since it improves farmers' skills, which, in turn, increases their motivation to put more land under cultivation. This is in line with the literature (e.g. Man *et al*. 2002; De Wolf & Schoorlemmer 2007; Man *et al*. 2008), which has shown the importance of focused agricultural training to improve farming entrepreneurship. Most of the farmers in rural areas use only trial and error when farming, which in most cases results in poor yields and losses, discouraging farmers from putting more land under cultivation. As such, those farmers who have received some form of agricultural training have more confidence in their ability to produce more and incur fewer losses, and hence put more land under cultivation.

As expected, contact with extension officers (EXTENSION) was associated with larger proportions of land area under cultivation. This is partly due to the advice and encouragement farmers get from extension officers. Moreover, farmers with contact to extension may have access to information on markets and new technologies. It was also highlighted by the farmers that contact with extension officers mainly helps them to access government support, such as tillage and inputs. As such, farmers who have contact with extension officers have access to more resources, resulting in them putting more of their land under cultivation.

The results further indicate that those farmers who own non-farm businesses (BUSINESS) put a smaller proportion of land under cultivation. This can be explained in two ways. Firstly, divided attention and, secondly, less dependence on farming because of money earned from non-farm business activities. Business owners' commitments in their non-farm businesses means they have less time and resources to invest in farming activities compared to non-business owners. Also, since non-farm ventures are usually more profitable than farming, non-farm business owners would prioritise more rewarding ventures.

4. Conclusion and policy implications

This paper has examined the extent to which social grants have incentive/disincentive impacts on the proportion of land area cultivated by rural households in South Africa. Based on the findings, the study concludes that social grants have no incentive/disincentive effects on the proportion of land cultivated. The results imply that social grants have not influenced land cultivation negatively, suggesting that the disincentive hypothesis should not be accepted in South Africa. The study also found no positive relationship between social grants and the proportion of land cultivated, suggesting inadequate complementarity between social grants and smallholder farming.

While the lack of evidence of a negative incentive effect is welcome, the lack of complementarity between social grants and smallholder farming in rural areas should be of concern to policy makers, especially now that social grants are seen as strategies to promote rural livelihoods. As such, 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 can materialise. The study has also demonstrated the importance of addressing production constraints and improving institutional support (such as extension, training, credit, etc.) for the success of smallholder farming.

It is production and institutional constraints, not dependence on social grants, which limit rural households' farming activities, trapping them in low production levels and a survivalist subsistence mode. This paper recommends prioritising policy on addressing these constraints in order to improve smallholder agricultural production in the rural areas of South Africa.

References

Abdulai A, Barrett CB & Hoddinot J, 2005. Does food aid really have disincentive effects? New evidence from sub-Saharan Africa. World Development 33(10): 1689–704.

Abel M, 2013. Unintended labour supply effects of cash transfer programmes: Evidence from South Africa's old age pension. SALDRU Working Paper 114, University of Cape Town, Cape Town, South Africa.

Agüero J, Michael C & Ingrid W, 2007. The impact of unconditional cash transfers on nutrition: The South African Child Support Grant. Working Paper number 39, International Poverty Centre, Brasilia, Brazil.

Aliber M & Hall R, 2012. Support for smallholder farmers in South Africa: Challenges of scale and strategy. Development Southern Africa 29(4): 548–62.

Aliber M & Hart TGB, 2009. Should subsistence agriculture be supported as a strategy to address rural food insecurity? Agrekon 48(4): 434–58.

Ardington C & Hofmeyr C, 2014. How the old age pension is helping young people from rural areas find jobs. University of Cape Town, Cape Town, SALDRU.

Ardington C, Bärnighausen T, Case A & Menendez A, 2013. Social protection and labour market outcomes of youth in South Africa. SALDRU Working Paper 96, University of Cape Town, Cape Town, South Africa.

Ardington C, Case A & Hosegood V, 2009. Labour supply responses to large social transfers: Longitudinal evidence from South Africa. American Economic Journal: Applied Economics 1(1): 22–4.

Barrett CB, 2006. Food aid's intended and unintended consequences. ESA Working Paper No. 06-05, The Food and Agriculture Organization, Rome, Italy.

Barrett CB & Maxwell DG, 2005. Food aid after fifty years: Recasting its role. New York: Routledge.

Baum CF, 2008. Stata tip 63: Modeling proportions. The Stata Journal 8(2): 299–303.

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

Binger BR & Hoffman E, 1998. Microeconomics with calculus. Second edition. Boston MA: Addison-Wesley Publishers Inc.

De Wolf P & 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

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

Devereux S, 2002. Can social safety nets reduce chronic poverty? Development Policy Review 20(5): 657–75.

DSD, SASSA & 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 & Lipton M, 2006. Premature deagriculturalisation? Land inequality and rural dependency in Limpopo province, South Africa. The Journal of Development Studies 42(8): 1325–49.

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

Greene WH, 2003. Econometric analysis. Fifth edition. Englewood Cliffs, NJ: Prentice-Hall.

Handa S, Davis B & Stewart S, 2012. Can Africa afford child support grants? Simulation analyses from 4 countries. Maputo: Instituto de Estudos Sociais e Económicos.

Hausman JA, 1978. Specification tests in econometrics. Econometrica 46(6): 1251–71.

Heckman JJ, 1979. Sample selection bias as specification error. Econometrica 47(1): 153–62.

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

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, Food and Agricultural Organisation (FAO), Rome.

Khandker SR, Koolwal GB & Samad HA, 2010. Handbook on impact evaluation: Quantitative methods and practice. Washington DC: The World Bank.

Kirsten J & 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): 503–29.

Klasen S & 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. KwaZulu-Natal Department of Agriculture, Environmental Affairs (KZNDAE), Pietermaritzburg, South Africa.

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

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).

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

Mabuza ML, Hendriks SL, Ortmann GF & Sithole MM, 2009. The impact of food aid on maize prices and production in Swaziland. Agrekon 48(1): 85–105.

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

Man TWY, Lau T & Chan KF, 2002. The competitiveness of small and medium enterprises: A conceptualization with focus on entrepreneurial competencies. Journal of Business Venturing 17: 123–42.

Man TWY, Lau T & 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): 257–76.

Markelova H, Meinzen-Dick R, Hellin J & 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.

Neves D, Samson M, Van Niekerk I, Hlatshwayo S & 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).

Papke LE & Wooldridge JM, 1996. Econometric methods for fractional response variables with an application to 401(k) plan participation rates. Journal of Applied Econometrics 11(6): 619–32.

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

Posel D, Fairburn JA & 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): 836–53.

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

Ramalho EA, Ramalho JJS & Murteira JMR, 2011. Alternative estimating and testing empirical strategies for fractional regression models. Journal of Economic Surveys 25(1): 19–68.

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 KM & 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 KM, Van Niekerk I, Gandhi V, Harigaya T & Abrahams C, 2004. The social and economic impact of South Africa's social security system. Summary Report. Economic Policy Research Institute, Cape Town.

SASSA, 2014. First quarter statistical report on social grants. Pretoria: SASSA (South Africa Social Security Agency).

Sharaunga S & 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.

Sinyolo S, Mudhara M & 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): 145–56.

Sinyolo S, Mudhara M & Wale E, 2014b. Water security and rural household food security: Empirical evidence from the Mzinyathi district in South Africa. Food Security 6(3): 483–99.

Tadesse G & Shively G, 2009. Food aid, food prices and producer disincentives in Ethiopia. American Journal of Agricultural Economics 3: 123–45.

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

Van der Heijden T & 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 & 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, 22–23 April, Maputo, Mozambique.

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): 270–91.

White H & Killick T, 2001. African poverty at the millennium: Causes, complexities and challenges. Washington DC: World Bank, Strategic Partnership with Africa.

Williams MJ, 2007. The social and economic impacts of South Africa's Child Support Grant. Working Paper #40, Economic Policy Research Institute, Cape Town, South Africa.

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, 8–10 September, Johannesburg, South Africa.