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Small-scale farming and hunger: the enabling role of social assistance programmes in South Africa's former homelands

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ABSTRACT

Cash transfers successfully alleviate poverty in many developing countries. South Africa is a case in point, implementing one of the largest unconditional cash transfer programmes internationally, and with substantial benefits to household well-being along multiple dimensions. Yet, grants discourage formal labour market attachment, creating dependencies on the fiscus. This study uses a fuzzy regression discontinuity design to establish that state-funded Old Age Pensions encourage non-market economic activity (in the form of small-scale farming), and improve the self-reported food security of rural households that farm, vis-à-vis those that do not. The role of small-scale farming is of broader interest in rural development, given the context of the 1913 and 1936 Land Acts that constrained this form of livelihood in former apartheid homelands. This paper's contribution is two-fold: grants are an effective channel to actively promote rural development through small-scale farming, and they improve food security by non-market mechanisms.

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1 Introduction

Publicly funded cash transfers have been effective at reducing poverty and its associated ills in many developing countries (Schultz, 2004; Ardington et al., 2013; Filipski et al., 2015; Gertler et al., 2012; Macours et al., 2012; Schady & Rosero, 2008). However, many of these assessments focus on direct welfare outcomes such as health or education, or whether the injected income frees resources that allow households to access labour and product markets. This study turns the focus to whether cash grants can improve the ability of households to embark on *non-market* activity. In particular, we evaluate whether the prevalence of small-scale farming increases, together with potential benefits for household food security in the former apartheid homelands of South Africa.

The role that small-scale agriculture should play in economic development remains disputed, with 2014 having marked the international year of the family farm (Christiaensen et al., 2010). Some suggest that the drivers of economic growth are found exclusively in modernising sectors, while others maintain that the *poor* benefit directly from subsistence agriculture (even if this does not stimulate aggregate economic activity). Concerns with feeding an estimated worldwide population of 9 billion by 2050 have again placed the focus on the role of small-scale agriculture to create sustainable livelihoods, curtail food insecurity and create employment in rural areas (Machethe, 2004; Dercon, 2009; Birner & Resnick, 2010). In South Africa this sector has been handpicked to drive development in deep rural areas, particularly in the former apartheid homelands. These regions were the only legally designated parts of South Africa where black households could farm, as stipulated by the 1913 and 1936 Land Acts. The legacy of these now-abandoned pieces of legislation remains a central contention in the current public discourse. The National Development Plan (NDP) has earmarked the small-scale farming sector to create 370 000 improved livelihoods in the former homeland regions (NPC, 2011). However, it is well known that the 4 million-strong (traditionally black) small-scale sector in homeland areas only produces about 5% of agricultural output, compared to the 35 000 (traditionally white) commercial farmers who produce the rest (Aliber & Hart, 2009).

At the same time, South Africa has a well-developed social assistance system, which is widely known for its success in targeting the poor and its mitigating impact on poverty (van der Berg et al., 2010). Recipients are concentrated in the homelands regions where poor small-scale farmers are still dominantly located. Of the eight available social grants, the old age pension (OAP) remains the best researched and documented, due to the substantial amounts that accrue to households monthly (Neves et al., 2009). Evidence suggests that the OAP positively impacts household wellbeing (Ardington & Lund, 1995), improves food security (Case & Deaton, 1998; Pienaar & von Fintel, 2013; Duflo, 2003), mitigates impacts of HIV/Aids (Booysen, 2004) and more recently have been shown to promote job search among younger rural household members (Ardington et al., 2013). Each of these studies shows that social assistance directly improves household well-being, while the latter also suggests that second-round benefits arise due to the economic activity that cash grants generate. These arguments suggest that cash transfers enable the poor to integrate into formal markets, rather than engendering dependency on the state. This stands in contrast to other studies, which suggest that labour supply reduces in response to receiving OAPs: poor households are apparently becoming more dependent on the fiscus than on generating income in the labour market (Bertrand et al., 2003; Ranchod, 2006; Abel, 2013). However, it remains unclear whether cash grants are enablers in small-scale (non-market) farming activities within rural homeland areas, where formal jobs are scarce and poverty is high. The question arises whether or not social grants in the former homeland areas engender economic inactivity and dependencies on government assistance; or do they possibly have an enabling effect amongst households by encouraging them to farm and to create livelihoods in these areas?

This paper fills this gap by estimating whether the OAP in South Africa contributes to the ability of rural households to pursue small scale farming activities, using a well-known regression discontinuity design that results from the age-eligibility criteria of this unconditional cash grant (Duflo, 2003; Bertrand et. al., 2003; Ranchod, 2006). It continues to assess whether grants have a direct or indirect impact on food security, by estimating their effect on self-reported hunger levels within farming and non-farming households respectively. We find that grants causally increase the probability of farming, and that those that do farm are able to reduce reported

hunger using the income from the OAP. This is not the case for non-farming households. Farmers do, however, display no increases in market expenditure, indicating that hunger is mitigated by other (non-market) means. Hence, subsistence farming is enabled through the OAP and improves food security through non-market channels. The rest of this paper starts with a review of the impacts of cash grants on socio-economic outcomes, and the role of small-scale farming in rural livelihoods. The subsequent section outlines data and methods used, followed by a discussion of results and our conclusions.

2 Cash transfers in developing countries

Cash transfers have been implemented by many developing countries in order to improve the lives of the poor. In South Africa, this programme has been particularly large, with close to 16.6 million recipients (of which nearly 3.1 million were awarded as OAP's) by 2015 (South African Social Security Agency, 2015). As a proportion of GDP, South Africa's cash transfer programme ranks among the largest in the world (van der Berg et al., 2010). In general, South African social grants are a means of redistributing income to directly impact poverty and inequality in both its incidence and severity. Furthermore, welfare transfers also provide wider impacts: they foster social cohesion, improve human capital development, operate as a cushion against livelihood shocks and they stimulate the local economy (Jacobs et al., 2010). Grants also display positive externalities by impacting health and housing positively, while also seemingly supporting informal economic activities (Altman et al., 2008; Neves et al., 2009).

Collective international evidence also suggests that cash grants have positive impacts on socio-economic outcomes in many different contexts. A focal point of this literature is the positive effects that they have on food security and nutrition. In defiance of the Engel curve, the income shock from cash grants *increase* food budget shares in Ecuador (Schady & Rosero, 2008). Other forms of income do not induce the same type of behaviour, with food shares typically declining with income. Cash grants therefore induce specific changes to expenditure patterns that are beneficial to households. In various other contexts (ranging from Mexico, Nicaragua to South Africa) cash grants have been found to improve childhood development, particularly through the

channel of improved nutrition (Macours et al., 2012; Fernald et al., 2009; Duflo, 2003; Coetzee, 2013).

Does nutrition improve due to direct spending in food markets, or do transfers also promote non-market home food production? Randomised control trial evidence from Mexico suggests that approximately 25% of cash transfers are re-invested into productive activity that directly raises household agricultural output (Gertler et al., 2012). While most of the cash grant is immediately consumed in the market, a sizable proportion stimulates *long-run* subsistence consumption that results from small-scale farming activity. Similarly, Tanzanian households increased investments in livestock, while they did not spend additional grant money on market food expenditure (Evans et al., 2014). Hence, cash transfers have the potential to improve livelihoods and food security through the promotion of own account economic activity, in particular through investment in small-scale farming.

In South Africa, the proposed channel through which cash transfers improve food security is usually presumed to be through direct market expenditure, or through the grants' role in enabling formal labour market attachment. Yet, the extensive social grant system has in many instances been found to reduce labour supply and employment (Bertrand et al., 2003; Ranchod, 2006; Abel, 2013). While some attribute this to the elderly that exit the formal labour market (reportedly to retire and care for the children of prime-aged labour force participants), others do find that the extra income frees the young to migrate from their rural homes and embark on job search in urban areas (Ardington et al., 2013; Ardington et al., 2009). Yet, no study considers the role that grants play in improving rural livelihoods through household *farming* activity. As the next section argues, small-scale farming is a historically neglected and depressed sector in rural South Africa. No investigation exists to establish whether cash transfers can potentially re-invigorate this type of livelihood. Yet, given the large reductions in poverty that the programme has prompted, as well as its large scale in the international context (van der Berg et al., 2010), it is likely that rural households *could* be using grants effectively towards small-scale farming and allowing them to overcome historical obstacles in creating subsistence living.

3 The proposed role of small-scale farming in supporting food security

3.1 Smallholder agriculture in the former apartheid homelands

While Fields (2011) emphasises the importance of small-scale agriculture in most developing countries (where formal labour markets are too small to absorb the entire labour force into employment) this alternative form of livelihood generation is more constrained in South Africa than the rest of the continent. The agricultural sector in South Africa is characterised by a dualistic structure (Vink & Kirsten, 2003). A division between the commercial, large-scale farming sector and the comparatively low productive, struggling small-scale sector is not exclusively a manifestation of economies of scale. This phenomenon is a direct result of historical patterns of dispossession and impoverishment, which systematically eroded historically successful land-based production systems and livelihoods in South Africa (Neves et al., 2009). Thus, a small-scale farmer today is typically black, landless, poor, farms on very small pieces of (communal) land for household subsistence and the majority of farmers depend on social grants payments from the government's social protection programme (Fenyes & Meyer, 2003; Groenewald & Nieuwoudt, 2003; Lahiff & Cousins, 2005). By all existing indications, then, this is a non-buoyant sector, characterised by *dependency*, rather than being enabled by social programmes.

Agriculture continues to be characterized by inequality in terms of the distribution of economic assets, support services, market access, infrastructure and income (Oettle et al., 1998). Nevertheless, the sector remains an important livelihood activity among the dwindling rural South African population, with the majority of households directly or indirectly involved in farming (Machethe, 2004; Pauw, 2007). Recent estimates from Statistics South Africa's 2013 General Household Survey suggest that 51% of all households in tribal (former homeland) areas are directly involved in farming activities, while the absolute number of farming households in former homelands has increased from 2.28 million in 2003 to 2.68 in 2013. The increase is matched by a large rise in social grants over the same period, particularly within the homelands regions. This begs the question whether grants have enabled subsistence activity, or whether increasingly impoverished small-scale farmers are forced to rely on transfer income. These

households improve livelihoods for many residents, supplementing the source of food within their respective communities that are plagued by high levels of unemployment.

Rural households are known to diversify their livelihood strategies, given the constraints they face (Tittonell et al., 2010, Ellis, 1998). Multiple economic activities and social support capabilities are utilised to improve living standards, including farming for own consumption, wage employment on other farms or in the non-agricultural sector, remittances and social transfers (Ellis, 1998; Perret et al., 2005). Farming households in South Africa's rural areas typically choose livelihood strategies on the basis of the available natural, physical, human and financial capital. These are, to a large extent, limited by a number of biophysical, and socio-economic conditions. Uniquely to South Africa, patterns of separate development still persist, constraining individuals to farms that are isolated from markets and which have traditionally supported many individuals on densely cultivated lands. It is unknown to what extent social welfare payments have mitigated these long-run constraints to small-scale farming.

3.2 Linkage between social grants and farming

While transfer income has been studied in many other contexts (as noted above), the formal link between cash grants and their impact on agriculture is not well researched in South Africa. Small-scale food production makes only a small contribution to income, emphasizing its subsistence characteristic. Furthermore, declining proportions of households rely on salary incomes and remittances from family members in recent years, and publicly funded social transfers have become a dominant source of income (Cousins, 2013). Figure 1 illustrates the potential grant dependence of households in former homeland areas. Farming households are more dependent on grants for their main source of income, with approximately 50% listing them as their main source of livelihood. On the other hand, non-farmers depend more on salary incomes, though grants are still the main source for more than 30% of those households that did not farm. Many authors and commentators claim that households are dependent on socials grants, but few investigate the potential positive impact they have on farming and other economic activities. Lewis et al. (2011) show that the introduction of social grants in the Mbongolwane Wetland (in KwaZulu-Natal) area played a catalytic role in the development from

a largely subsistence, resource-based local economy to a strongly commercial, cash-based economy. Furthermore, these grants were said to boost households' purchasing power indirectly and provided capital for farmers to start businesses. Individuals receiving old age pensions continued to pursue land-based livelihoods. The younger generation was clearly unwilling to take up these farming activities (Lewis et al., 2011), but other evidence suggests that they become enabled to enter urban labour markets due to the resources now available to households (Ardington et al., 2009; Ardington et al., 2013).

The rest of this paper distinguishes between the dependency and enabling hypotheses, by finding causal estimates of grants on farming and food security. We isolate the channels by which farmers are able to create better livelihoods.

<Figure 1 here>

4 Data and Methodology

4.1 Data

The data utilized in this paper is the nationally representative Living Conditions Survey (LCS) survey, conducted by Statistics South Africa during 2008 and 2009 (Statistics South Africa, 2008/09). It included 25 075 households, with questions on household income and expenditure, subjective poverty, assets and more importantly, detailed information on small-scale farming. The latter remains limited in many other sources, but this survey allows for successful differentiation between farming households and non-farming households. The questionnaire continues to collect detailed information on income and, more specifically, cash transfer (social grant) incomes from government (Statistics South Africa, 2008/09).

We pay attention to a limited sample, covering only households that are headed by a black person and situated in the former apartheid homelands. Using both the self-reported geographic type indicator and GIS information, we are able to successfully sample households residing within the boundaries of South Africa's former Bantustan homeland areas, as demarcated under

the Natives' Land Acts of 1913 and 1936 (Pienaar, 2013). Former homelands constitute 13% of the total land area of South Africa. These areas were developed separately during the most part of the previous century and remain distinct in their economic characteristics to this day.

We furthermore limit ourselves to tribal areas within former homelands, because these areas have been targeted for the expansion of small-scale farming as a means of increased livelihood activity. This also excludes urban areas and commercial farming activity, which is absent from these regions. These areas are also the poorest and receive a large concentration of social transfers. We also restrict ourselves to the black subpopulation, as this group was directly affected by the imposition of the Land Acts and other apartheid policies that enforced separate development.

Small-scale farmers are identified based on their responses to the question on whether or not the household produced any agricultural produce during the previous 11 months. In every instance, farmers reported farming on small pieces of land in the chosen region.

4.2 Methodology

The causal impact of South Africa's social grants have been identified using multiple methods, including propensity score matching (Coetzee, 2013; Aguero et al., 2007), panel data methods (Ardington et al., 2013; Ardington et al., 2009; Abel, 2013) and in the case of the old age pension (OAP), a fuzzy regression discontinuity design (RDD) (Duflo, 2003; Bertrand et al., 2003; Ranchod, 2006).

This paper takes the latter approach. RDD's have become an increasingly popular tool to identify causal effects in social sciences, and are relatively easy to interpret (Imbens & Lemieux, 2008; Angrist & Pischke, 2009). The basic idea is that a certain continuous variable is shocked due to a rule-based external policy or eligibility criteria. Individuals just below that threshold and just above it are, for all intents and purposes, similar, except that they fall on either side of the policy eligibility criteria. This separates respondents into a neat treatment and control group around the cut-off point. Any large differences in outcome variables around the threshold are plausibly caused by the external "rule" only. In the case of the OAP, a clear age-eligibility criteria is in

place, alongside means testing. People above the threshold age are in the treatment group, as they qualify for pensions only because they have become older. People below that age are excluded. The question in this analysis is whether the propensity to embark on small scale farming and to have improved self-reported food security also changes around the age eligibility criteria, so much so that we can causally attribute this to OAP receipt.

At the time of the survey used in this data, only females above the age of 60, and males above the age of 61 or 63 (depending on the time of the interview) were considered for receipt of the OAP. Initially males only qualified from the age of 65, though a 2008 constitutional court ruling progressively lowered this threshold during the time that the LCS was enumerated, to converge on the criteria for females by 2010 (Department of Social Development, 2008). While the means test further restricts eligibility, about 90% of individuals in the relevant age range receive this grant in rural South Africa, so that age is the primary criteria for being treated (Ardington et al., 2013; Ardington et al., 2009).

Figure 2 shows the discontinuity in both the number of pensions and total income from pensions that arises when the household head crosses the relative threshold (at 0 years from eligbility; negative values indicate being younger than the eligible age, and positive values indicate being older). The jump is not sharp, because many younger individuals also live in households with pension recipients and benefit from this type of income. This household formation pattern is common in rural areas, whereby the unemployed tend to congregate in households with pensioners (Klasen & Woolard, 2009).

<Figure 2 here>

Typically fuzzy RDD's are estimated using Two-Stage Least Squares (2SLS), with the threshold serving as the exogenous instrument to identify causal effects. Predictions of OAP from a first-stage interaction model are used in a second stage model to obtain the causal effect of transfers on various outcomes (y):

$$\log(\widehat{OAP_i}) = \hat{\alpha}_0 + \hat{\alpha}_1 age_i + \hat{\alpha}_2 I(age_i > threshold) + \hat{\alpha}_3 age_i * I(age_i > threshold) + \delta' x_i$$

$$y_i = \hat{\beta}_0 + \hat{\beta}_1 \log(\widehat{OAP_i}) + \gamma' x_i + \hat{\varepsilon}_i$$

To avoid the effects of confounding factors, the RDD strategy is most effective at reducing bias if conducted on a sub-sample close to the threshold; conversely, limiting the sample to a region in the data that is concentrated too close to the cut-off may result in imprecise estimates. On balance, we choose a sample with household heads that are 10 years younger and older than the eligibility criteria, though results are robust to broader bandwidths.

While recent research conducted in Lesotho shows that local spillovers also benefit non-recipient households (Filipski et al., 2015), these community-level externalities are not explored here. As a result, the effects noted in this study are potentially understated, and could be larger than reported. Yet, given the widespread coverage of the OAP in former homelands, spillover effects are likely to be less important in this context.

We limit ourselves to study the OAP, as its income is sizable compared to other grants and sources of income, amounting to roughly twice the per capita black income (Bertrand et al., 2003). In 2008, when the survey used in this study was collected, the monthly payout stood at R940 (about US$120) per recipient. Exploiting the fuzzy RDD apparent in the data, we study the effect of the OAP on the probability of being a farmer, and also on self-reported hunger outcomes in former apartheid homeland regions. We also uncover the channels through which farmers maximise the benefits of the transfers vis-à-vis non-farmers: we consider whether the cash is spent on direct market expenditure, on inputs into the production process, or whether it relieves individuals from formal labour market work in order to focus on hunger-reducing home production.

5 Results

Table 1 indicates the substantive differences between black homeland households that farm and those that do not. As noted above, farmers receive significantly more grant income than salaries compared to non-farmers. They also have significantly fewer household members in employment outside the home, while significantly more household members work in home production. Farmers' access to credit is substantially lower than that of non-farmers. Non-farmers have smaller households with fewer child and elderly dependents, and their heads are better educated.

Ironically, non-farmers are closer to food markets and have better access to water infrastructure (though the former difference is not statistically significant). Non-farmers are close to food markets for consumption purposes, while those who do cultivate lands are likely doing so for subsistence purposes rather than for selling at the market. Farmers' self-rated poverty is marginally higher than non-farmers. Overall, then, farmers seem to be initially poorer and supplement their livelihoods with subsistence activity in the absence of substantial labour market income. Despite these differences, reported hunger levels are not significantly different across groups, indicating that this livelihood strategy is successful at bridging welfare gaps to ensure food security.

<Table 1 here>

5.1 The causal effect of OAP income on the probability of farming

Are farming households reliant on grant income for additional livelihood, or does the OAP *enable* households to pursue non-market farming activities? OLS results in Table 2 suggest that a 1 percentage point increase in per capita income from the OAP is associated with an approximately 0.9 cent increase in a household's probability to engage in farming. Yet, these results cannot distinguish between the two lines of causality noted above. Instrumenting with the RDD raises this estimate to 1.2 per cent, and now gives the causal impact of grant income on pursuing farming activity (and not the other way around). Figure 3 shows that the probability of farming jumps at the age eligbility threshold, so that the impacts we measure can be attributed causally to pension receipt. The instrument is strong, with a first stage F statistic of 948.871 (much larger than the rule of thumb of 10), and the Hausman test on the second stage rejects that the instruments are inconsequential for the point estimates. The first stage regression shows that crossing the threshold substantially raises the probability of receiving the OAP. A similar first stage regression is used in all subsequent 2SLS results, but is not shown again. The downward bias of the OLS coefficient indicates that poorer farmers select into social grant receipts, as was also indicated by the descriptives in Table 1.

<Figure 3 here>

While all other variables are not instrumented for, we briefly discuss their importance. Notably, salary incomes are associated with a lower probability of farming (though the coefficient is not statistically significant). This suggests that those attached to the labour market select out of farming, which is primarily supportive of subsistence living as opposed to income generation in the homelands. Income from other non-labour sources and credit availability also tend to motivate individuals to farm. Female-headed households are less likely to embark on farming than male-headed households, while married heads tend to do so. Larger households are significantly more likely to farm, indicating that this is a livelihood strategy when large families are not adequately supported by other forms of income. A control for access to piped water is introduced to account for potential selection on infrastructure and access to service delivery: households that are generally poorly resourced choose to farm, supporting the notion that this type of activity supports subsistence living rather than market activity. The rest of this paper will only focus on the coefficient of interest (the OAP), departing from the variables considered in this paragraph.

<Table 2 here>

5.2 The causal effect of OAP income on self-reported hunger

Table 3 turns to estimating the impact of income from the OAP on self-reported hunger levels of children, differentiated by households' farming status. Child hunger is defined as a dummy variable that indicates when a household reports that any child was hungry "often" or "always". While it would be preferable to estimate these equations based on actual levels of nutrition achieved by way of caloric intake, data constraints do not allow this. Because only *market* food expenditure is recorded in the LCS, *non-market* production's contribution is ignored. The latter could be potentially large among farming households. Hence, we are forced to rely on self-reported measures.

<Table 3 here>

The instruments are again strongly correlated with the endogenous variables (with particularly high first stage F statistics), and the Hausman test suggests that they differ from OLS estimates

in the case of farmers. Whilst salary incomes are associated with lower prevalence of child hunger, the coefficients are not statistically significant. In contrast, coefficients on OAP income are substantially larger in absolute value, and are aditionally statistically significant for the OLS estimates. Studying the causal 2SLS estimates, non-farming households do not report significantly lower levels of child hunger when they receive additional OAP income (the effect is less than half a per cent and cannot be statistically differentiated from zero), while it does so significantly (at the 1% level) in farming households. The effect of the latter is quantitatively large, with a 1% increase in per capita income from the OAP reducing the probability of child hunger by 1.2%. Should an additional person cross the age eligibility threshold in a one-pensioner household, child hunger would be eliminated among farming households, but not among non-farming households. Similar results are reported for adult hunger in Table 4, with income from the OAP only causally reducing self-reported hunger in *farming* households. The first row of Figure 4 confirms discontinuities at the pension age threshold for hunger probabilities of farming households, but they are not clear for non-farming households. Hence, the results are deemed to result from the OAP receipt.

Given that the OAP prompted households to pursue small-scale farming operations, these results suggest that a channel through which income support alleviates child hunger in the homelands is through subsistence cultivation.

<Table 4 here>

<Figure 4 here>

5.3 Channels

What are the mechanisms through which the income shock improves self-reported hunger levels among farming households vis-à-vis non-farming households? We first investigate changes to market expenditure on food across farming and non-farming households, to establish whether the additional income was spent directly on immediate consumption. Should transfers not be spent on market *purchases* (particularly by farming households), then it is, by implication, spent on investments in non-market food production that in turn reduces self-reported hunger. As noted

above, international evidence suggests that this particular channel raises consumption expenditure over the long-run, and not only in the short-run (Gertler et al., 2012). Secondly, we turn our attention to expenditure on fertilizer and the value of cultivation tools, to establish whether the OAP improves capacity to invest in farming inputs. Finally, we study whether labour (as opposed to other inputs) is affected by the income shock.

Table 5 starts with models of per capita food expenditure. This quantity represents food that is bought on the market only, over and above that which is produced for own consumption. OLS and 2SLS results reveal that grant income is only significantly associated with food expenditure in non-farming households, while the impact is small and statistically insignificant in farming households. For farmers, the impact amounts to a roughly 0.015% increase in food expenditure for every 1% increase in OAP income. This suggests that the grants promote direct market expenditure on food in alleviating hunger among non-farming households, without the need for additional production. Yet, this impact is small. In farming households, however, the grants promote subsistence consumption *without* any accompanying increases in market-related food expenditure. It must therefore be transfer-induced *subsistence* consumption (which we unfortunately cannot measure here) that significantly reduced hunger levels in farming households, rather than market-acquired consumption. In all cases salary income aided increases in food market expenditure. The second row of figures in Figure 4 confirms the negligible movements in food expenditure around the threshold for farmers, and the small change for non-farmers.

<Table 5 here>

How then, did farming households use the OAP income to reduce self-reported hunger levels? Table 6 shows various 2SLS results to investigate this question (we do not show OLS results, as they are qualitatively similar, as attested to by the usually insignificant Hausman tests). While a 1% increase in OAP income raises fertilizer expenditure by approximately 0.057%, this quantity is not significantly different from zero. The second row of Figure 4 indicates a fall in fertilizer use, so that the collective evidence points to a null effect. Similarly, pension income raises the asset value of tools used for cultivation, but not significantly. Yet, the discontinuity in second

row of Figure 4 appears to be positive. Evidence to suggest that agricultural inputs are extended by the OAP among farming households, is therefore limited.

An alternative explanation investigates changes in the composition of household labour. Ranchod (2006) shows that the elderly withdraw from the labour market in response to receiving the OAP. Does this exit promote home production? In neither farming nor non-farming households is there a statistically significant shift towards work within the home. The coefficient on OAP is positive for farming households, though the discontinuity in the third row of Figure 4 is negative. Furthermore, employment outside the home significantly reduces in both types of households in response to OAP income, confirming the results of Ranchod (2006). However, the exit is larger in farming households, potentially reconciling the different hunger-reducing impacts of the grants across sectors. The third row of Figure 4 clearly shows the larger employment decline in farming households compared to non-farming households. Together, this suggests that the elderly exit the labour market, with some (weak) evidence to suggest that they compensate for this by investing time in home production.

<Table 6 here>

6 Conclusion

Many studies have shown the benefits of both conditional and unconditional cash grants in the livelihoods of poor households across countries. Some focus on ultimate outcomes such as education, health and nutrition. Others show that second round benefits arise, as household members are freed to search for work and generate labour market income for the household. However, this study shows that a large cash transfer in rural South Africa also allows individuals to pursue farming activities. While a large number of these farmers exhibit a dependency on grants as a main source of income, the amount is also used to pursue subsistence economic activity, stimulating self-rated food security. The potential for reaping long-run benefits (which cannot be measured here), as noted in other economies, also exists (Gertler et al., 2012).

In particular, farming households tend to be larger and have poorer access to food markets and infrastructure. These factors are likely to leave them at greater risk of food insecurity. The income from the OAP is therefore invested in farming activities that mitigate the risks of food insecurity. The result is that the relatively low market expenditure on food can be compensated with own production that is funded by the OAP. Income from the OAP reduces child hunger substantially among farming households, alleviating the higher dependency burden within this group. This is not the case in non-farming households. Duflo (2003) shows that the OAP generally improves child outcomes if grandmothers receive the grant and Coetzee (2013) shows that similar benefits accrue to children due to the Child Support Grant. This study adds to the picture by showing that subsistence farming is one of the important mechanisms through which these benefits arise. Importantly, then, grants improve livelihoods in multiple ways: through direct effects (by, for instance, enabling food expenditure in the market), they promote youth attachment to the labour market to generate additional income (Ardington et al., 2013) and, as we show, they even reach the most resource constrained by allowing them to produce food for own consumption among households with elderly members. Hence, while many rural households *depend* on grants as a dominant income source, this form of social assistance also *enables* secondary economic activity.

The National Development Plan's objective to promote rural development through small-scale farming is therefore supported by the extension of social grants to these areas. While the direct benefits of transfers come in the form of nutrition, the channels through which this occurs are likely to be sustainable in the long-run, as households use the cash injection to embark on non-market production to supplement livelihoods.

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Table 1 Differences between farming and non-farming households

	Non-Farmer	Farmer	Difference	N
Per capita monthly household income (Rands)	970.75	652.61	318.14***	5450
Per capita monthly income from OAP (Rands)	64.33	104.10	-39.77***	5318
Per capita monthly household income from salaries (Rands)	639.79	276.03	363.76***	5450
Per capita access to immediate credit (Rands)	149.49	92.40	57.09***	5357
Education of head (years)	6.74	5.26	1.49***	5377
Proportion of heads female	0.53	0.57	-0.04***	5450
Proportion of heads married	0.41	0.52	-0.12***	5450
Household size	4.24	5.53	-1.3***	5450
Distance to food market (m)	392.90	413.18	-20.28	5371
Proportion access to piped water	0.58	0.37	0.21***	5394
Number employed in household	0.64	0.49	0.16***	5450
Number of family workers in household	0.15	1.03	-0.89***	5450
Proportion rating themselves as poor	0.52	0.55	-0.03*	5370
Proportion reporting child hunger	0.09	0.10	-0.01	4111
Proportion reporting adult hunger	0.09	0.11	-0.01	5186

Source: Own calculations from LCS 2008/9. ***p<0.01 **p<0.05 *p<0.1

Table 2 Linear Probability Model for the propensity to engage in farming activities

	P(Farming)	*P(OAP)*	*P(Farming)*
	OLS	2SLS first stage	2SLS second stage
log(per capita income from OAP)	0.009***		0.012***
log(per capita income from salaries)	-0.004	-0.056***	-0.004
log(per capita income from other sources)	0.011**	-0.034	0.011**
log(per capita access to credit)	0.007**	-0.012	0.007**
HH head education	-0.001	-0.014	0.000
HH head education squared	0.000	-0.005	0.000
HH head is female	-0.030	-0.028	-0.029
HH head is married	0.054*	0.141	0.057*
log(HH size)	0.068***	0.102	0.067***
Distance to food market <750m	-0.031	-0.136	-0.031
Distance to food market 0.75-1.5km	-0.053	-0.317	-0.052
Distance to food market 6-15km	0.007	-0.217	0.008
Distance to food market >15km	-0.025	-0.172	-0.026
Access to piped water	-0.182***	-0.127	-0.183***
Age from eligibility threshold		0.129***	
Above age eligibility threshold		5.123***	
Age from threshold * above threshold		0.241***	
Constant	0.294***	-2.906***	0.294***
R-squared	0.082	0.666	0.081
N	1603	1603	1603
Hausman p-value			0.068*
First stage F statistic		948.871	

NOTES: own calculations from LCS 2008/9. Only households with heads whose ages are 10 years above or below the pension eligibility threshold and living in rural tribal areas are included in the sample. Estimates are weighted. * p<0.1, ** p<0.05, *** p<0.01

Table 3 Linear Probability Models of the prevalence of child hunger

	P(Child Hunger)			
	Non-Farmer	Farmer	Non-Farmer	Farmer
	OLS	OLS	2SLS	2SLS
log(per capita income from OAP)	-0.005**	-0.007**	-0.004	-0.012***
log(per capita income from salaries)	-0.001	-0.003	-0.001	-0.004
log(per capita income from other sources)	-0.006	0.006	-0.005	0.005
log(per capita access to credit)	0.001	0.002	0.001	0.002
HH head education	-0.011	-0.006	-0.010	-0.007
HH head education squared	0.000	0.000	0.000	0.000
HH head is female	-0.005	-0.100**	-0.004	-0.105**
HH head is married	-0.059**	-0.093*	-0.057**	-0.099**
log(HH size)	0.107***	0.017	0.106***	0.018
Distance to food market <750m	0.021	-0.037	0.020	-0.040
Distance to food market 0.75-1.5km	0.054	-0.057	0.055	-0.057
Distance to food market 6-15km	-0.057**	-0.017	-0.057**	-0.017
Distance to food market >15km	0.025	0.073	0.024	0.071
Access to piped water	-0.032	-0.02	-0.033	-0.02
Constant	0.003	0.202**	0.004	0.211***
R-squared	0.065	0.067	0.065	0.062
N	843	450	843	450
Hausman p-value			0.293	0.041**
First stage F statistics			568.983	365.602

NOTES: own calculations from LCS 2008/9. Only households with heads whose ages are 10 years above or below the pension eligibility threshold and living in rural tribal areas are included in the sample. Estimates are weighted. * p<0.1, ** p<0.05, *** p<0.01

Table 4 Linear Probability Models of the prevalence of adult hunger

	P(Adult Hunger)			
	Non-Farmer	Farmer	Non-Farmer	Farmer
	OLS	OLS	2SLS	2SLS
log(per capita income from OAP)	-0.007***	-0.007**	-0.004	-0.011***
log(per capita income from salaries)	-0.002	-0.003	-0.002	-0.004
log(per capita income from other sources)	-0.003	0.007	-0.003	0.007
log(per capita access to credit)	-0.001	0.003	-0.001	0.003
HH head education	-0.008	0.003	-0.007	0.002
HH head education squared	0.000	-0.001*	0.000	-0.001*
HH head is female	-0.023	-0.131***	-0.022	-0.134***
HH head is married	-0.056**	-0.140***	-0.054**	-0.144***
log(HH size)	0.048***	0.006	0.047***	0.006
Distance to food market <750m	0.01	-0.046	0.01	-0.048
Distance to food market 0.75-1.5km	0.044	-0.033	0.044	-0.032
Distance to food market 6-15km	-0.035	-0.026	-0.034	-0.025
Distance to food market >15km	0.044	0.069	0.043	0.067
Access to piped water	-0.036*	0.000	-0.037*	0.001
Constant	0.115***	0.233***	0.117***	0.241***
R-squared	0.05	0.074	0.048	0.071
N	1035	507	1035	507
Hausman p-value			0.136	0.073*
First stage F statistics			496.347	391.088

NOTES: own calculations from LCS 2008/9. Only households with heads whose ages are 10 years above or below the pension eligibility threshold and living in rural tribal areas are included in the sample. Estimates are weighted. * p<0.1, ** p<0.05, *** p<0.01

Table 5 Regressions modelling market food expenditure

	log(per capita market expenditure on food)			
	Non-Farmer	Farmer	Non-Farmer	Farmer
	OLS	OLS	2SLS	2SLS
log(per capita income from OAP)	0.014***	0.004	0.016***	0.001
log(per capita income from salaries)	0.008*	0.017***	0.009**	0.016***
log(per capita income from other sources)	0.016**	0.022**	0.016**	0.022**
log(per capita access to credit)	0.000	0.005	0.000	0.005
HH head education	0.006	0.000	0.006	-0.001
HH head education squared	0.001	0.002	0.001	0.002
HH head is female	0.033	0.038	0.033	0.036
HH head is married	0.172***	0.131*	0.174***	0.128*
log(HH size)	-0.527***	-0.602***	-0.528***	-0.602***
Distance to food market <750m	-0.05	-0.04	-0.051	-0.041
Distance to food market 0.75-1.5km	0.072	0.063	0.072	0.064
Distance to food market 6-15km	0.141*	0.114	0.142*	0.114
Distance to food market >15km	0.120**	0.039	0.120**	0.039
Access to piped water	0.069*	-0.102*	0.068*	-0.101*
Constant	8.211***	8.489***	8.213***	8.495***
R-squared	0.272	0.310	0.272	0.310
N	1081	522	1081	522
Hausman p-value			0.516	0.486
First stage F statistic			535.792	402.8

NOTES: own calculations from LCS 2008/9. Only households with heads whose ages are 10 years above or below the pension eligibility threshold and living in rural tribal areas are included in the sample. Estimates are weighted. * p<0.1, ** p<0.05, *** p<0.01

Table 6 2SLS Regressions modelling agricultural inputs and labour decisions

	log(fertilizer)	*log(tools)*	*log(homeworkers)*		*log(external employment)*	
	Farmer	Farmer	Non-Farmer	Farmer	Non-Farmer	Farmer
log(per capita income from OAP)	0.057	0.036	-0.011	0.026	-0.086***	-0.095***
log(per capita income from other sources)	-0.179**	0.032	0.009	0.049	-0.240***	-0.269***
log(per capita access to credit)	0.017	0.021	0.016	0.053**	0.000	-0.002
HH head education	-0.009	0.068	-0.003	0.115	-0.025	0.036
HH head education squared	0.018	-0.002	0.000	-0.005	0.009**	0.001
HH head is female	-0.605	0.181	-0.213*	-0.775**	-0.301*	0.279
HH head is married	0.112	0.461	0.110	0.093	0.062	0.114
log(HH size)	0.993***	0.142	0.029	0.578***	0.561***	0.676***
Distance to food market <750m	0.916*	0.503*	-0.063	-0.625**	0.134	-0.333
Distance to food market 0.75-1.5km	1.098	0.906*	-0.269*	0.823*	-0.374	-0.013
Distance to food market 6-15km	0.904	1.046*	-0.415***	0.858*	-0.037	0.126
Distance to food market >15km	0.478	0.244	0.325*	0.183	-0.067	-0.035
Access to piped water	-2.461***	-0.054	-0.278***	-0.721***	0.088	0.601***
Constant	-0.926	-5.274***	-3.924***	-2.635***	-2.497***	-3.165***
R-squared	0.112	0.038	0.042	0.107	0.213	0.185
N	522	522	1081	522	1081	522
Hausman p-value	0.871	0.049**	0.568	0.498	0.126	0.749
First stage F statistics	447.992	447.992	575.653	447.992	575.653	447.992

NOTES: own calculations from LCS 2008/9. Only households with heads whose ages are 10 years above or below the pension eligibility threshold and living in rural tribal areas are included in the sample. Estimates are weighted. *log(fertilizer)* is logged expenditure on fertilizer inputs, *log(tools)* is the logged value of tools for cultivation of crops, *log(homeworkers)* is the logged number of household members that worked without pay in the home, *log(external employment)* is the number of household members that worked outside the home.* p<0.1, ** p<0.05, *** p<0.01

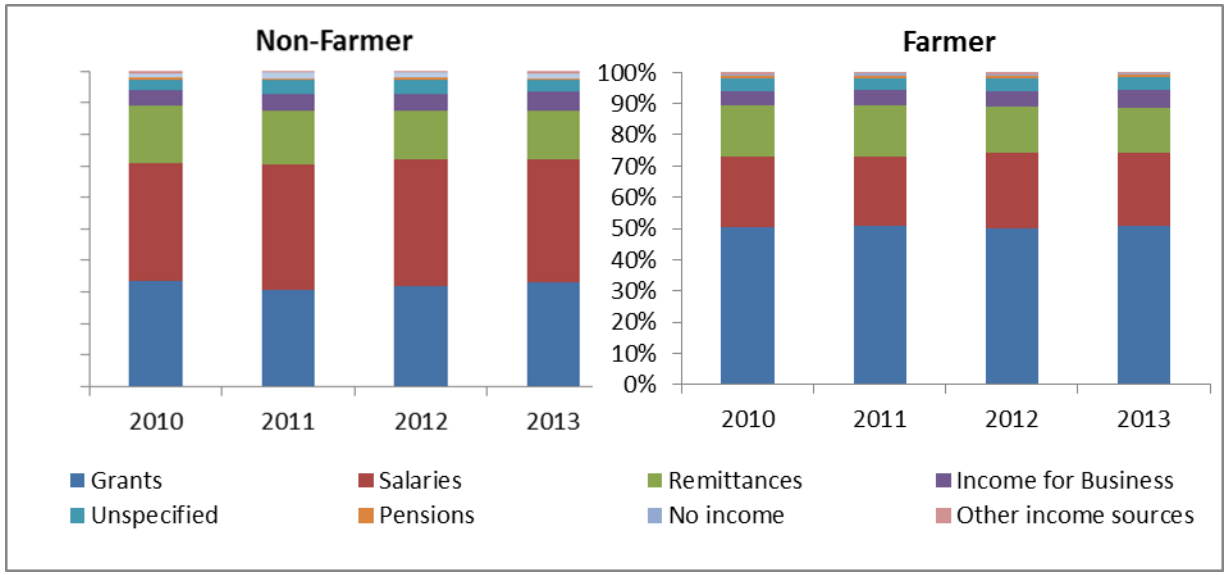

Figure 1 Black homeland households' main income sources, by farming status. Source: Own calculations from General Household Survey, 2010-2013

Figure 2 Discontinuity in Old-Age Pension Take-up. Source: Own Calculations from LCS (2008/9)

Figure 3 Discontinuity in probability of farming around age threshold. Source: Own Calculations from LCS (2008/9)

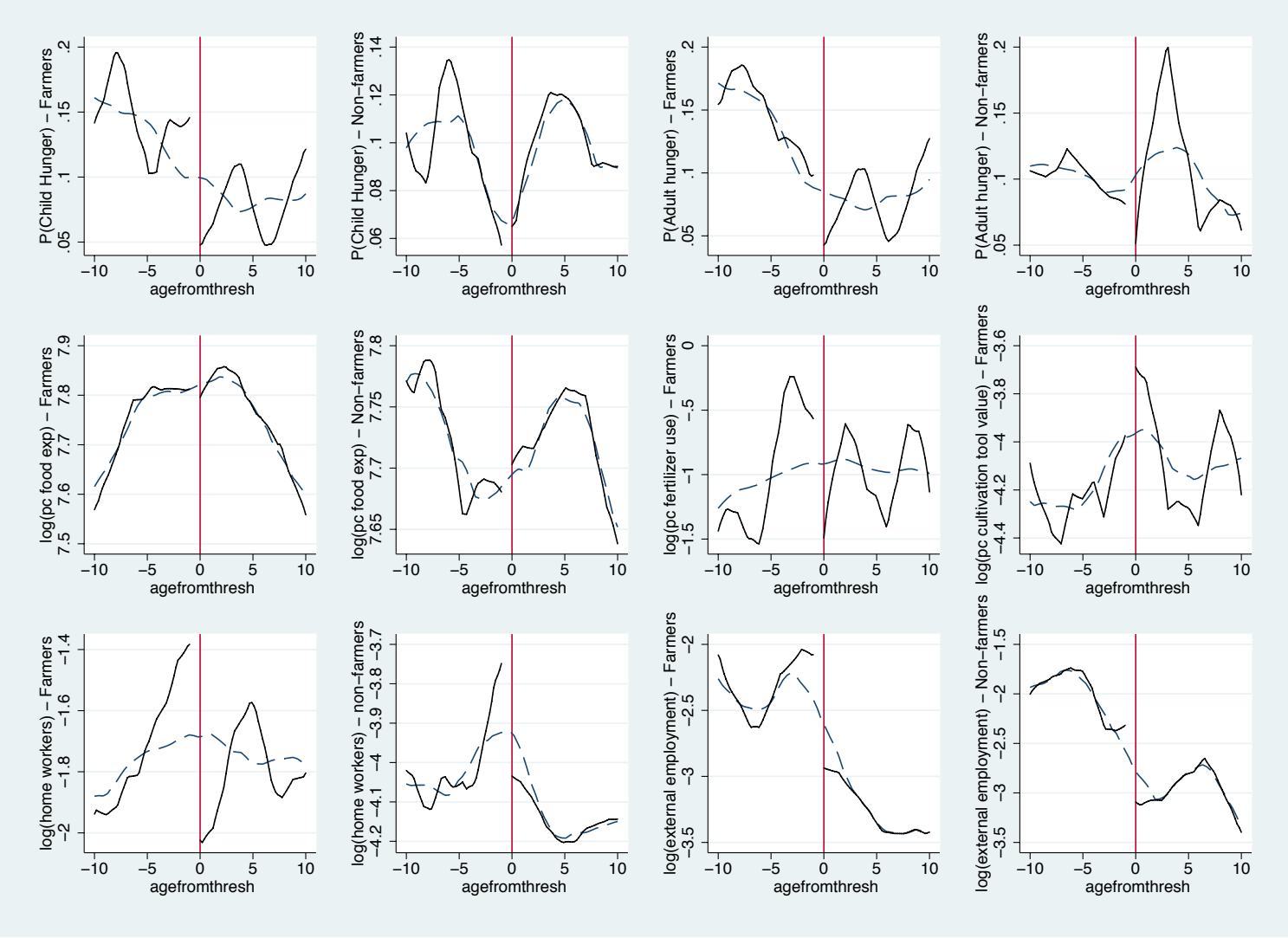

Figure 4 Discontinuities in outcomes around age threshold. Source: Own Calculations from LCS (2008/9)