CHAPTER 2

The Role of Targeted Intergovernmental Transfers in Rural Poverty Reduction

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2.1 Introduction

Over the last 60 years, the question of which sectors can serve as engines of growth, stimulate development and reduce poverty across rural communities has received significant attention, particularly in economic transformation strategies pursued by developing countries in Africa, Asia and Latin America. The dual economy model, which was developed by Lewis (1954) and dominated development theory in the 1960s and 1970s, viewed agriculture as a backward and relatively unproductive sector, characterised by low wages and a surplus of labour. This view informed the economic transformation agenda adopted by many developing countries that emphasised accelerating the industrialisation process by heavily taxing agriculture (Krueger et al., 1988; Schiff and Valdez, 1992).

The experience of the Green Revolution provided an alternative view: that agriculture could serve as an active engine of growth and development. The Green Revolution used modern science and technology to address a widening food crisis across Asian countries during the 1960s. Its dynamism and contribution to reducing poverty inspired confidence in the potential of agriculture to launch broader economic growth. However, confidence around the potential of the sector was tempered by the poor performance of many agricultural development projects, especially in sub-Saharan Africa, and the shift to export-led manufacturing growth in the economies of East Asian countries (World Bank, 2007).

Despite pessimism over the role of agriculture in economic growth, the UN's Sustainable Development Goals (or the Global Goals) shifted the focus from the growth–agricultural productivity nexus, to reforming the agricultural sector with the objective of enhancing job creation and food (as well as nutritional security), thereby reducing high levels of poverty in developing countries. This approach is based on the premise that agricultural activities form the main source of income and economic livelihoods for the majority of poor people in developing countries. Thus strategies to achieve "pro-poor" or "shared growth" would be more effective if policies and investments targeted growing labour-intensive sectors such as agriculture, in which the poor are active participants and important stakeholders (Christiansen et al., 2011).

In South Africa, a renewed focus is on the potential of the agricultural sector to be an engine for rural development and support the creation of economically vibrant and sustainable rural communities. For much of the first decade of democracy, the country's agricultural policy focused on the historical inequities of apartheid-era discriminatory practices that skewed the racial (and gender) participation in agricultural activities and access to land.[12] Included within this focus was the objective of addressing rural development through a cross-sectoral and multi-occupational diversity of programmes (ANC, 1994). The initial policies relating to rural development evolved around the social and political goals of the Reconstruction and Development Programme (RDP) in 1994 and the spatial concepts of nodes, corridors and infrastructure strategies contained in the Integrated Sustainable Rural Development Strategy of 2000.

By 2004, government concerns over the structural nature of rural poverty and the limited impact of land reform on reducing inequality and poverty prompted a shift in government's views of rural development. Between 1994 and 2003, South Africa's economy grew by an average of 3.2%, the longest period of steady economic growth since World War II, but at the same time poverty continued and inequality rose.[13] Concerns over the continued co-existence of relatively strong economic growth and structural poverty led the then State President, Thabo Mbeki, to describe South Africa's main development challenge as the need to create sustainable linkages between "two economies" – a first or modern economy (dominated by industrial, mining, financial and services sectors) that was well integrated with global markets and generated the bulk of South Africa's wealth, and the second or marginalised economy that was under-development, contained the vast majority of rural and urban poor and structurally disconnected from the first economy (Mbeki, 2003). Integrating both economies would require sustained agrarian reform and integrated rural development programmes that could transfer resources and infuse much needed capital into growing agricultural and agro-processing activities in order to address growth and development challenges of the second/marginalised economy.

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[12] The first set of post-1994 strategies to address the question of rural and agrarian development in South Africa was embodied in a number of key legislations enacted between 1994 and 1996. These included: Restitution of Land Rights Act (No. 22 of 1994); Provision of Land and Assistance Act (No. 126 of 1993, amended in 1994); Extension of Security of Tenure Act (No. 62 of 1997); Land Reform (Labour Tenants) Act (No. 3 of 1996); and the Communal Property Associations Act (No. 28 of 1996) (Twala and Selesho, 2013).

[13] The country's Gini coefficient had decreased slightly from 0.66 in 1993 to 0.63 by 2001. South Africa also experienced a steady increase in unemployment in the decade following the 1994 transition and the unemployment rate peaked in early 2003 at 31.2%, using the narrow or strict definition that includes only active job-seekers, and 42.5%, based on the broad or expanded definition, which includes people who want employment but were not actively looking for work (Seekings, 2007).

2.2 Problem Statement and Rationale for the Research

Since 2009, government's strategy seeks to fast-track rural development and land reform, and radically restructure the country's agrarian economy as a catalyst for poverty reduction and wider societal transformation (Nzimande, 2014). A stand-alone ministry – the Department of Rural Development and Land Reform (DRDLR) – was established, dedicated to the socio-economic development of rural South Africa. The department's flagship policy is the Comprehensive Rural Development Programme (CRDP), which consists of three phases[14] and has two focus areas: (i) an integrated programme of land reform and agrarian change aimed at fostering social cohesion and development, and (ii) a rural development strategy aimed at improving economic, cultural and social infrastructure, public amenities and facilities, and information and communications technology (ICT) infrastructure.

Complementing the focus on rural development are programmes aimed at integrating land reform and agricultural development. Government has two main initiatives in this regard: the Comprehensive Agricultural Support Programme (CASP) and the Land Redistribution for Agricultural Development (LRAD) programme. Following the 2003 intergovernmental fiscal review of agriculture, which found that agriculture was under-funded, especially capital funding, CASP was launched in 2004, with the aim of expanding the provision of support services in order to promote and facilitate agricultural development programmes targeting beneficiaries of land and other agrarian reform strategies (Hall and Aliber, 2010). Established in 2008, as a joint programme of the Department of Agriculture, Fisheries and Forestry (DAFF), the Department of Land Affairs (which was the forerunner of the DRDLR) and provincial departments of agriculture, the LRAD is designed to address imbalances created by apartheid-era land distribution through providing black South African citizens with grants to access agricultural land.

Despite these laudable initiatives, agriculture's contribution to rural development and poverty reduction has been called into question. The scope for agriculture to be an engine for economic growth and job creation is limited because of poor coordination, implementation and administration of (and access to) key support programmes (Grewell et al., 2012). Although government has increased capital funding to small-scale farmers, only about 13% of eligible black farmers benefitted from the range of support services offered by CASP (Hall and Aliber, 2010). A recent study found that the CASP programme had little to no impact because the grant services were thinly spread across a large number of beneficiaries (Business Enterprises at UP, 2015).

The limited impact of agricultural support programmes has raised concerns about the efficacy of public investments in agriculture. Policy-makers argue that, although agricultural support programmes are needed, intergovernmental transfers could be used more effectively if directed at improving farm infrastructure and inputs, community level infrastructure, market development and institutional re-engineering (Hall and Aliber, 2010). More effective use of intergovernmental institutional and fiscal instruments could spur rural development and aid poverty reduction efforts. Furthermore, the potential role of the non-agricultural sector should not be ignored, as shown in a number of recent studies. For example, Hasan and Quibria (2004) found that, although agricultural activities were the most effective driver for reducing poverty in South Asia and sub-Saharan Africa, in Latin America and East Asia, growth in the services and industrial sectors respectively had the greatest impact on poverty reduction. Based on the analysis of a sample of 25 countries, Cervantes-Godoy and Dewbre (2010) found that while growth in agricultural productivity was the main driver in reducing extreme poverty reduction (denoted as income ≤ US$1.25 per day), support to the non-agricultural sector was more effective at reducing poverty among the relatively poor population (i.e. those classified as living on US$2.00 per day).

The lack of South African empirical research is a major drawback in the current policy debates and recommendations around the effectiveness (or efficacy) of agricultural support in rural development and poverty reduction strategies. In particular, whether (i) the inter-sectoral linkages/value chains needed for a pro-agricultural strategy are present in a world of increasingly interconnected markets, and (ii) the potential pro-agricultural support-driven growth will facilitate the participation of the majority of poor people living in rural areas (Anriquez and Lopez, 2007).

When assessing the growth and participation effects of pro-agriculture strategies, four questions need to be answered (Christiansen et.al., 2011):

(i) Do agriculture-focused investments enhance overall growth more than similar investments in non-agricultural sectors?
(ii) Do more poor households benefit from agricultural growth than from non-agricultural growth, and if so, which groups are able to participate in such growth and under which conditions?

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[14] Phase one of the framework is driven by programmes aimed at meeting basic human needs of citizens located in rural areas; the second phase will focus on the delivery of large-scale infrastructure development to support the transformation of rural economies; the final phase will focus on facilitating the emergence of rural industrial and credit financial sectors through the creation of small, micro and medium enterprises and village markets (South African Yearbook: 2010/2011, 20110)

(iii) If agricultural growth results in slower overall growth but greater participation by the poor (compared to non-agricultural growth), then which (agricultural or non-agricultural) growth strategy will reduce poverty the most and under which circumstances?
(iv) Will the results of (agricultural or non-agricultural) growth on poverty reduction be different if different measures are used to classify the poor?

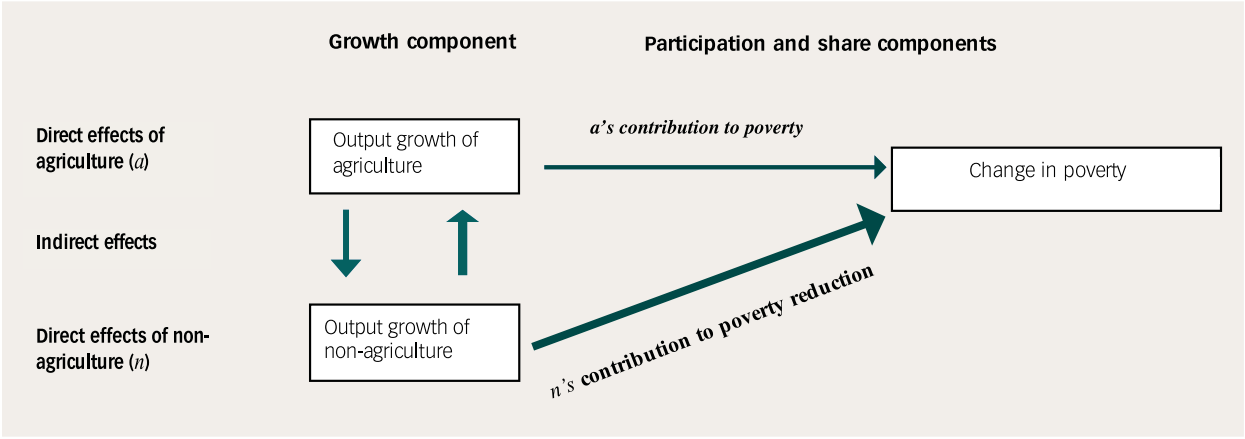
Empirical research addressing these four questions should provide a more nuanced and qualified framework in which the impacts of the productivity of agriculture and non-agriculture on poverty can be decomposed into three main sources: a growth, participation and a size effect. Knowledge of such decompositions should provide policymakers with an important starting point in formulating effective poverty reduction strategies that capture the relative levels of poverty across regions. To the best of the author's knowledge, no such study exists for South Africa. Thus, the paucity in extant literature is addressed by focusing on the role of both agriculture and non-agriculture in reducing poverty levels across South Africa's rural municipalities.

2.3 Conceptual Framework

An economic sector's impact on poverty reduction depends on the interaction of four components: (a) the *direct effect* that captures a specific sector's capacity to increase the income levels of those employed in that sector; (b) the *indirect component* that stems from spill-over effects of growth in one economic sector on other economic sectors and helps to reduce poverty; (c) the *participation component* that captures the extent to which poor people benefit from a particular sector's growth and depends on the type and location of a sector's productive processes;[15] (d) the *total contribution* of a sector to poverty reduction, which depends on the relative size of that sector in total economic activity.

The framework in Figure 22 highlights the interaction of these four components in terms of the relative role of agriculture and non-agriculture in reducing poverty.

Figure 22. The relative role of agriculture and non-agriculture growth in reducing poverty



Source: Christiansen et al. (2011)

The formal representation of Figure 22 is as follows. Let P_i denote the measure of poverty and Y_i be gross domestic product (GDP) per capita in region i. The proportionate change in poverty in a region can be viewed as being equal to the GDP elasticity of poverty (≈ the proportionate change in poverty divided by the proportionate change in GDP per capita) multiplied by per capita GDP. Mathematically, this is equivalent to:

$$\frac{dP_i}{P_i} = \left(\frac{dP_i}{P_i} \bullet \frac{Y_i}{dY_i}\right)\frac{dY_i}{Y_i} \quad (1)$$

Approximating for small changes, Eq. (1) can be rewritten as:

$$d\ln P_i = \varepsilon \; d\ln Y_i \quad (2)$$

where ε_i, the GDP elasticity of poverty captures the participation component and measures the growth component of poverty change in region i. Given heterogeneity in the growth processes across different sectors, the growth in Y_i can be approximated as the sum of the share weighted growth rates of economic sectors.

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[15] For example, capital-intensive agricultural activities in Region A is likely to result in minimal participation of poor and unskilled persons living in that area. However, a higher intensity of labour-intensive subsistence agriculture in Region B may result in a high participation rate by the poor.

Agriculture (***a***) and non-agriculture (***n***) in Figure 22, Eq. (1) can be rewritten as a share weighted sum of the contributions to poverty reduction by these two sectors:

$$d\ln P_i = \varepsilon_{ia} s_{ia} d\ln Y_i + \varepsilon_{in} s_{in} d\ln Y_i \quad (3)$$

where s_{ij} denotes the share of the j^{th} sector ($j=a,n$) in total GDP of the i^{th} region. From Eq. (3), the two sector-economy yields two elasticity terms ($\varepsilon_{ia}s_{ia}$ and $\varepsilon_{in}s_{in}$) that each have two elements: a share component (s_{ij}) and a sector's participation component (ε_{ij}). The sectoral participation components measure the responsiveness of overall poverty to aggregate growth originating from a particular sector ($\approx s_{ij}dY_{ij}/Y_{ij}=dY_{ij}/Y_i$). This responsiveness measure can be seen as an indicator of the extent to which all persons classified as poor participate in overall growth generated by the j^{th} sector.

A two-step econometric approach is used to derive the parameter estimates of Eq.(3). For the first step of the empirical analysis, rural municipalities are the preferred unit of analysis, following Christiansen et al. (2011) in estimating non-agricultural output growth per capita ($y^n_{it} \approx$ per capita growth in non-agriculture gross value added [GVA]/GDP) in a region/municipality i at time t as a linear function of both lagged levels of per capita non-agricultural sector growth and lagged levels of agricultural sectoral growth (y^a_{it-p}) and a vector X_{it} of region specific explanatory factors. Mathematically, this can be expressed as:

$$y^n_{it} = \chi_0 + \sum_{j=1}^{k} \beta_j X_{it} + \gamma_1 y^n_{it-p} + \gamma_2 y^a_{it-p} + h_i + \upsilon_{it} \quad (4)$$

where h_i represents unobserved municipal specific characteristics and υ_{it} is an idiosyncratic error term. Similarly, agricultural GDP growth per capita (y^a_{it}) is expressed as a function of lagged levels of per capita non-agricultural and agricultural sector growth as well as unobserved region-specific exogenous variables. The linear functions for each of y^n_{it} and y^a_{it} are estimated separately, with a statistically significant coefficient on lagged agricultural growth (in the non-agricultural growth equation) indicating Granger causality from agriculture to non-agriculture (and vice-versa in the agricultural growth equation).

Empirical estimations of versions of Eq.(4) for both the non-agricultural and agricultural sectors will help in evaluating the extent to which linkages exist, and show that such linkages encourage mutually beneficial growth. While linkages within the dual economy provide the extent of direct and indirect growth, how citizens benefit from such growth – the participation effect – becomes important for assessing the impact of sectoral growth on poverty. The literature offers three main propositions on why the effect of growth on poverty differs across economic sectors:

- The majority of rural poor stand to benefit more from agricultural growth than from non-agricultural growth because of their location in rural areas where agriculture is the main economic activity (Byerlee et al., 2005).
- The major asset of the majority of the poor is their (unskilled) labour, and so differences in (unskilled) labour intensity might result in sectoral differences in poverty reduction on growth (Christiansen et al., 2011).[16]
- Differences in asset inequality, such as the distribution of land, are likely to lead to growth having different poverty-reducing effects across sectors. When small and medium-scale farmers cultivate a larger share of land, lower income inequality occurs and (by extension) growth has a greater impact on poverty (Bourguignon and Morrisson, 1998). [17]

To test these three propositions, and examine which source of (sectoral) growth matters for poverty, a modified version of Eq.(3) is estimated:

$$\Delta\ln P_{it} = \delta_a s_{iat-1}\Delta\ln Y_{ait} + \delta_n s_{\text{int}-1}\Delta\ln Y_{nit} + c_i + u_{it} \quad (5)$$

where P_{it} is the measure of poverty derived from nationally representative household surveys, and ΔY_{ait} ($j=a,n \approx$ where a denotes the agricultural sector and n is non-agricultural sector) denotes economic growth of a sector in a region/municipality, i at time period t. δ_j ($j\approx a,n$) represents parameter coefficients that capture sectoral participation effects i.e. the impact of growth in a particular sector on growth. Finally, c_i are time-invariant municipal-specific characteristics, while u_{it} represents the white-noise error term.

It is important to ensure that the estimation of Eq.(5) controls for possible bias that may arise if unobserved municipal characteristics are correlated with sectoral growth rates, while simultaneously influencing the rate-dependent variable – the poverty rate, independently. For example, if a municipality with a large mining industry experiences a positive exogenous shock (such as an increase in demand or rise in relative prices), such a shock will serve to boost the growth of the non-agricultural sector relative to the agricultural sector, while also reducing the rate of poverty reduction. Such an outcome would cause the effect of the

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[16] In a study on cross-country heterogeneity of the poverty response to changes in economic growth, Loayza and Raddatz (2010) find evidence that growth in the highly labour-intensive agricultural sector has the greatest impact on reducing poverty. On the other hand, growth in the relatively skilled and less labour-intensive services, mining and utilities sector had the least impact on poverty reduction.

[17] A number of country study reports support this argument. Ravallion and Chen (2007) found that in China, where land is relatively equally distributed, the poverty-reducing effects of growth in agriculture is four times that of growth in the services sector. In contrast, in India where land inequality and landlessness is more widespread, Ravallion and Datt (1996) found that growth in the agriculture sector and the services sector had a similar impact on poverty reduction.

non-agricultural sector to be underestimated (and that of the agricultural sector to be overestimated), resulting in a misleading importance being attached to growth in the agricultural sector relative to the non-agricultural sector. To address this potential bias, Eq.(5) is estimated using the fixed-effects approach.

While the fixed-effects estimation helps mitigate against potential omitted variable bias, the effects of different economic activities/sectors may also depend on municipal-specific characteristics ($\boldsymbol{X_{it}}$). To examine how such characteristics affect sectoral participation effects, the approach of Christiansen et al. (2011) is used and interaction terms – the Gini coefficient of income/consumption inequality ($\boldsymbol{GN_{it-1}}$) and the share of the mining (or manufacturing) sector in GDP ($\boldsymbol{M_{it-1}}$), – are included in the empirical model. The size of the sectoral participation effects ($\boldsymbol{\delta_a}$ and $\boldsymbol{\delta_n}$, respectively) are also dependent on the position of the poverty line relative to the mean, as well as the shape of income distribution within a particular municipality. Given that both the mean and shape of income distribution evolve over time and critically depend on the level of development, it becomes important to quantify how sectoral growth affects income across different segments of the population within each municipality. Drawing upon the approach of Christiansen and Demery (2007), Eq.(5) is further augmented with interaction terms between sectoral GDP growth variables and the ratio of the poverty line ($\boldsymbol{z}$) to each municipality's average household income ($\tilde{\boldsymbol{e}}_{\boldsymbol{it-1}}$). Eq.(5) then becomes:

$$\Delta \ln P_{it} = \delta_0 + [\delta_a + \delta_{ax} X_{it'-1}] s_{iat-1} \Delta \ln Y_{ait} + [\delta_n + \delta_{nx} X_{it-1}] s_{int-1} \Delta \ln Y_{nit} + c_i + u_{it} \quad (6)$$

where $X_{it-1} = GN_{it-1}, M_{it-1}$ and $\frac{z}{e_{it-1}}$, i.e. the interactive terms of the Gini coefficient, sectoral GDP growth and poverty-to-household income ratio.

Given the unit of analysis, the regression analysis is carried out by applying dynamic panel data techniques to a panel of municipalities classified as rural in South Africa.[18] A unique feature of the estimations, especially of Eq.(6), is that effects of sectoral growth on poverty reduction are carried out using poverty measures that that take into account the position of the poverty line with respect to the mean of income distribution (in each region/municipality), as well as the shape of this poverty distribution. In this regard, Stats SA's measure of a set of three national poverty lines – the food poverty line, lower-bound poverty line and upper-bound poverty line – will be employed as measures of poverty in this study.

2.4. Empirical Analysis and Results

2.4.1 Agriculture as engine of growth

In many developing countries, the argument for policies aimed at agricultural growth and development is that economic growth results from the export of surplus resources. The opposite has also been suggested, that increased wages in the non-agricultural sectors result in resources leaving and productivity increasing in the agricultural sector (Tiffin and Irz, 2006).

The issue of whether agriculture growth drives economic growth or economic growth drives agricultural growth is of vital importance to policy-makers. If the former is true, then it validates current efforts to bolster rural economies through policies that enhance agricultural investments and productivity. If the latter is the case, then a more appropriate policy could be one that targets growth in key non-agricultural sectors and encourages more linkages between such sectors and agriculture. Therefore, the first part of the analysis examines the links between agriculture and regional economic growth across municipalities.

Very little is known about the relationship between agriculture and economic growth in the context of sub-national settings such as South Africa's. Therefore, the first part of the empirical analysis presents the first detailed attempt to examine the relationship between agriculture and regional economic growth in a local government setting, following the works of Zapata and Rambaldi (1997) and Tiffin and Irz (2006). An econometric model is estimated that allows for an analysis of Granger causality between agricultural value-added per worker and regional GDP per capita in constant prices.

First, the unit root properties are tested for the two variables (agriculture value added per worker and regional GDP per capita) using the standard tests of integration such as Dickey-Fuller (DF) and the Augmented Dickey-Fuller (ADF). More formally, the test for unit root in the agricultural value-added series for the $\boldsymbol{i^{th}}$ municipality is obtained by estimating the following regression:

$$\Delta v_{it} = \mu_i + \delta_i v_{it-1} + \gamma_i t + \varepsilon_{it} \quad (7)$$

where $\boldsymbol{v}$ is agriculture value added, $\boldsymbol{\mu}$ is a constant and $\boldsymbol{t}$ is a trend term. The subscripts $\boldsymbol{i}$ and $\boldsymbol{t}$ denote the $\boldsymbol{i^{th}}$ municipality and time period, respectively. The relevant test statistic obtained as a $\boldsymbol{t}$- statistic on the coefficient $\boldsymbol{\delta}$.

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[18] In 2006, measures developed by the Department of Cooperative Governance classified South Africa's municipalities into five sub-categories. Of relevance to this study, rural municipalities are those classified as B3 (small towns) and B4 (mostly rural) municipalities. B3 municipalities are defined as lacking a large town as a core urban settlement, with a relatively small population largely based in one or several small towns. B4 municipalities are characterised by the presence of at most one or two small towns in their areas, communal land tenure and villages or scattered groups of dwellings, and typically located in former homelands. Based on this classification, 111 municipalities are in category B3, and 70 in category B4.

On the basis of these test statistics, three different cases can be distinguished: (i) the series are all stationary in levels; (ii) the series are all non-stationary in levels and stationary in first differences, and (iii) some of the series are stationary in levels and others are stationary in first differences. In the first case, the VAR is the standard formulation with variables entering in all levels, as it is for the third case but with the variables entering in levels if stationary and in differences if non-stationary. In the second case, it is necessary to check for cointegration between variables. If cointegration is not present, then the VAR is still the reference formulation, but the variables are entered after first differencing. The approach of Pedroni (1999) is used to test for cointegration, estimating for each series in a panel data set of 234 municipalities over the period 1996 to 2014, the following model:

$$y_{it} = \beta_i \nu_{it} + \gamma_i t + \varepsilon_{it} \quad i = 1,\ldots\ldots\ldots N \qquad (8)$$

where y is regional GDP per capita and the other variables are as described in Eq.(7). The residuals obtained from Eq.(8) are checked for unit roots by estimating the following model:

$$\hat{\varepsilon}_{it} = \varphi_i \hat{\varepsilon}_{it-1} + \nu_{it} \qquad (9)$$

with the relevant test statistic computed as the arithmetic mean of the t- statistics on φ_i across the cross-sectional units (Tiffin and Irz, 2006). If there is cointegration, then the appropriate formulation is the vector error correction model (VECM) estimated under dual restrictions required for Granger non-causality and cointegration, where the first differenced variables are entered jointly with the vector of deviations from long-run equilibrium.

Following Tiffin and Irz (2006), panel data is used on agricultural value-added per worker (in the agricultural sector) and income per capita in constant 2010 Rands for the 234 municipalities in South Africa over the period 1996–2014. Table 10 reports the findings of the regressions for the full sample of 234 municipalities as well as sub-samples of urban and rural municipalities.[19]

Table 10. Panel – VAR Granger causality wald test

Regression (1)	Equation Variable	Excluded	Prob > Chi² (3)
Full sample (all 234 municipalities)	APW	PCI	5.311 (0.150)
		ALL	5.311(0.150)
	PCI	APW	168.221 (0.000)***
		ALL	168.221 (0.000)***
Sub-sample 1 (urban municipalities)	APW	PCI	11.472 (0.003)***
		ALL	11.472 (0.003) ***
	PCI	APW	19.289 (0.000) ***
		ALL	19.289 (0.000) ***
Sub-sample 2 (rural municipalities)	APW	PCI	12.796 (0.002) ***
		ALL	12.796 (0.002) ***
	PCI	APW	276.796 (0.000) ***
		ALL	276.796 (0.000) ***

Notes: The terms APW and PCI denote agricultural value added per worker and per-capita income, respectively. (***) denotes statistical significance at the 1% level. The Prob > Chi2 gives the causality test, where the test is:
H_{01}: PCI does not cause APW;
H_{02}: APW does not cause PCI

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[19] These sub-samples are based on the 2010 classification/categorisation of municipalities within the local government sphere by the Department of Cooperative Governance and Traditional Affairs (COGTA). According to this classification, South Africa's 234 municipalities can be defined into two broad categories: A and B. Category A includes 8 metropolitan municipalities described as having large urban complexes with populations of over one million and accounting for over 50% of all local government spending. Category B municipalities include four main types: (a) 19 B1 municipalities that have secondary cities with large urban spatial patterns and responsibilities for relatively higher operating budgets; (b) 25 B2 municipalities that have large town(s) as their urban core; (c) 113 B3 municipalities that are local municipalities with small towns, and a relatively small percentage of its population residing in smaller urban settlements, but with no large town as a core, and (d) 69 B4 municipalities that cover mainly rural areas characterised by the presence of no more than two small towns in their areas, communal land tenure and villages or scattered groups of dwellings, and typically located in former homelands. Based on this classification, the 52 Category A, B1 and B2 municipalities are urban municipalities, and the 182 Category B3 and B4 municipalities are rural municipalities.

In Table 10, column (3) gives the Wald test-statistic for the hypothesis that per-capita income (agricultural value added) is non-causal of agricultural value added (per-capita income). For the full sample of municipalities, the hypothesis that per-capita income causes agricultural value added cannot be rejected, i.e. per-capita income does not Granger cause agricultural value added across all municipalities. However, the results indicate that for the whole sample, agricultural value added exerts a causal influence on per-capita income. In terms of the two sub-samples of municipalities, the evidence points to bi-directional causality where for both urban and rural municipalities, agriculture value added and per-capita income exert causal influence on one another.

While knowledge about the direction of causality is valuable, Granger-causality does not often provide a complete picture of the interactions among the variables. Applied work and policy analysis require an understanding of the response of one variable to an impulse or shock in another variable. To gain insight into such a phenomenon, this kind of causality is examined by tracing the effect of an exogenous shock or innovation in agriculture value added on per-capita income (and vice versa). This kind of analysis is carried out using *impulse-response functions* (IRF), which describe the evolution of the variable of interest along a specified time horizon following a shock at a given moment. The impulse response analysis is supplemented with estimations of *forecast error variance decompositions* (FEVD), which measures the percentage of the variance of the error made in forecasting a variable (e.g. agriculture value added) due to a specific shock (e.g. the error term in the per-capita income equation) at a given horizon (e.g. 10 years).

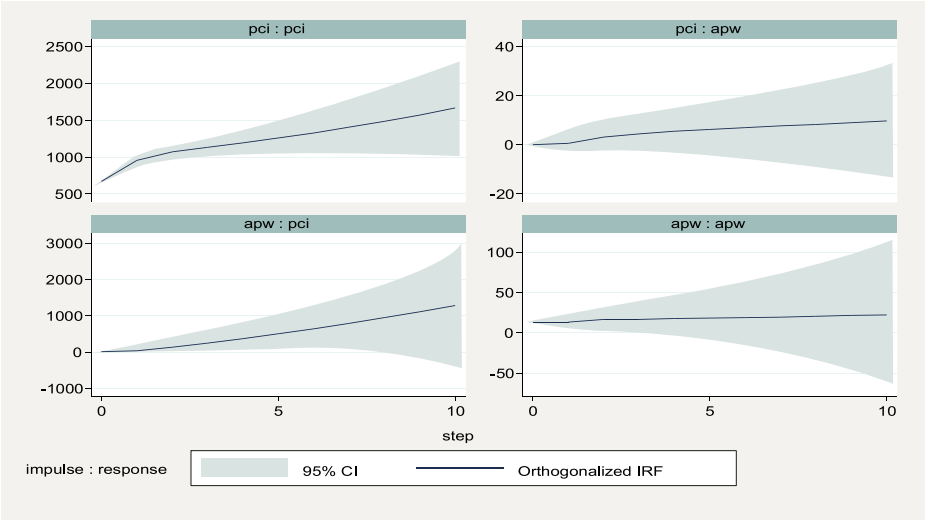
Table 11. Forecast-error variance decomposition

Response variable and forecast horizon			Impulse variable	
			APW	PCI
Full sample (all municipalities)	APW	5	.9536	.0463
		7	.9283	.0716
		10	.8991	.1008
	PCI	5	.0410	.9589
		7	.0950	.9049
		10		.8050
Sub-sample 1 (urban municipalities)	APW	5	.985	.014
		7	.988	.011
		10	.994	.005
	PCI	5	.066	.933
		7	.074	.925
		10	.072	.927
Sub-sample 2 (rural municipalities)	APW	5	.975	.024
		7	.968	.031
		10	.965	.034
	PCI	5	.163	.836
		7	.184	.815
		10	.197	.802

Table 11 provides the forecast decompositions. Generally, for the full sample of municipalities, about 10% of the variation in agricultural value added can be explained by per-capita income, while about 19% of variation in per capita-income (*pci*) can be explained by agricultural value added per worker (*apw*). For both sub-samples of rural and urban municipalities, per capita-income accounts for relatively little (3.4% and 0.5%, respectively) of the variation in agricultural value added. However, the agricultural sector is clearly important to incomes within rural municipalities in particular, as agricultural income here accounts for almost one-fifth of the variation in per-capita income.

The dynamic adjustment patterns are traced out in the IRFs provided in Figures 23–25. The IRF plot displayed in Figure 23 depicts the response of agriculture value added (per-capita income) to an innovation in per-capita income (agriculture value add).

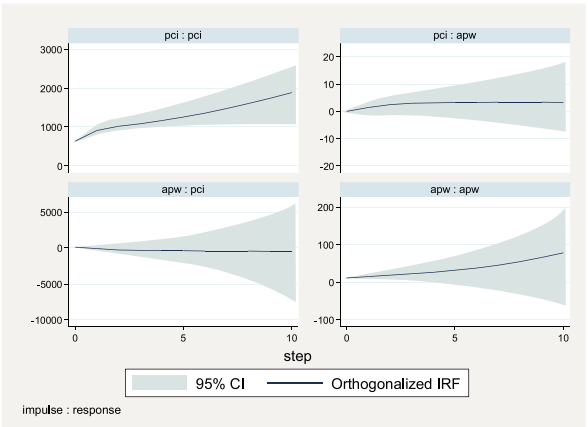
Figure 23. Responses to innovations in apw and pci – full sample



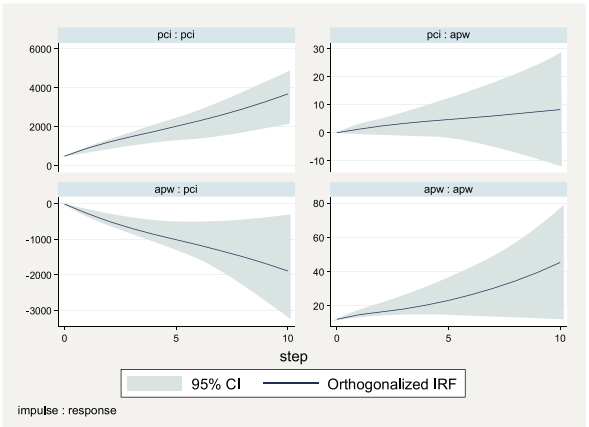
The bottom left quadrant of Figure 23 shows that a positive shock to agriculture value-added leads to an increase in per-capita income. Similarly, the top right quadrant shows that a shock to per-capita income has a positive effect on agriculture value-added. In both cases, these effects persist over a 10-year forecast horizon.

Figures 24 and 25. Responses to innovations in apw and pci

Sub-sample: urban municipalities



Sub-sample: rural municipalities



Figures 24 and 25 show that, for large/urban municipalities, innovations in agriculture value-added (per-capita income) has no impact on per-capita income (agriculture value-added). However, in rural municipalities, innovations cause negative shocks to agriculture value-added and have a persistent negative impact on per-capita income, while positive shocks in per-capita income have a positive impact on future agriculture value-added.

2.4.2 Indirect growth effects

In addition to contributing directly to overall economic growth, the development of the agricultural sector has indirect economic growth effects (see Schultz, 1964; Johnston and Mellor, 1961). These indirect effects occur through three main channels: (a) the *production* channel, through which the agriculture sector forms forward linkages with other economic sectors via agro-processing activities, and backward links via its demand from input supply sectors, (b) the *consumption* channel, which occurs when people within the agriculture sector consume locally produced non-tradable goods, and (c) the *income effects* channel through which increased agricultural productivity serves to lower food prices. Reduced food prices lower the real product wages in the non-agricultural sector, providing a boost to levels of profitability and investment in other non-agricultural sectors. Similarly, reduced food prices would cause real consumption wages to rise, thus providing a direct benefit to poor wage earners in both urban and rural settings.

To gain insights into these channels, the relationship between agricultural and non-agricultural output is explored by applying dynamic panel data techniques to the estimation of Eq.(4). Following Christiansen et al. (2011), separate regressions/estimations of Eq.(4) are carried out for agricultural and non-agricultural per-capita growth using the generalised method of moments (GMM) estimator developed by Arellano and Bond (1991). Both regressions include dummy variables to capture period-specific shocks relating to the effects of the 2008 global financial crises as well as the sudden change in agricultural terms of trade arising from the 2007/08 global food crisis.

To capture the effects of the increased developmental role of the public sector in South Africa's sub-national economies, the lagged share of community services is included in total non-agricultural value added, as an additional exogenous variable in the estimation of the non-agricultural version of Eq.(4). The regressions also include a rural municipality indicator variable to examine whether linkages in municipalities with relatively low per-capita incomes differ from those observed in urban municipalities. Table 12 provides the regression results for the full sample of 234 municipalities as well as the sub-samples of urban and rural municipalities.

Table 12. Sectoral growth linkages. Forecast-error variance decomposition

Panel A: Agricultural per-capita growth	Full Sample (1)	Rural Municipalities (2)	Urban Municipalities (3)
Non-agricultural growth$_{t-1}$	0.0277 (0.114)	**-0.026** (.005) ***	-0.004 (0.014)
Non-agricultural growth$_{t-1}$ *RuralMun	-0.042 (0.124)	---	---
Agricultural growth$_{t-1}$	**-0.221** (0.016)***	**-0.288** (0.15) ***	**-0.187** (0.033) ***
Dummy1 (global financial crisis)	**-3.941** (.441) ***	-0.642 (0.677)	-0.325 (1.469)
Dummy2 (world food crisis)	**9.789** (0.525) ***	**9.643** (0.669) ***	**11.181** (1.52) ***
Panel B Non-agricultural per capita growth			
	(1)	(2)	(3)
Non-agricultural growth$_{t-1}$	**0.242** (0.021) ***	**-0.756** (0.012) ***	**-0.531** (0.087) ***
Agricultural growth$_{t-1}$	**-0.077** (0.016) ***	**0.071** (0.027) ***	-0.001 (0.038)
Agricultural growth$_{t-1}$*RuralMun	-0.001 (0.018)	-----	-------
Dummy1	**3.051** (0.205) ***	**13.226** (1.74) ***	**8.067** (2.89) ***
Dummy 2	-0.304 (.233)	**3.95** (1.83) ***	3.372 (3.037)
Community services share$_{t-1}$	**-63.02** (11.28) ***	44.59 (74.10)	**-114.83** (66.93) *

Note: Panel A shows estimation results using agricultural per-capita growth as the dependent variable, while Panel B depicts the results using non-agricultural per-capita growth as the dependent variable. (*) and (***) denote statistical significance at the 10% and 1% levels, respectively.

Results for the full sample of municipalities indicate that a 1% growth in the non-agricultural sector raises the per-capita growth rate of the agricultural sectors by 0.03 percentage points. Although this effect is not statistically significant, it suggests that the non-agricultural sector creates growth-enhancing linkages with the agricultural sector. In the case of rural municipalities, growth in the non-agricultural sector does not create growth-enhancing linkages but has a negative and statistically significant impact on per-capita agriculture value-added. This finding is consistent with the argument that, as a country's economy expands, growth in the non-agricultural sector leads to resources leaving the agricultural sector, which causes a slow-down in productivity or a decline in overall output.

Similarly, as Table 12 indicates, agriculture has a negative and statistically significant impact on non-agriculture. This result is not surprising given the declining share of agriculture in South Africa's economy, and the increasing linkages within the country's non-agricultural sectors because of the adoption of technology and structural transformations. It mirrors results of similar studies, such as Bravo-Ortega and Lederman (2005) and Tiffin and Irz (2006). The sub-sample of municipalities revealed a more interesting result: a positive (and strongly significant) reverse effect from agriculture to non-agriculture in rural municipalities: a 1% increase in annual per capita growth in the agricultural sector raises the per capita growth rate outside the agricultural sector by 0.07 percentage points.

2.4.3 Participation effects – the impact of sectoral growth on poverty reduction

As explained in Section 2.3 about the Conceptual Framework, the literature provides three main explanations of why the impact of growth on poverty differs across economic sectors.

- People are better able to participate or benefit from growth that occurs in areas where poor people are located. Therefore, agricultural growth will have a larger impact on poverty alleviation than non-agricultural growth because the poor are mainly concentrated in rural areas where their main income source comes from agriculture and related activities (Byerlee et al., 2005; Christiansen et al., 2011).
- Labour intensity is a key factor in determining a particular sector's impact on poverty (e.g. Loayza and Raddatz, 2006; 2010). In rural areas, most poor people's major asset is their unskilled labour, and so growth in the agricultural sector (which in developing countries is mainly labour-intensive) would result in greater poverty reduction than, for example, growth in the less-labour intensive and technology-driven services sector. [20]
- Differences in asset inequality, in particular land ownership, can explain why growth has different poverty-reducing effects across sectors. In countries that have favourable land distribution, income inequality is lower because small and medium farmers are able to cultivate a large share of available land (Bourguignon and Morrisson, 1998). Similarly, in China (where land distribution is relatively equitable) agricultural growth contributed up to four times more to poverty reduction than growth from industry and services (Ravallion and Chen, 2007). In contrast, in countries with high levels of land inequality – India (Ravallion and Datt, 1996) and Pakistan (Dorosh and Haggblade, 2003) – agricultural growth either had the same poverty-reducing effect as the services sector (India) or contributed very little to poverty reduction in rural areas (Pakistan).

To assess whether or not the source of growth matters for poverty reduction, an empirical model is estimated in which different measures of poverty are expressed as linear functions of lagged agriculture and non-agriculture per capita growth as well as interaction terms of the variables that capture the impact of the structure of the non-agricultural sector and the effects of the levels and depth of poverty, respectively. The literature on economic development posits that the presence of a large, non-agricultural sector such as mining/extractive industries can create a "Dutch disease" phenomenon, whereby the real exchange rate appreciates because of increased exports from the non-agriculture sector, which results in reduced growth of the agricultural sector and increased growth of the expanding non-agricultural sector. Failure to account for this could result in an estimation bias, where the effect of the non-agricultural (agricultural) sector is underestimated (overestimated);, a result that could lead to a potentially misleading conclusion: that the agricultural sector, not the non-agricultural sector, has greater poverty-reducing effects. To account for the share of the non-agricultural sector, the share of community services in municipal GVA is used.[21] Following Christiansen et al. (2011), an indicator variable is used, taking a value of 1 if the share is greater than or equal to 25% and zero otherwise.

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[20] Thorbecke and Jung (1996) find that the agricultural sector contributes the most to overall poverty reduction, followed by the services and informal sectors. They also find that, despite the manufacturing sector having the least impact on poverty reduction, the (unskilled) labour-intensive food processing and textiles sub-sectors within manufacturing made relatively large contributions to poverty reduction. Loayza and Raddatz (2010) report similar findings, with growth in the relatively labour-intensive sectors of agriculture, manufacturing and construction having the most poverty-reducing impact, and the capital-intensive mining, utilities and services sectors having the least poverty-reducing effects.

[21] Community services captures economic activities run by the Government and related public-sector institutions.

Three national poverty lines (Stats SA, 2014) were used: (a) the food poverty line, which is the level of consumption below which individuals are unable to purchase sufficient food needed for an adequate diet (those below this line are either consuming insufficient calories or must change their consumption patterns); (b) the lower-bound poverty line, which includes non-food items that individuals obtain by foregoing food; and (c) the upper-bound poverty line, which is defined as the level of consumption at which individuals can purchase adequate food and non-food items. The Rand value of each line is updated annually using CPI prices data (Stats SA, 2014).

Tables 13 to 15 provide the results obtained from applying fixed effects estimation technique to the preferred empirical model in which the three poverty measures are alternated as dependent variables.

Table 13. Impact of sectoral growth on food poverty

Food Poverty Line (Headcount)	All Municipalities		Rural Municipalities		
Country fixed-effects estimate	(1)	(2)	(3)	(4)	(5)
	Coefficient /p-value	Coefficient /p-value	Coefficient/p-value	Coefficient/p-value	Coefficient/p-value
Agriculture growth	-1901 (0.001)***	-2474 (0.000) ***	-2555 (0.000) ***	-2254 (0.000)***	-2920 (0.000)***
Agriculture growth* $Gini_{t-1}$	3215 (0.001)***	3895 (0.000)***	4051 (0.000)***	3835 (0.00) ***	4583 (0.000)***
Agriculture growth* $(poverty/income\ per\ capita)_{t-1}$	--	11797 (0.000) ***	7679 (0.230)	--	14534 (0.000)***
Agriculture growth* (poverty/income per capita)* rural	--	--	3922 (0.473)	--	---
Non-agricultural growth	-1370 (0.460)	-5535 (0.006) **	-5383 (0.008) **	-2430 (0.234)	-6744 (0.003)***
Non-agriculture growth* $Gini_{t-1}$	2411 (0.427)	7786 (0.016)**	7438 (0.019)**	4318 (0.191)	9765 (0.006)***
Non-agriculture growth* 25% community services share	-5 (0.972)	-405 (0.02)**	-396 (0.022)**	-48 (0.735)	-491 (0.009)***
Non-agriculture growth* *$(poverty/income\ per\ capita)_{t-1}$	--	84244 (0.000) ***	103884 (0.003) **	--	89030 (0.000)***
Non-agriculture growth* (poverty/income per capita)* rural	--	--	-18305 (0.497)	--	--

Note: (*), (**) and (***) denote statistical significance at the 10%, 5% and 1% levels, respectively.

Table 13 shows that agriculture has a statistically significant effect on poverty, irrespective of the poverty line used (columns **(1)** and **(4)**, respectively). A 1% increase in agricultural growth per capita leads to the food poverty headcount reducing by about 1900 persons across all municipal types, and by about 2300 people across rural municipalities. However, when the depth of poverty and the presence of a large public sector are taken into account, this significant poverty-reducing effect is dampened. While both agricultural and non-agricultural growth has statistically significant (food) poverty-reducing effects, the effect of non-agricultural growth is on average 2.24 times (-5535/-2474) greater than agricultural growth for all municipal types, i.e. urban and rural – see column **(2)**, and on average 2.3 times higher for rural municipalities – see column **(5)**.

Tables 14 and 15 present the estimation results that serve to assess whether the reported findings detailed in Table 11 are consistent with other measures of poverty.

Table 14. Impact of sectoral growth on lower-bound poverty (LBP)

Lower-Bound Poverty Line (Headcount)	All Municipalities			Rural Municipalities	
Country fixed-effects estimate	(1)	(2)	(3)	(4)	(5)
	Coefficient /p-value	Coefficient /p-value	Coefficient/p-value	Coefficient/p-value	Coefficient/p-value
Agriculture growth	-1988 (0.001)***	-2670 (0.000) ***	-2764 (0.000) ***	-2301 (0.000)***	-3039 (0.000)***
Agriculture growth* $Gini_{t-1}$	3371 (0.001)***	4185 (0.000)***	4361 (0.000)***	3908 (0.00)***	4757 (0.000)***
Agriculture growth* (poverty/income per capita)$_{t-1}$	--	13047 (0.000) ***	8891 (0.173)	--	15421 (0.000)***
Agriculture growth* (poverty/ income per capita)* rural	--	--	4025 (0.485)	--	---
Non-agricultural growth	-795 (0.665)	-4707 (0.018) **	-4506 (0.022)**	-1822 (0.363)	-5893 (0.007)**
Non-agriculture growth* $Gini_{t-1}$	1457 (0.628)	6499 (0.04)**	6029 (0.053)**	3297 (0.308)	8432
(0.014)***	-5 (0.972)	-405 (0.02)**	-396 (0.022)**	-48 (0.735)	-491 (0.009)***
Non-agriculture growth* 25% community services share	27 (0.850)	-354 (0.04)**	-341 (0.05)**	-24 (0.861)	-446 (0.016)***
Non-agriculture growth* *(poverty/income per capita)$_{t-1}$	--	79611 (0.000) ***	107508 (0.003)**	--	84393 (0.000)***
Non-agriculture growth* (poverty/income per capita)* rural	--	--	-25959 (0.360)	--	--

Note: (*), (**) and (***) denote statistical significance at the 10%, 5% and 1% levels, respectively

Table 14. Impact of sectoral growth on lower-bound poverty (LBP)

Lower-Bound Poverty Line (Headcount)	All Municipalities			Rural Municipalities	
Country fixed-effects estimate	(1)	(2)	(3)	(4)	(5)
	Coefficient /p-value	Coefficient /p-value	Coefficient/p-value	Coefficient/p-value	Coefficient/p-value
Agriculture growth	-1759 (0.001)***	-2370 (0.000) ***	-2448 (0.000)***	-1963 (0.000)***	-2617 (0.000)***
Agriculture growth* $Gini_{t-1}$	2964 (0.001)***	3712 (0.000)***	3855 (0.000)***	3329 (0.00)***	4084 (0.000)***
Agriculture growth* (poverty/income per capita)$_{t-1}$	--	11510 (0.000) ***	8486 (0.123)	--	13395 (0.000)***
Agriculture growth* (poverty/ income per capita)* rural	--	--	2984 (0.553)	--	---
Non-agricultural growth	-142 (0.929)	-3271 (0.06)*	-3085 (0.072)*	-1190 (0.488)	-4528 (0.015)**
Non-agriculture growth* $Gini_{t-1}$	338 (0.897)	4368 (0.112)	3926 (0.148)	2220 (0.422)	6429
(0.014)***	(0.027)**	-405 (0.02)**	-396 (0.022)**	-48 (0.735)	-491 (0.009)***
Non-agriculture growth* 25% community services share	54 (0.683)	-253 (0.108)	-240 (0.126)	-19 (0.878)	-366 (0.021)**
Non-agriculture growth* *(poverty/income per capita)$_{t-1}$	--	63956 (0.000) ***	91089 (0.004)**	--	69370 (0.000)***
Non-agriculture growth* (poverty/income per capita)* rural	--	--	-25223 (0.312)	--	--

Note: (*), (**) and (***) denote statistical significance at the 10%, 5% and 1% levels, respectively

The coefficient estimates listed in Tables 14 and 15 mirror the reported findings in Table 13. Growth within the agriculture sector has significant poverty-reducing effects and can be a powerful tool for raising households above the three poverty lines. However, when a large public sector is present and the depth of poverty is accounted for, growth in non-agriculture per-capita value added is a more powerful tool for reducing the headcount of persons living below all three poverty measures.

2.5 Concluding Remarks

Despite almost two decades of efforts aimed at restructuring the county's agrarian economy, most of South Africa's rural areas remain characterised by high levels of poverty and inequality. This raises concerns about the efficacy of agricultural support programmes in achieving growth and reducing rural poverty in line with the government's stated objective of creating a vibrant and inclusive rural economy. While agriculture remains an important source of sustenance in rural areas with weak economic bases, its contribution to overall economic activity in rural areas is less significant than is generally perceived: agriculture accounts for 30% or more of total gross value added (GVA) in only 48 municipalities, or about 21% of all municipalities, of which 43 are classified as rural (i.e. category B3 and B4 municipalities). The relatively small share of agriculture in economic output/activities of rural municipalities has called into question government's emphasis on agriculture-led rural development strategy, and whether it is the most viable policy to generate growth required for development and poverty reduction, and facilitate the participation of the majority of poor people in economic activities within rural spaces.

The argument for policies aimed at agricultural growth and development within rural economies is that economic growth in the agriculture sector results from the export of surplus resources. The empirical evidence indicates that agricultural activities represent an important driver of incomes and local economic growth in rural municipalities because of its positive effect on non-agricultural sectors. In contrast, growth within the non-agricultural sector can lead to resources leaving the agricultural sector, causing a slow-down in productivity growth or a decline in overall value added output. Growth within the agriculture sector exerts significant poverty-reducing effects and can be a powerful tool for lifting people above the three poverty levels. However, this comparative edge over growth in the non-agricultural sector declines in the presence of a large public sector and deep poverty. In such instances, growth in non-agriculture per-capita value added is a more powerful tool in reducing the headcount of persons living below all three poverty levels.

2.6 Recommendations

With respect to creating conditions for rural development from agriculture-led growth, the Commission recommends that:

1. The Department of Agriculture, Forestry and Fisheries enhances agricultural productivity by establishing a framework for implementing, evaluating and monitoring key agricultural grants targeted at subsistence and small-scale farmers.
2. Agriculture-related intergovernmental transfers are distributed across recipient provinces in a manner that promotes equity and ensures access for targeted groups, especially emerging and subsistence farmers located within rural provinces and municipalities. This can be achieved through expanding the current disbursement criteria to incorporate weights for a province's share of national rural population, the proportion of a province's rural population with incomes below official poverty levels/measures, and the extent to which the rural population in a province participates in subsistence and smallholder farming.
3. A framework is established to supplement rural development initiatives. The framework would facilitate greater coordination and communication among departments and public entities tasked with driving rural development through entrepreneurial programmes, which create linkages between agriculture and non-agricultural sectors.

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