Agricultural Trade, Policy Complementarities and Poverty: The Role of Agricultural Trade and Policy Complementarities in Poverty Reduction in South Africa

Moses H. Lubinga

*National Agricultural Marketing Council, Block A, 4th Floor, Meintjiesplein Building,
536 Francis Baard Street, Arcadia, Pretoria, Private Bag X935,
Pretoria 0001, South Africa
E-mail: <moseslubinga@yahoo.co.uk>, <Hlubinga@namc.co.za>*

ABSTRACT This paper set out to answer the question as to whether South Africa's growth in agricultural export performance was associated with poverty reduction during the period 1996-2014. The paper evaluated the effects of export intensity and policy complementarities on poverty levels using agricultural data, disaggregated on the basis of end use category. Relative poverty was used as a proxy for poverty while export intensity was interrelated with access to credit, level of education and governance systems as proxies for policy complementarities. A Two-Stage Least Squares estimator was used to control the causal relationship between exports and poverty. The researcher found that exports and imports of household consumables, good governance, education and increased access to credit significantly reduce poverty levels. It is recommended that people's education levels be enhanced, people's confidence in government institutions be increased, and the financial sector's scope and depth be extended. Furthermore, imports of final consumption goods not produced in sufficient quantities (or at all) in South Africa should be promoted.

INTRODUCTION

Effective participation in markets (Gani and Adeoti 2011; World Bank and WTO 2015; Van den Broeck et al. 2017) in the presence of coherent policies is believed to be a key means through which rural poverty is alleviated. Policy frameworks like preferential trade agreements aim to increase export performance, thereby stimulating economic development. Despite positive export performance trends, poverty remains a challenge in South Africa (Maseko et al. 2015). Existing literature (for example, McCaig 2011; Brambilla et al. 2012; Le Goff and Singh 2014; Thelle et al. 2015; Brambilla and Porto 2016) reveals that trade induces both positive and negative poverty reducing effects, thus implying no clear linkage between trade performance and poverty reduction. Winters et al. (2004) note that no general conclusion can be arrived at about the trade-poverty nexus but the long-term view suggests that trade does contribute to poverty reduction. This is also reported by Dollar and Kraay (2004), Beck et al. (2007), Thelle et al. (2015), and Singh and Huang (2015).

Earlier work (Dollar and Kraay 2004; Chang et al. 2009; Loayza et al. 2005; Guillaumont and Kpodar 2011; Kpodar and Singh 2011; Le Goff and Singh 2014; Singh and Huang 2015; Thelle et al. 2015) was based on aggregated trade data. Yet in today's globalised world, Global Value Chains (GVCs) are becoming increasingly prevalent, fuelling a growing trend towards the production of specialised goods. This is largely the result of the fragmentation of production processes, which has globally transformed the process of trading across borders. Studies by Topalova (2010), McCaig (2011), Brambila et al. (2012), Brambilla and Porto (2016) and Van den Broeck et al. (2017) also address the trade-poverty nexus but their analytical frameworks (mainly skewed towards microdata) are beyond the scope of this particular paper. Global Value Chains (GVCs) account for more than sixty percent of global trade, with an estimated twenty percent growth rate in value-added trade being recorded since the early 1990s (Fundira 2016).

It is not uncommon to find that recent datasets assembled by the Organisation for Economic Co-operation and Development (OECD)

of a number of economically comparable countries with roughly the same trade volumes, exhibit varying proportions of goods categorised by end use (that is, capital, intermediate or household consumption). This suggests that any country's policy process should be informed by the actual nature of trade flows in the context of GVCs (that is, the end use category of goods traded). For instance, it is important for a country to know whether its imports and exports comprise more capital, intermediate or household (consumption) goods so that appropriate policies can be designed that deliver on stated economic development goals.

Objective

This paper seeks to empirically respond to the question as to whether South Africa's growth in agricultural export performance was associated with poverty reduction during the period 1996-2014. The study precisely evaluates the effects of export intensity and policy complementarities on poverty levels using agricultural data disaggregated on the basis of end use category. The concept of policy complementarity can be explained as the mutually reinforcing benefits of policies that, together, appear critical for stimulating development (Aziz and Westcott 1997; Ok 2004).

As distinct from the work of other scholars (for example, Le Goff and Singh 2014; Thelle et al. 2015; Oh and Lee 2017), the novelty of this paper is five-fold. First, agricultural export data used in the analysis was disaggregated on the basis of end use category (that is, intermediate and household consumption). The advantage of disaggregated export flows is that it is possible to identify the nature of the goods that a country prioritises for the purpose of addressing economic development-related challenges, such as the problem of ballooning poverty in the country (standing at 36% in 2012) (Alexander 2013; Van Heerden 2016). In addition, the measure of export intensity on the basis of intermediate or final household consumption goods reveals how the domestic market deals with imports, given that imports impact the country's export competitiveness. Notably, the existing literature generalises all developing countries and none of the reviewed studies focuses on specific sectors such as agriculture; yet more than fifty percent of the population in developing

countries depends on agriculture for their livelihood. This paper is unique in that it analyses the direct poverty reduction effects of sector-specific trade flows disaggregated by end use category.

Second, this paper deviates from the traditional measures of poverty– that is, the poverty head count ratio and poverty gap (Guillaumont and Kpodar 2011; Le Goff and Singh 2014; Singh and Huang 2015; Thelle et al. 2015; Oh and Lee 2017). Instead, relative poverty is used. Relative poverty refers to people living in households with incomes below the poverty income (Allexander 2013; Van Heerden 2016). In 2012, the monthly poverty income was established to start at R1450 for a one member household and to rise to R5170 for eight or more members in a household. The relative poverty measure is advantageous given that it directly relates to the real socio-demographic situation in South Africa. According to the National Planning Commission (NPC) established by the Presidency in 2010, as cited by Alexander (2013), South Africa does not have a single official poverty line.

Third, corruption, which is a governance-related measure indicating the extent to which individuals use public power for their own interests, is introduced in the specified model.

Fourth, the paper is based on a smaller-than-normal sample (one country) so as to avert the heterogeneity problem (Le Goff and Singh 2014; Singh and Huang 2015) that could arise when a large sample is used, as evidenced in differences in the factors that explain poverty across different countries. Jolliffe and Serajuddin (2015) provide evidence that discredits the assumption that global poverty estimates based on poverty counts from all countries are comparable.

Finally, the paper employs the Two-Stage Least Squares (2SLS) estimation technique, unlike previous studies (Dollar and Kraay 2004; Chang et al. 2009; Kpodar and Singh 2011; Le Goff and Singh 2014; Thelle et al. 2015) which were anchored in the System of Generalized Method-of-Moment (GMM) estimator. Like the GMM, the 2SLS estimator controls for both fixed effects and the direction-specific cause and effect association between interrelated variables.

METHODOLOGY

To ascertain the extent to which the growth of agricultural exports (export intensity) affects

the level of poverty in South Africa, agricultural exports disaggregated by end use category (into intermediate and final household consumption) were used. The data was obtained from the OECD database. Furthermore, relative poverty was used given that data was available for all the years under consideration. The average relative poverty for 2010-2012 was used as the proxy for 2013 and 2014. Data for relative poverty was obtained from South Africa's survey publications produced by IRR and ICRA (2013) and IRR (2016).

The effect of export intensity on poverty outcomes was isolated from other determinants of poverty which could also influence export flows by including other variables. Among other variables, South Africa's import intensity was included but its computation was also decomposed in terms of intermediate and final household consumption. The inclusion of import intensity was motivated by the fact that agricultural imports could lead to more competition in the domestic market, thereby crowding out local production in certain sectors. Hence, it is probable that competition from such imports could lead to higher poverty levels. Heightened poverty arises especially if the product types being imported are also those substantially produced by the poor.

In line with the work of Le Goff and Singh (2014) and Thelle et al. (2015), other variables such as the level of education, governance, access to financial credit and the Consumer Price Index were included. The level of education was measured using Barro-Lee's indicator, defined as the percentage share of the non-educated aged 15 or more of the country's population. The indicator is presented at five-year intervals but given that this paper uses annual data, the five years were assigned the same value of the indicator, thereby differing from the approach used by Thelle et al. (2015). For instance, the percentage of South Africa's population aged 15 or more with no education between 2006 and 2010 was 5.65 percent. Therefore, each year during that period was assigned the value of 5.65 percent to account for the level of education. Data for Barro-Lee's indicator was obtained from the education statistics database of the World Bank.

Access to credit refers to the percentage of domestic credit (based on Gross Domestic Product (GDP)) available to the private sector. The

Consumer Price Index, in turn, was used as a proxy for macroeconomic stability. Sets of data for GDP and the Consumer Price Index were obtained from the World Bank's development indicators. The estimate for the level of corruption reflects citizens' perceptions of how public servants misuse their entrusted authority for their own benefit. The index starts at -2.5 and goes up to 2.5. The higher the index, the greater is the perception that public servants do not misuse their power. An average of two years was used in case a given year had missing data. Index estimates were obtained from the World Bank governance indicators.

Export intensity and poverty are interdependent; hence, there is no certainty as to the direction of the causal relationship between these two and other control variables. Therefore, the estimation of the Ordinary Least Squares (OLS) was inappropriate given that the estimates become biased due to endogeneity problems. A Two-Stage Least Squares (2SLS) estimator was thus used. The estimator is based on the assumption that exogenous variables correlate with relative poverty but are uncorrelated with the error. Since the analysis used time series data, instrumental variables were regarded as the lagged values of the endogenous variables given that lagged values are less likely to be affected by current shocks. In other words, while poverty levels may affect export intensity and vice versa, it is less likely that export intensity can influence previous poverty levels. Because the sample was small (one country scenario), few instrumental variables were used in order to avoid biased estimates of the endogenous variables (Roodman 2009).

Since the estimator brings into perspective the fact that the poverty outcome in the future may be influenced by the current poverty outcome, a lagged variable of the poverty outcome was also included; this implied that a dynamic model was estimated. A simple fixed static model was also run to compare estimates with those obtained from the dynamic model. The generic specified model is expressed as follows:

$$Pov_{i,t} = \beta_1 Pov_{i,t-1} + \beta_2 (\frac{X}{GDP})_{1,t}$$
$$+ \beta_3 (\frac{M}{GDP})_{1,t} + \beta_4 Z_{i,t} + \varepsilon_{i,t} \qquad (1)$$

Where, $Pov_{i,t}$ denotes relative poverty in a given year t as a function of the relative poverty

in the previous period ($Pov_{i,t-1}$), export intensity in agricultural goods (whether total, intermediate or final household consumables) ((X/GDP)$_{1,t}$), intensity of imported agricultural goods ((M/GDP)$_{1,t}$) and a vector of covariates ($Z_{i,t}$) as discussed earlier. All variables were expressed in natural logarithms except for corruption. To further check if the effect of export intensity was influenced by contemporary policies, the generic model was extended by separately interacting export intensity with education, access to credit and corruption, as was done by Chang et al. (2009), Le Goff and Singh (2014) and Thelle et al. (2015).

RESULTS AND DISCUSSION

The baseline results in terms of total agricultural exports are presented in Table 1. With the exception of the corruption variable which was not log transformed, coefficients of all the other variables are interpreted as elasticities. Hence, a negative coefficient suggests a decrease in relative poverty among South African households, while the reverse is also true. Both the static and dynamic model estimates obtained – without individually interacting export intensity with education, access to credit and corruption – indicate that intensifying agricultural exports on their own have no significant effect on the poverty outcomes in South Africa.

Only increased stability of the macroeconomic environment was noted to contribute towards poverty reduction by about 37.9 percent (-0.379, p<0.01), while a unit increase in the uneducated portion of the population and poverty level of the previous period are associated with 8.5 percent (0.085, p<0.01, for static model) and 57.7 percent (0.577, p<0.01, for dynamic model) rise in relative poverty. This concurs with the findings of Kanayo (2013) and Maseko et al. (2015) who argue that the failing education system is a hindrance to poverty alleviation. According to Bangura and Kim (2017), having educated citizens' leads to effective and efficient institutions, thereby fostering coherent systems through which poverty can be alleviated. The researchers also argue that education indirectly contributes towards poverty reduction by minimising expenditure on other aspects of day-to-day life, such as medical care.

When the interrelated variables of export intensity and access to credit, export intensity and education, and export intensity and corruption were introduced, export intensity still exhibited no significant effects on poverty outcomes but significant poverty reducing effects were observed to emanate from agricultural imports, particularly for the dynamic model. The statistically significant negative estimate (-0.147, p<0.10) suggests that a unit increase in the import intensity of agricultural goods leads to a 14.7 percent reduction in poverty outcomes. The poverty reduction effects associated with agricultural imports may be attributed to the importation of household consumables, especially major food items like wheat (100199) and rice (100630) given that they do not necessarily crowd out local production. Realistically, South Africa does not produce rice while the quantity of wheat produced cannot meet the domestic market demand.

Therefore, the findings suggest that the importation of such food items may not necessarily pose a competitive threat to local producers. Some food items like rice are subject to duty-free access into South Africa, making them more affordable to the poor populace. This concurs with the arguments advanced by Idan et al. (2014) and Oh and Lee (2017). Idan et al. (2014) posit that lower food prices effectively increase the incomes of net food purchasers, which in the process reduces the level of poverty, while Oh and Lee (2017) argue that imports are more competitive due to labour market attributes. Apparently, significant estimates (-0.074, p<0.05, for static model and -0.068, p<0.05, for dynamic model) obtained on the interaction term between export intensity and access to credit suggest that a one percent increase in export intensity coupled with increasing access to credit is on average associated with a 7.1 percent reduction in relative poverty.

Conversely, significant estimates (0.165, p<0.01, for static model and 0.127, p<0.05, for dynamic model) obtained on the interrelated variables of export intensity and education imply that a one percent increase in export intensity amidst an increasing share of the uneducated on average leads to an approximate 14.6 percent rise in poverty. Furthermore, poverty reducing effects were observed to emanate from increased access to credit (-0.945, p<0.05 for static model and -0.870, p<0.05 for dynamic model) and an improved perception that South Africa has good governance (the level of corruption is perceived to be low in this case). However, the estimates

Table 1: Baseline results on the effect of total agricultural exports (intermediate and household consumption goods) on relative poverty

| Variable | Dependent variable = Relative poverty (%) (No policy interaction terms) | | | | | | Dependent variable = Relative poverty (%) (With policy interaction terms) | | | | | |
| | Static model | | | Dynamic model | | | Static model | | | Dynamic model | | |
	Coefficient	Std error	p-value	Coefficient	Std error	p-value	Coefficient	Std error	p-value	Coefficient	Std error	p-value
Export intensity (log)	-0.029	0.234	0.905	0.149	0.169	0.398	-0.082	0.168	0.639	0.144	0.204	0.503
Import intensity (log)	-0.085	0.104	0.432	-0.105	0.071	0.166	-0.115	0.077	0.173	-0.147*	0.072	0.081
Population share with no education (log)	0.085***	0.024	0.005	0.025	0.023	0.293	2.018***	0.536	0.006	1.532**	0.565	0.030
Access to credit (log)	0.015	0.027	0.594	-0.010	0.019	0.625	-0.945**	0.342	0.025	-0.870**	0.312	0.027
Macroeconomic stability (CPI) (log)	-0.281	0.163	0.113	-0.379***	0.113	0.007	-0.060	0.154	0.706	-0.247	0.178	0.209
Corruption	-0.179	0.141	0.231	-0.164	0.095	0.116	-0.278**	0.105	0.029	-0.208*	0.104	0.087
Poverty of the last period (log)	-	-	-	0.577***	0.154	0.004	-	-	-	0.387	0.232	0.139
Export intensity* Access to credit	-	-	-	-			-0.074**	0.027	0.026	-0.068**	0.025	0.029
Export intensity* no Education	-	-	-	-			0.165***	0.045	0.007	0.127**	0.047	0.030
Export intensity* Corruption	-	-	-	-			-0.013	0.007	0.108	-0.003	0.008	0.710
Constant	3.359	2.255	0.165	3.699**	1.526	0.036	1.838	1.653	0.299	3.518*	1.801	0.092
R-squared	0.934			0.973			0.982			0.978		
Adjusted R-squared	0.897			0.953			0.962			0.969		
Root MSE	0.031			0.021			0.019			0.017		

***, **, * denote significant at 1 percent, 5 percent and 10 percent level, respectively
Source: Author

on the variable for corruption must be interpreted cautiously, as illustrated in the following expression: $[(2.718281828^\wedge (\text{estimate}))-1]\ ^*100$. Therefore, the significant estimates for the static and dynamic models suggest that a unit increase in the perception that the country is not corrupt is on average associated with a 21.4 percent reduction in poverty outcomes for both models. However, an increase in export performance amidst a growing uneducated portion of the population on average worsens poverty levels by 177.5 percent. Given that export intensity on its own did not exhibit significant effects on relative poverty, as shown by the baseline results (Table 1), the reduction in relative poverty upon the introduction of the interaction terms may be attributed to the influence of access to credit and good governance.

Results based on robust checks (Table 2) further affirm that both intermediate and household consumption export intensities have no significant effects on poverty outcomes without the interaction terms between export intensities and the individual policy complementarities. However, the statistically significant negative estimates (-0.183, $p<0.05$ for static model and -0.095, $p<0.10$ for dynamic model) on import intensity for household consumable agricultural goods suggest that a one percent increase in household agricultural consumable imports on average leads to a 13.9 percent reduction in poverty among South African households. This concurs with the earlier argument that such imports, especially food items, do not crowd out local production. The other variables that are associated with poverty reduction are good governance (no corruption) and macroeconomic stability, while poverty outcomes of the previous period and an increase in the proportion of uneducated people in South Africa worsen poverty levels. These findings also concur with the baseline results.

Results based on the interactions of policy complementarities with export intensity are presented in Table 3. The statistically significant negative estimates on export intensity for the intermediate (0.152, $p<0.05$) and the household consumption (0.201, $p<0.10$; average value) exports suggest that in the presence of coherent domestic policies, exports of those goods are associated with a 15.2 percent and a 20.1 percent (average) reduction in poverty outcomes, respectively. The high level of poverty reduc-

tion outcomes for household consumption exports could be attributed to the fact that South Africa dominates in the export of household consumables. As earlier observed in the baseline results and findings in Tables 2 and 3 (household consumption goods), it is clear that intensifying imports of household consumables exhibit very significant poverty reducing effects at all levels.

Results further reveal that the estimate of the individual interaction of export intensity with increased access to credit for intermediate goods is significantly associated with poverty reduction by six percent. The coefficients (0.140, $p<0.009$, for static model and 0.104, $p<0.053$, for dynamic model) of the interaction between export intensity and education suggest that increasing exports of intermediate goods together with an increasing proportion of uneducated people aggravates poverty outcomes by 10.4 to 14 percent. The results concur with the views of Bangura and Kim (2017).

CONCLUSION

In the absence of coherent domestic policies (policy complementarities), agricultural exports were found not to be significant in influencing poverty outcomes in South Africa. Poverty reduction is strongly enhanced if the increase in export intensity is supported by better access to credit. Agricultural imports coupled with favourable domestic policies exhibit significant effects in reducing poverty outcomes, especially in the case of household consumption goods, which is probably due to food imports that do not necessarily crowd out local production. A large proportion of uneducated people have far-reaching negative effects on poverty outcomes, while increasing agricultural exports in a well-governed economy leads to promising results in terms of poverty reduction outcomes. In a nutshell, South Africa's growing trade performance in the agricultural sector contributes to poverty reduction. However, greater poverty alleviation could be achieved in the presence of supportive and coherent domestic policies.

RECOMMENDATIONS

Based on the empirical findings, the paper makes the following recommendations: First, South Africa should export more final house-

Table 2: Effect of agricultural exports disaggregated by end use category on relative poverty (No policy interaction terms)

Dependent variable = Relative poverty (%)

Category of export	Intermediate exports						Household consumption exports					
	Static model			Dynamic model			Static model			Dynamic model		
	Coeffi-cient	Std error	p-value	Coeffi-cient	Std error	p-value	Coeffi-cient	Std error	p-value	Coeffi-cient	Std error	p-value
Export intensity (log)	-0.097	0.057	0.116	-0.007	0.051	0.887	0.148	0.170	0.401	-0.062	0.063	0.344
Import intensity (log)	-0.056	0.047	0.258	-0.040	0.035	0.276	-0.183**	0.083	0.051	-0.095*	0.041	0.041
Population share with no education (log)	0.082***	0.025	0.008	0.030	0.025	0.253	0.063**	0.027	0.041	0.014	0.021	0.531
Access to credit (log)	0.037	0.030	0.254	0.005	0.024	0.829	0.011	0.025	0.655	0.019	0.021	0.371
Macroeconomic stability (CPI) (log)	-0.293**	0.099	0.013	-0.288***	0.073	0.003	-0.335**	0.149	0.046	-0.118	0.095	0.242
Corruption	-0.264*	0.123	0.056	-0.221**	0.092	0.036	-0.168	0.098	0.114	-0.174**	0.067	0.026
Poverty of the last period (log)	-	-	-	0.578***	0.180	0.009	-	-	-	0.469**	0.133	0.006
Constant	-2.772**	0.998		0.018	2.204**	0.755	0.015	4.227**	1.799	0.038	0.307	1.138
R-squared	0.935			0.968			0.940			0.979		
Adjusted R-squared	0.899			0.945			0.907			0.964		
Root MSE	0.031			0.023			0.030			0.019		

***, **, * denote significant at 1 percent, 5 percent and 10 percent level, respectively

Sources: Author

Table 3: Effect of agricultural exports disaggregated by end use category on relative poverty (With policy interaction terms)

Dependent variable = Relative poverty (%)

Category of export	Intermediate exports						Household consumption exports					
	Static model			Dynamic model			Static model			Dynamic model		
	Coeffi-cient	Std error	p-value	Coeffi-cient	Std error	p-value	Coeffi-cient	Std error	p-value	Coeffi-cient	Std error	p-value
Export intensity (log)	-0.152**	0.049	0.014	-0.096	0.072	0.221	-0.172**	0.070	0.036	-0.245*	0.110	0.057
Import intensity (log)	0.006	0.041	0.889	-0.005	0.042	0.904	-0.212***	0.038	0.000	-0.229***	0.044	0.001
Population share with no education (log)	1.909***	0.531	0.007	1.420*	0.703	0.083	0.682	0.570	0.262	0.351	0.694	0.627
Access to credit (log)	-0.832*	0.285	0.019	-0.628	0.343	0.110	0.093	0.277	0.745	0.369	0.425	0.411
Macroeconomic stability (CPI) (log)	-0.239**	0.087	0.025	-0.267**	0.090	0.021	-	-	-	-	-	-
corruption	-0.403***	0.096	0.003	-0.343**	0.111	0.018	1.001	1.249	0.443	2.233	1.907	0.275
Poverty of the last period (log)	-	-	-	0.267	0.253	0.327				-0.286	0.332	0.413
Export intensity * Access to credit	-0.060**	0.020	0.016	-0.046	0.024	0.103	0.006	0.022	0.799	0.028	0.034	0.437
Export intensity * no Education	0.140***	0.041	0.009	0.104*	0.053	0.088	0.052	0.046	0.289	0.023	0.058	0.706
Export intensity * Corruption	-0.008	0.006	0.245	-0.004	0.007	0.614	0.089	0.102	0.406	0.188	0.155	0.258
Constant	3.033***	0.888	0.009	2.741**	0.924	0.021	-1.590	0.977	0.138	-1.767	1.011	0.119
R-squared	0.976			0.979			0.984			0.985		
Adjusted R-squared	0.949			0.950			0.969			0.969		
Root MSE	0.022			0.022			0.017			0.017		

***, **, * denote significant at 1 percent, 5 percent and 10 percent level, respectively
Sources: Author

hold consumable agricultural products. These products are linked to broad value chains through which many people generate incomes. Second, there is a need to enhance the education of the population. Third, public institutions with governance responsibilities should perform their work more efficiently and with greater transparency in order to boost people's confidence in the country's systems of governance. Fourth, in order to reduce the financial bottlenecks frequently encountered by the business community, user-friendly policies should be designed that would improve access to financial resources by the private sector. In addition, there is a need to expand the scope and depth of the financial sector. Finally, the importation of household consumable goods, particularly those that are not produced in sufficient quantities (or at all) in the country, should be encouraged.

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