Asymmetric Response of Poverty to Growth and Inequality in South Africa: Implications for Current and Future Shocks

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List of abbreviations and acronyms

ASGISA	Accelerated and Shared Growth Initiative of South Africa
COVID-19	Corona Virus Disease 2019
FE	Fixed Effects
FGT	Foster-Greer-Thorbecke
GDP	Gross Domestic Product
GEAR	Growth, Employment and Redistribution
IES	Elasticity of Intertemporal Substitution
IV	Instrumental Variables
LSMS	Living Standards Measurement Study
MDGs	Millennium Development Goals
NDP	National Development Plan
NIDS	National Income Dynamics Survey
RDP	Reconstruction and Development Programme
SDGs	Sustainable Development Goals
STATSSA	Statistics South Africa
SUR	Seemingly Unrelated Regression
UN	United Nations
UNECA	United Nations Economic Commission for Africa
UNGA	United Nations General Assembly
ZAR	South African Rand

Abstract

This study investigates the effect of economic growth on poverty reduction, given inequality in South Africa. It focuses on whether the poor suffer more losses of welfare during economic recessions and depressions than they gain during expansions, and the factors that can assist the poor to stay afloat during times of economic shocks. Individuals in micro data set are matches with municipality-level data and in binary, truncated, panel, instrumental variables, and quantile regression techniques to estimate poverty and welfare effects of positive and negative economic growth rates. The study finds that, while economic growth reduces poverty, it is not enough to compensate for the poverty-raising effects of inequality. Moreover, economic decline raises poverty, but economic prosperity more than compensates by a higher magnitude. The study also reveals that, social grants and free health care and education policies have limited effects on poverty reduction during economic downturns. The findings call for policy measures that reduce inequality and promote economic growth to help cushion the poor during times of significant economic decline. Additionally, programmes that provide good education up to tertiary level and access to the labour market are crucial for sustaining poverty reduction efforts in South Africa.

1. Introduction

While sustainable economic growth is key to meaningful poverty reduction, poverty itself is the basis for why countries are locked into underdevelopment. Most development stakeholders have recognized poverty reduction as the starting point and the most fundamental aspect in kick-starting development. Thus, the United Nations General Assembly (UNGA, 2000), adopted the Millennium Development Goals (MDGs), with the main goal of eradicating extreme poverty and hunger.

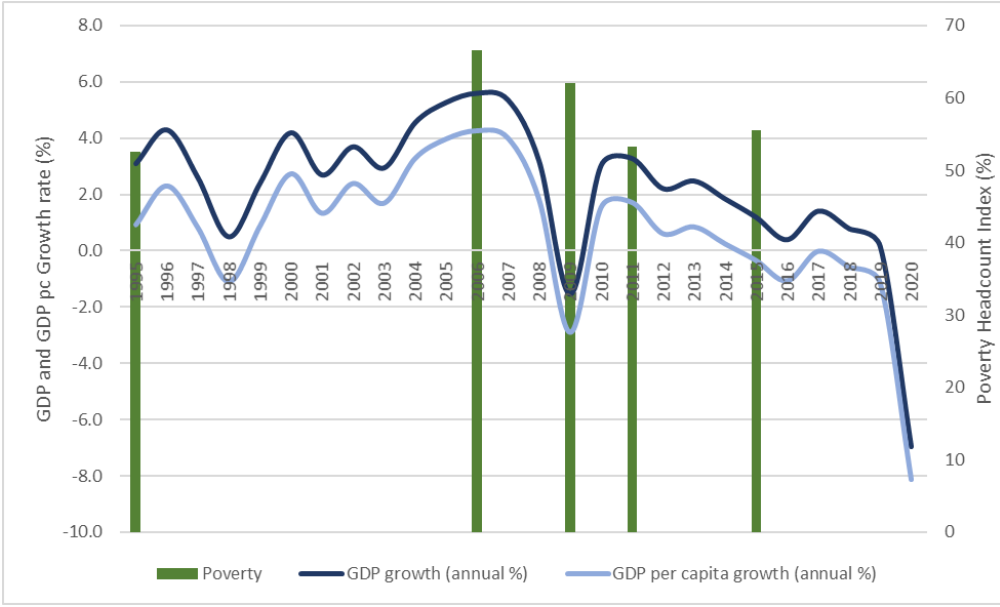
The role of economic growth in poverty reduction has generated intense debate in the development economics circles since 1990. The debate particularly relates to the extent to which economic growth benefits the poor, especially in the developing world. Dollar and Kraay (2002), for example, establish that the average income of the poorest fifth rises proportionately with societal average income. They thus conclude that economic growth generally benefits the poor as much as others. This has been further backed by the success of the Chinese economic growth in reducing poverty since early 1990 (Ngepah & Espoir, 2018). Those who subscribe to this view assert the necessity and sufficiency of economic growth in poverty reduction. At the same time others argue that economic growth tends to raise both income and asset inequality, making it less beneficial to the poor than the rich. Emerging consensus seems to suggest that focusing on growth may be necessary but not sufficient in alleviating poverty for certain countries or regions in the developing world (Besley & Cord, 2007).

Post-apartheid South Africa inherited a very high level of poverty that was predominantly among the black race. Bhorat and Westhuizen (2012) estimated a headcount poverty index[1] to be 52.54 in 1995. During the apartheid era, poverty was seen as an issue only when it touched the white population (Nattrass & Seekings, 2010). The high levels of poverty prompted the South African Government to develop successive waves of poverty reduction policies. The first was the Reconstruction and Development Programme (RDP), with the express objective to decrease poverty and redress past racial economic injustices. However, it lacked a focus on economic growth strategies. This was, therefore, replaced in 1996 by the Growth, Employment and Redistribution (GEAR) policy, aiming to address the problem of unemployment though economic growth. However, despite positive economic growth, employment did not grow commensurately, hence significant poverty reduction was not achieved (Adelzadeh et al., 1998; Changunda, 2006). The Accelerated and Shared Growth

1 Their estimate uses an upperbound poverty line of 322 ZAR at 2000 prices.

Initiative of South Africa (ASGISA) was conceived, focusing among others on achieving a 6% growth rate and poverty reduction. It was premised on supporting small businesses and tackling inefficiencies in the service delivery mechanism, addressing skills shortages, corruption and lack of inter-ministerial policy coordination. This also fell short of its stated objectives. So, in 2012, the government proposed the National Development Plan (NDP), aiming to, among others, generate labour absorptive economic growth rate of at least 7%, and inclusive enough to reduce poverty significantly (World Bank, 2015).

Figure 1: GDP growth, GDP per capita growth and poverty trends in South Africa



Source: Author's compilation using poverty data from Statistics South Africa (2017), and GDP and GDP per capita growth series from the World Development Indicators.

The post-1994 economic growth in South Africa has been described as relatively robust (Bhorat et al., 2020). Economic growth rate rose from the 0.9% average of 1990–1995, to an average of 2.8% in the period 1995–2000, 3.8% in 2000–2005, 3.1% in 2006–2010, before declining to 2.2% in 2011–2015 (Bhorat et al., 2020). From 2016, GDP growth rate has fluctuated from 0.7%, rising to 1.5% in 2018 and falling to -0.2% in 2019 (Figure 1). With the advent of the COVID-19 crises, the GDP fell by 6.5% in 2020.

However, this robust growth story in South Africa has not kept up with the expectation of commensurate poverty reduction relative to other regions of the world with similar or lower growth. The growth–sufficiency paradigm appears not to tally in South Africa. Figure 1 shows that poverty trends have hardly followed the economic growth rate. Poverty headcount at local upper bound poverty line increased from 52.5% in 1995 to 66.6% in 2005, falling marginally to 53.2% in 2011 and rising to 55.5%

in 2015. This picture of South Africa's poverty trend is in line with the situation in the rest of Africa. In terms of US$1.90 poverty line, World Bank (2018) shows that global poverty fell from 35.6% in 1990 to 10.0% in 2015 globally. While most other regions of the world achieved poverty reduction of more than 50%, sub-Saharan Africa recorded only 28% reduction during that period. It is clear that not all economic growths are equal in terms of their poverty reduction abilities.

If this trend and weak coupling of growth with poverty persist, South Africa, together with Africa, will lead the way, not only in terms of high inequality, but also in terms of being home to the world's poorest. As the MDGs transitioned to the Sustainable Development Goals (SDGs), the anti-poverty target in the SDGs is much more ambitious, to end poverty in all its forms (United Nations [UN], 2015). While global poverty is projected to average about 7.4% in 2030, that of sub-Saharan Africa will remain at about 20% (Lakner et al., 2020). This makes Africa and South Africa the harbour of future global poverty by 2030 unless somethings change.

High and persistent inequality has shouldered most of the blames for the weak effect of growth on poverty reduction. Inequality is a key determinant of both the ability of growth to reduce poverty and the level of growth itself (Espoir & Ngepah, 2021; Fosu, 2018a; Ngepah, 2016; Ravallion, 2012). The three issues that inequality poses in this regard are: (1) reduction in economic growth, (2) reduction of poverty-reducing power of growth, and (3) general inefficient use of resources, breeding socio-political instability and unsustainable development. Fosu (2015), for example, points to uneven distribution of the benefit of growth in many parts of sub-Saharan Africa as a major cause of the persistence in poverty. Lakner et al. (2020) show that 1% decrease in Gini index will bring about a greater measure of poverty reduction compared to a percentage point increase in economic growth.

It is not only economic growth that matters for poverty, the type and source of the growth equally matters. South Africa's economic performance is marked by significant episodes of negative growth and the inability to rebound from global crises. For example, since the global financial crises, most African countries managed to navigate relatively safely; South Africa remained under the weight of the crises in terms of its low to negative GDP growth for some time after the crises.

This study, therefore, examines how growth and inequality affect poverty during times of recessions and depressions versus times of economic expansion in South Africa, and what factors can assist to cushion the poor from economic downturns. The key contributions of this study lie in the facts that, while most growth–poverty–inequality relationship are assessed at aggregate level, we propose to map poor individuals in micro-dataset to economic factors like growth, nature of growth, inequality and other individual, household and community characteristics, in their immediate environment (district municipality). This will help in formulating more pointed and more targeted policies for cushioning the poor during economic shocks. Secondly, the issue of asymmetric effects of economic growth on poverty reduction has not been given attention in literature. It is not a given that economic expansion improves the lives of the poor in the same way that economic down-turns deteriorate the welfare of the poor.

2. Brief literature review

Economic growth, inequality, and poverty reduction are three interconnected phenomena that have been extensively studied in the literature. Economic growth is generally seen as a prerequisite for poverty reduction, but the relationship between inequality and poverty reduction is less clear. This review is an overview of the main findings on the relationship between economic growth, inequality, and poverty reduction, and some aspects of poverty reduction policies in South Africa.

Growth, inequality and poverty

Economic growth is often seen as a necessary condition for poverty reduction. Numerous studies have shown a positive association between economic growth and poverty reduction. Dollar and Kraay (2002) pointed that economic growth is associated with a reduction in poverty rates in low- and middle-income countries. They also established that, in the long run, economic growth is associated with a reduction in poverty rates, and that this relationship holds across countries and regions. A strong correlation between economic growth and poverty reduction has also been established, with each percentage point increase in economic growth leading to a 1.7 percentage point decrease in poverty rates. The elasticity is only 0.6% in developing countries (Ravallion & Chen, 2019).

The relationship between economic growth and poverty reduction is not always straightforward. Economic growth can sometimes lead to an increase in inequality, which may undermine poverty reduction efforts (Deaton, 1997). Moreover, the benefits of economic growth may not be evenly distributed, and the poorest segments of society may not benefit from economic growth (Ravallion, 2007). Other studies have also highlighted the role of economic growth in reducing poverty through job creation and income generation. For example, Maloney (2004) found that, in Latin America, job creation through economic growth was the main driver of poverty reduction. Similarly, a study by Khan and Senhadji (2001) found that in sub-Saharan Africa, economic growth was associated with an increase in the number of wage jobs, which in turn led to poverty reduction.

South Africa has experienced relatively low economic growth over the past two decades, averaging just 1.8% annually from 1994 to 2019 (World Bank, 2021a). While there have been some periods of higher growth, such as the early 2000s, growth has

been insufficient to generate significant poverty reduction (Ardington et al., 2020). Low growth has been attributed to factors such as declining productivity, infrastructure constraints, and policy uncertainty (Gelb & Blackden, 2019).

The relationship between inequality and poverty reduction is complex and has been widely debated in the literature. Some studies have found a negative relationship between inequality and poverty reduction, while others have found no significant relationship. Dollar and Kraay (2002) showed that income inequality was negatively correlated with poverty reduction in low- and middle-income countries. Ravallion (2001) reports that a one percentage point increase in the Gini coefficient is associated with a 0.7 percentage point increase in the poverty rate. However, other studies have found no significant relationship between inequality and poverty reduction. For example, Ferreira et al. (2016) find that changes in inequality had little impact on changes in poverty rates in developing countries.

South Africa has one of the highest levels of income inequality in the world, with a Gini coefficient of 0.63 in 2020 (World Bank, 2021b). This inequality is rooted in the country's apartheid history, with unequal access to education, land, and employment opportunities perpetuating income disparities (Nattrass and Seekings, 2010). Inequality has been found to have negative impacts on economic growth, as it reduces human capital development, limits social mobility, and leads to political instability (Haroon, 2020).

Asymmetric effects of economic growth on poverty

Chakravarty and D'Ambrosio (2006) found that the distribution of economic growth matters for poverty reduction, and that growth that benefits the poor has a greater impact on poverty reduction than growth that benefits the rich. Similarly, Fleisher et al. (2010) found that economic growth may not lead to poverty reduction in the short run if the poor are excluded from the benefits of growth. Negative economic growth is often associated with increased poverty and social distress. For example, during the 2008 global financial crisis, many countries experienced negative economic growth, which led to increased unemployment and poverty rates. A study by Ferreira et al. (2015) found that during the crisis, poverty rates increased in many countries, particularly in developing countries.

Some studies have also highlighted the heterogeneity and inconclusive nature of the effects of negative economic growth on poverty reduction. For example, Balakrishnan et al. (2010) found that the impact of negative economic growth on poverty reduction depends on the nature of the shock that caused the contraction, the initial conditions of the economy, and the policy responses of governments. Similarly, a study by Rodríguez-Pose and Di Cataldo (2015) found that the impact of negative economic growth on poverty reduction is mediated by a range of institutional and social factors, such as the quality of governance and the level of social capital.

It is important to note that the impact of economic growth on poverty reduction can vary depending on the specific context and policy measures implemented.

Therefore, further investigation is needed to understand the complex relationship between economic growth and poverty reduction, especially in the context of negative economic growth and economic shocks.

Overall, there is still a significant gap, especially in the wake of the recent financial and health shocks that have negatively impacted economic growth globally and in South Africa. South Africa's case in which earlier post-apartheid economic growth has not sufficiently brought about poverty reduction, which is now being coupled with recessions and long periods of very low economic growth prospects, merits a particular attention.

Poverty Reduction Policies

Poverty reduction policies can help to mitigate the negative effects of economic growth and inequality on poverty rates. Social protection programmes, such as cash transfers and food subsidies, have been shown to be effective in reducing poverty and inequality (World Bank, 2015). Education and health policies can also help to reduce poverty and inequality by increasing human capital and productivity. A study by Barro (2001) found that investments in education were associated with higher economic growth rates, which in turn led to lower poverty rates.

Despite government efforts to reduce poverty, the level of poverty in South Africa remains high, with an estimated 55.5% of the population living below the poverty line in 2020 (Statistics South Africa, 2017). Poverty is concentrated in rural areas, where unemployment and lack of access to basic services are prevalent (Ardington et al., 2020). Despite some progress in reducing poverty levels in the early 2000s, poverty reduction has stalled in recent years (Woolard & Leibbrandt, 2016). The relationship between economic growth and poverty reduction in South Africa has been found to be weak, with growth having little effect on reducing poverty (Leibbrandt et al., 2019). Inequality has been found to be a major barrier to poverty reduction in South Africa, with income disparities limiting access to education, health care, and employment opportunities (Haroon, 2020).

3. Methodology

Inequality–growth–poverty framework

The theoretical foundations upon which frameworks assessing both inequality and income/growth elasticities of poverty have been built on the 'identity' model first derived by Bourguignon (2003). The model is based on an approximation of a log normal distribution of income allowing for inter-country and intertemporal heterogeneity (Epaulard, 2003). Many authors have applied this model (e.g., Fosu, 2009, 2015, 2018b; Kalwij & Verschoor, 2007). The identity model links poverty to mean income, inequality, and the ratio of poverty line to mean income. The two theoretical frameworks due to Epaulard (2003) and Bourguignon (2003) arrive at similar functional forms. We present the version of Epaulard just to give a sound theoretical basis for this analysis.

The version approximates income distribution with a standard log normal function, with parameters estimated using the per-decile distribution. The cumulative distribution of income (x) and mean income c, with dispersion σ, capturing the degree of inequality, and a density function φ is given by:

$$F(x) = \frac{1}{\sqrt{2\pi\sigma^2}} \int_{-\infty}^{lnx} e^{-\frac{(t-\ln(c)+\sigma^2/2)^2}{2\sigma^2}} dt = \varphi\left(\frac{\ln(x/c)}{\sigma} + \frac{\sigma}{2}\right) \tag{1}$$

With a zero mean and standard deviation of 1, the headcount poverty (H) with poverty line Z is $H = F(Z)$. The corresponding change in poverty given a change in income (consumption) for a given poverty line and dispersion parameter is:

$$\frac{dH}{H} = \frac{\varphi\left(\frac{\ln(Z/c_t)}{\sigma} + \frac{\sigma}{2}\right) - \varphi\left(\frac{\ln(Z/c_{t-s})}{\sigma} + \frac{\sigma}{2}\right)}{\varphi\left(\frac{\ln(Z/c_{t-s})}{\sigma}\right)} \tag{2a}$$

Placing less weight on changes in mean consumption, and $\emptyset$ being the density of the standard normal distribution (SND), (2a) can be approximated by:

$$\frac{dH}{H} \approx \frac{\emptyset\left(\frac{\ln(Z/c_{t-s})}{\sigma} + \frac{\sigma}{2}\right)}{\varphi\left(\frac{\ln(Z/c_{t-s})}{\sigma} + \frac{\sigma}{2}\right)} \left[\frac{dln(c)}{\sigma} - \left(\frac{\ln(Z/c_{t-s})}{\sigma^2} + \frac{1}{2}\right) d\sigma\right] \tag{2b}$$

Using the hazard function for the SND (λ), we can rewrite (2b) as:

$$\frac{dH}{H} \approx \frac{1}{\sigma}\lambda\left(\frac{\ln(Z/c_{t-s})}{\sigma}+\frac{\sigma}{2}\right)dln(c)+\lambda\left(\frac{\ln(Z/c_{t-s})}{\sigma}+\frac{\sigma}{2}\right)\left[-\frac{\ln(Z/c_{t-s})}{\sigma}+\frac{\sigma}{2}\right]\frac{d\sigma}{\sigma} \quad (2c)$$

It is apparent from (2c) that any change in poverty is decomposable into the growth effect (the first term on the right-hand side of 2c), and an inequality effect (the second term on the right-hand side of 2c). Equation 2c therefore forms the theoretical basis of analysis of poverty response to growth and inequality given poverty line. There are versions that allow the poverty line to vary as well.

In assessing the influence of inequality on growth elasticity of poverty Ravallion (2012) proposes a parsimonious specification that fits data for developing countries well.

$$\Delta lnH_{it} = \alpha(1-lnG_{it-1})\Delta\ln\mu_{it}+\varepsilon_{it} \quad (3)$$

Where: Δ is the difference operator, ln is natural log, α is growth, ($\Delta\ln\mu_{it}$) is elasticity in the presence of inequality, ε_{it} is a zero mean error term, and G_{it-1} and μ_{it} are, respectively, initial inequality and mean income. Fosu (2009, 2015, 2018a, 2018b b) have used similar formulation which includes poverty line relative to mean income $\left(\frac{Z}{\mu}\right)_{it}$, growth in inequality ($\Delta lnG_{it}$), in addition to initial inequality (lnG_{it-1}), and the interactions.

$$\Delta lnH_{it} = \alpha_0+\alpha_1 lnG_{it-1}+\alpha_2\Delta ln\mu_{it}+\alpha_3\Delta lnG_{it}+\alpha_4 ln\left(\frac{Z}{\mu}\right)_{it}+\alpha_5\Delta ln\mu_{it}.lnG_{it-1}+$$
$$\alpha_6\Delta ln\mu_{it}.ln\left(\frac{Z}{\mu}\right)_{it}+\alpha_3\Delta lnG_{it}.lnG_{it-1}+\alpha_3\Delta lnG_{it}.ln\left(\frac{Z}{\mu}\right)_{it}+\varepsilon_{it} \quad (4)$$

The functional models

We relate the poverty status of an individual i at time t in district municipality j (H_{ijt}) to the natural logs of the prevailing mean income $(\Delta ln\mu_{jt})$, inequality (ΔlnG_{jt}), initial inequality (lnG_{jt}); the interaction of mean income with inequality to capture the joint effect of growth and inequality on poverty and a set of individual and household-specific controls like age, education, sector of employment, household access to government social safety programmes etc. (X_{ijt}). Our fundamental specification follow Fosu (2018b). An important issue in formulating the appropriate functional form is to decide which initial conditions to control for. Literature suggests that initial inequality (Ravallion, 2012; Fosu, 2018b), initial income and initial poverty (Ravallion, 2012) are important in determining poverty reduction. Kalwij and Verschoor (2007) and Fosu (2015, 2018b), for example, include only initial inequality. Following these, we also prioritize initial inequality. Another reason we give importance to initial inequality is that the role of inequality on poverty has been proven to be higher in

magnitude than that of growth (Lakner et al., 2020), and therefore we also suppose that initial inequality will trump all other initial conditions.

$$H_{it} = \alpha_0 + \alpha_1 lnG_{jt-\tau} + \alpha_2 ln\mu_{jt-\tau} + \alpha_3 \Delta ln\mu_{jt} + \alpha_4 \Delta lnG_{jt} + \alpha_5 \Delta ln\mu_{jt}.lnG_{jt-1} + \alpha_6 \Delta ln\mu_{jt}.\Delta lnG_{jt} + \sum_\rho \beta^\rho X_{ijt}^\rho + \vartheta_{ijt} \quad (5a)$$

Further, we split the change in the mean income into its positive and negative values to capture the asymmetry in the growth effects on poverty.

$$H_{it} = \alpha_0 + \alpha_1 lnG_{jt-\tau} + \alpha_2 ln\mu_{jt-\tau} + \alpha_3^+ \Delta ln\mu_{jt}^+ + \alpha_3^- \Delta ln\mu_{jt}^- + \alpha_4 \Delta lnG_{jt} + \alpha_5 \Delta ln\mu_{jt}.lnG_{jt-1} + \alpha_6 \Delta ln\mu_{jt}.\Delta lnG_{jt} + \sum_\rho \beta^\rho X_{ijt}^\rho + \vartheta_{ijt} \quad (5b)$$

Growth and quintile mean income framework

In examining the effects of positive and negative income growth on the mean incomes of the various segments of the income distribution spectrum, we divide the spectrum into five quintiles of 20 percentiles each. We first employ a set of estimations on the mean incomes of the bottom 40 and the top 20 percentiles comparatively, in the spirit of Palmer's ratios. Secondly, a quantile regression technique is then applied to models consisting of income/expenditure per capita quintiles as dependent variables and growth, positive and negative income economic changes (measured by district level GDP changes), and a measure of growth in Gini coefficient for changes in inequality. For this analysis, we follow the framework employed by Dollar and Kraay (2002) and expanded by Gundlach et al. (2001) to include educational human capital. The parsimonious version of the model we specify is as follows:

$$\Delta lny_{ijw}^p = \alpha_0 + \alpha_1 lnG_{jt-\tau} + \alpha_2 ln\mu_{jt-\tau} + \alpha_3^+ \Delta ln\mu_{jw}^+ + \alpha_4^- \Delta ln\mu_{jw}^- + \alpha_5 \Delta lnG_{jw} + \varepsilon_{ijw} \quad (6)$$

In Equation 6, y is the income of individual i within district municipality j in NIDS wave w. p is the income or expenditure quintile in which individual i belongs. All other variables are as defined in equations 5a and 5b, and α are regression coefficients.

Variables and data

For the analysis, our poverty data is computed from the National Income Dynamics Survey database (NIDS). The NIDS project covers a panel of individuals and households followed over five waves: wave 1 in 2008, wave 2 in 2012, wave 3 in 2012, wave 4 in 2014, and wave 5 in 2017. Quantec also computes inequality data (1993–2020), which seems to be more representative at municipality level. They use more sub-nationally-

representative data sets. The underlying data sets used for Quantec's inequality measures are the IES, LSMS, and various population censuses. The measures from Quantec have been benchmarked to STATSSA inequality measures for robustness. In this work, we use the Quantec data for initial incomes, initial inequality, income growth, and inequality measures at the respective district municipality levels. All the individual level and household level variables will be sourced from the NIDS and matched to the respective district municipalities.

Dependent variables

Poverty variables are computed using the Foster-Greer-Thorbecke (FGT) poverty measures and comprise a binary variable depicting an individual as poor (H=1) if his income falls below the poverty line for a given year (taken from Statistics South Africa (2022)). We also compute the gap between an individual's income and the poverty line, and the square of that from the NIDS data set. The incomes and expenditure data used in the welfare analysis in the quantile models are also computed from the NIDS. We also use the incomes of the bottom 40 and top 20 percentiles from Quantec to assess how income growth affects individuals at these segments of the distribution.

Table 1: Variables and data sources

Variable	Meaning	Data Source
H	Binary poverty measure, H=1 if poor and H=0 otherwise	NIDS
PG	FGT poverty gap measure	NIDS
SPG	Square of PG	NIDS
LREXPC	Log of per capita household expenditure	NIDS
LRINCPC	Log of per capita household income	NIDS
LINCB40	Log of bottom 40 percentile incomes	Quantec
LINCT20	Log of top 20 percentile incomes	Quantec
INCG	GDP growth rate at district municipality (DM)	Quantec
INCG-	Negative INCG	Quantec
INCG+	Positive INCG	Quantec
LG_i	Log of initial inequality: 5-year lag of DM inequality	Quantec
LMINC_i	Log of initial income: 5-year lag of DM GDP	Quantec
DLNG	First difference of log of current DM inequality	Quantec
GOVHC	Free public health service (binary, 1=access and 0 otherwise)	NIDS
GOVED	No fees public schools (binary, 1=access and 0 otherwise)	NIDS
SSG	Social grant access (1 if access; 0 otherwise)	NIDS
LSSGA	Log of amount of SSG received	NIDS
OGI	Other non-wage government income support	NIDS
LLMI	Log amount of labour market income	NIDS

EDU	Educational categories (0=no education set as reference; 1=primary; 2=secondary; 3=tertiary	NIDS

Estimation techniques

The binary poverty measures are estimated by means of logistics regressions, and the poverty gap and square of poverty gap using Tobit regression due to the censored nature of the poverty gap measures. We employ Fixed Effects (FE), instrumental variables (IV) regressions, and seemingly unrelated regression (SUR) to estimate the models of bottom 40 and top 20 percentiles incomes. Lastly, we estimate household per capita expenditures and incomes using quantile regressions. The analysis of policies and factors that can assist in attenuating the effects of negative economic change on the welfare of the poor is done using a set of interactions of relevant policy variables with indicators of economic change.

4. Results and interpretation

Descriptive statistics and correlations

Table 2a shows the summary statistics of the main variables in the data set. The sample comprises 182,784 individuals across the five waves, with 54% females. The average absolute positive growth over the period is 0.27 percentage points, and the corresponding negative growth in GDP is 0.22 percentage points. The headcount poverty is 41% according to the lower bound poverty line. By the same token, the poverty gap is 19%.

Table 2a: Summary statistics

	N	Mean	SD.	Min	Max
H	182784	0.41	0.49	0	1
PG	182784	0.19	0.25	0	0.94
REXPC	182784	1548.92	3696.17	27.4	260734
INCG	182784	0.06	0.61	-1.4	1.54
INCG-	182784	0.22	0.33	0	1.4
INCG+	182784	0.27	0.38	0	1.54
Gini (G)	182784	0.64	0.06	0.52	.8
LG_i	182784	-0.45	0.09	-0.66	-0.22
All					
SSGA	115328	1581.645	1240.147	10.33	21540
OGI	1514	1710.356	2549.881	3	22100
LMI	101850	6263.33	10976.881	.071	530000
Poor					
SSGA	61648	1789.519	1320.409	14.761	13490
OGI	454	1432.033	1849.065	6	14000
LMI	36932	3104.079	4527.834	.582	151200
Non-poor					
SSGA	53680	1342.916	1093.322	10.33	21540
OGI	1060	1829.562	2789.144	3	22100
LMI	64918	8060.634	12979.578	.071	530000
INCB40	191590	176427	74852	34131	482994
INCT20	191590	1197215	565033	327316	3330563

No education	182784	0.22	0.42	0	1
Primary	182784	0.30	0.46	0	1
Secondary	182784	0.38	0.49	0	1
Tertiary	182784	0.09	0.29	0	1
Female	182784	0.54	0.50	0	1

The correlation coefficients in Table 2b are all in line with the theoretical expectations of the growth–inequality–poverty framework. Growth in per capita income is negatively correlated with all poverty indicators but positively with the measures of welfare used in this work. Initial inequality is also negatively (positively) correlated with current poverty (welfare). Growth in current inequality is, not only positively correlated with levels of all poverty measures, but also positively correlated with overall welfare. This seems to suggest that inequality rises with levels of welfare. This is also supported by the positive association of growth in inequality with mean income growth. This association is not surprising in South Africa as inequality tends to reduce only the welfare of the poor, and leaves that of the rich either unchanged on enhances it. This will be supported later in the regression models.

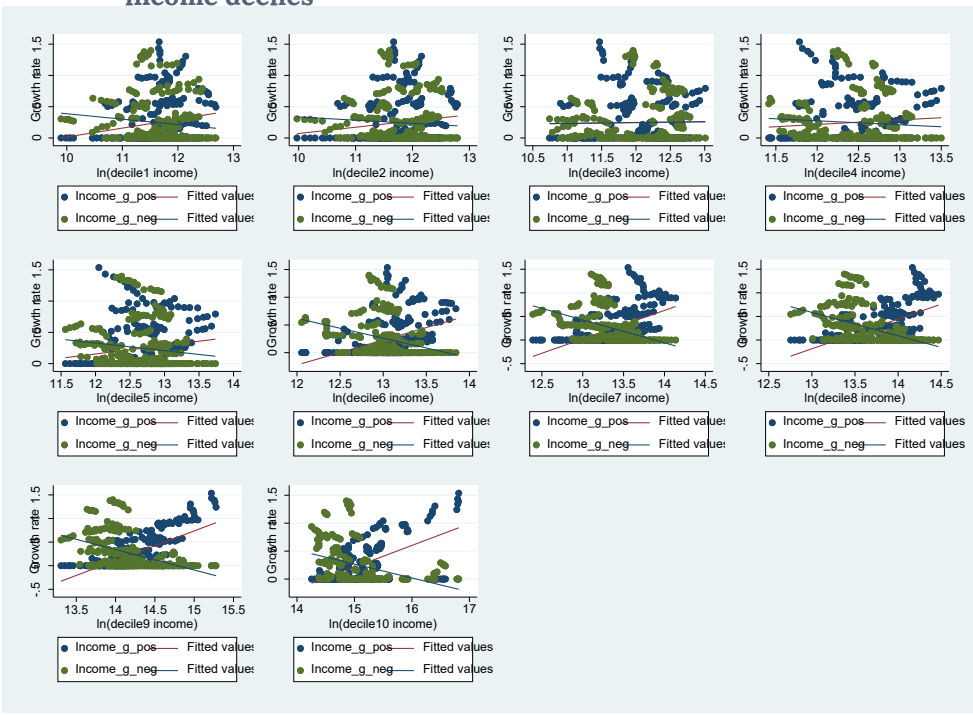
Table 2b: Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) H	1.00						
(2) PG	0.82*	1.00					
(3) LREXPC	-0.55*	-0.55*	1.00				
(4) LRINCPC	-0.54*	-0.50*	0.63*	1.00			
(5) INCG	-0.08*	-0.08*	0.09*	0.10*	1.00		
(6) INCG-	0.05*	0.05*	-0.05*	-0.06*	-0.83*	1.00	
(7) INCG+	-0.09*	-0.08*	0.10*	0.11*	0.88*	-0.47*	1.00
(8) LG_i	-0.05*	-0.05*	0.01*	0.02*	-0.04*	0.02*	-0.05*
(9) DLNG	0.02*	0.01*	0.01*	0.01*	0.27*	-0.19*	0.27*

Notes: *** p<0.01, ** p<0.05, * p<0.1

Positive change in per capita mean income is associated with lower poverty and higher levels of welfare. On the contrary, negative economic growth rate is associated with higher poverty and lower levels of welfare. The scatter plots in Figure 1 seem to concur with the correlation results.

Figure 2: Scatter plots of positive and negative economic changes with logs of income deciles



Regression results

Results of economic growth on poverty

Table 3 columns 1 to 3 carries results of regression of growth rate in mean income on poverty, while columns 4 to 6 disaggregates growth into positive and negative growth rates in absolute terms. Columns 1 and 4 are logistic models for binary measures of poverty, columns 2 and 5 are Tobit models for poverty gap, and columns 3 and 6 are Tobit results for the square of poverty gap. Judging from the log-likelihood Chi2 and the respective Chi2 p-values, the models fit significantly better.

The coefficients of the standard variables accord with the theoretical predictions and are significant. The coefficient of the log of initial income is negative and significant, suggesting that a 1% higher district municipality level initial income is associated with 0.39% lower probability of poverty, 0.1% lower poverty intensity, and 0.06% lower poverty severity. Initial inequality is associated with higher poverty, with elasticities of 0.61%, 0.21%, and 0.12%, respectively. These results are consistent with Gouws and Burger (2018) for initial income and Leibbrandt et al. (2012). The magnitudes of the coefficients, (which are higher for initial inequality compared with initial income) suggest that past inequality is still a strong hindrance to current poverty reduction. In the context of current and persistently high inequality amidst low-income growth, South Africa's future poverty reduction efforts might be significantly jeopardized.

One percentage point higher growth rate in contemporaneous inequality raises the probability of being in poverty by 1%, poverty intensity by 0.26%, and poverty severity by 0.15%. One percentage point increase in mean income growth rate reduces the probability of being poor by 0.3%, poverty intensity by 0.08%, and poverty severity by 0.05%.

Table 3: Results of logit marginal effects and Tobit

	(1)	(2)	(3)	(4)	(5)	(6)
	LOGIT	TOBIT	TOBIT	LOGIT	TOBIT	TOBIT
VARIABLES	ME	PG	PG2	ME	PG	PG2
LG_i	0.460***	0.169***	0.098***	0.606***	0.212***	0.124***
	(0.048)	(0.014)	(0.009)	(0.049)	(0.014)	(0.009)
LMINC_i	-0.338***	-0.089***	-0.055***	-0.388***	-0.100***	-0.061***
	(0.010)	(0.003)	(0.002)	(0.010)	(0.003)	(0.002)
DLNG	0.868***	0.225***	0.134***	1.001***	0.255***	0.152***
	(0.040)	(0.011)	(0.007)	(0.041)	(0.011)	(0.007)
INCG	-0.297***	-0.084***	-0.053***			
	(0.008)	(0.002)	(0.002)			
INCG+				-0.637***	-0.171***	-0.104***
				(0.016)	(0.005)	(0.003)
INCG-				0.092***	0.011**	0.003*
				(0.017)	(0.005)	(0.002)
Constant	-6.252***	-1.618***	-1.011***	-6.994***	-1.781***	-1.106***
	(0.171)	(0.048)	(0.030)	(0.174)	(0.048)	(0.030)
LR Chi2	2695.21	2527.99	2435.10	3289.09	2957.18	2802.43
P > Chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	173,406	160,497	160,497	173,406	160,497	160,497

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Disaggregating economic growth into positive and negative values reveals that positive income growth significantly reduces poverty by a higher magnitude than a similar quantum of negative growth rate increases poverty. One percentage point increase in positive growth rate reduces the probability of being poor by 0.64%, poverty gap by 0.17%, and the square of poverty gap by 0.1%. One percentage point increase in negative economic growth rate increases these poverty measures by 0.09%, 0.011% and 0.003%, respectively. This result could be explained by a number of factors, one of which is that although South Africa's unemployment is high, due to unionization and regulated labour market, it is difficult to quickly shed jobs. The second possible explanation is the safety nets like the social security programmes and free education and health, which we will analyse further. Comparing the coefficients of economic growth rates with those of inequality reveals that inequality erodes poverty reduction gains far more than positive economic growth reduces poverty in South Africa.

In terms of absolute poverty, we can therefore conclude that positive economic growth rate reduces poverty in South Africa much more that economic decline increases poverty. Hence the absolute poverty reduction benefit of positive economic growth is significantly higher. A combination of increasing inequality and negative economic shocks is a dangerous mix for the poor in South Africa. Pro-economic growth policies that also reduce inequality, or at least stops its increase, will prove beneficial to the poor in South Africa.

Results of economic growth on the distribution of welfare

The results above focus on absolute poverty. Poverty-reducing abilities of growth cannot be sustained in the presence of high and persistent inequality. It is, therefore, useful to assess the effects on positive and negative economic changes on the entire welfare distribution spectrum. This approach is able to both answer the question of poverty, and also draw inference on how inequality is likely to progress given the way economic growth and downturns affect those at the lower end versus those at the upper end of the distribution. For this purpose, we first look at the asymmetric effects of economic growth on the change in mean incomes of the bottom 40 versus the top 20 percentiles in Table 4. Following this, we present two sets of quantile regressions, one for log of incomes (Table 5a) and another for log of expenditures (Table 5b).

Table 4 carries pooled, fixed effects (FE), instrumental variables (IV), and seemingly unrelated regressions (SUR). The models are fairly reliable in terms of performance, although the test statistics of over-identification restriction is rather weak. However, the coefficients, though varying across models, are not out of range and the signs of the coefficients are congruent. The results suggest that initial inequality reduces incomes of both the top 20 (T20) and Bottom 40 (B40) percentiles, but more for the latter. Initial incomes are also associated with positive incomes, but generally less so for the B40 than T20. The negative effects of initial inequality on incomes trumps the positive effects of initial incomes on current incomes. Inequality growth is also associated with lower incomes and more so for the poor than the rich.

Positive income growth rates have significant positive effects on incomes of both T20 and B40, but the effect is weaker on the B40. A percentage increase in positive growth rate raises incomes by about 0.82% for the T20, but only by about 0.36% for the B40. Contrary to this, a percentage increase in negative economic growth rate is associated with 0.28% reduction in T20 incomes compared with 0.62% for B40. Evidently, the poor bear a greater burden of negative economic shocks than the rich, but positive growth rates benefit the rich more. This picture suggests that the situation of inequality in South Africa would grow worse with either positive or negative economic shocks.

Table 4: Regression results of changes in top 20 and bottom 40 percentiles incomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Pool T20	Pool B40	FE T20	FE B40	IV T20	IV B40	SUR T20	SUR B40
LG_i	-0.589***	-1.597***	-0.116***	-0.629***	-2.020***	-0.922***	-0.608***	-0.766***
	(0.005)	(0.016)	(0.021)	(0.019)	(0.131)	(0.093)	(0.005)	(0.018)
LMINC_i	0.075***	0.013***	0.102***	0.074***	0.654***	0.266***	0.078***	0.001
	(0.001)	(0.003)	(0.010)	(0.009)	(0.072)	(0.051)	(0.001)	(0.003)
DLNG	-0.321***	-1.269***	-0.712***	-0.983***	-0.497***	-0.832***	-0.301***	-0.796***
	(0.004)	(0.012)	(0.019)	(0.017)	(0.220)	(0.160)	(0.004)	(0.013)
INCG+	0.827***	0.430***	0.731***	0.417***	0.920***	0.426***	0.824***	0.363***
	(0.002)	(0.005)	(0.002)	(0.001)	(0.214)	(0.150)	(0.001)	(0.005)
LNINC-	-0.780***	-0.243***	-0.109***	-0.304***	-1.177***	-1.973***	-0.676***	-0.921***
	(0.002)	(0.005)	(0.021)	(0.019)	(0.474)	(0.324)	(0.002)	(0.006)
Constant	0.976***	-0.458***	-0.972***	-0.501***	-0.671***	-0.931***	0.917***	-0.568***
	(0.017)	(0.052)	(0.069)	(0.052)	(0.109)	(0.055)	(0.016)	(0.055)
F-STAT	194371	6585	32109	45625	3822	15451		
Observations	173,406	173,406	173,406	173,406	173,406	173,406	173,406	173,406
RMSE					0.25	0.17	19	0.66
CD F-stat					1518(5%)	1518(5%)		
SARGAN P-val					0.611	0.508		
R-squared	0.849	0.160	0.904	0.931	0.669	0.867	0.866	0.103

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Tables 5a and 5b show the results of quantile regressions for per capita incomes and expenditures as measures of welfare, respectively. In both tables, we estimate the models with quintiles divided into five, representing 20% each of the distribution.

The coefficient of change in inequality is negative and significant for quantile 1 to 4 in both income and consumption models. The coefficients also fall steadily as one move from the bottom to the higher quantiles. We deduce that inequality reduces both income and consumption welfares only up to the 80th percentile of the distributions. Inequality has a bigger weight of welfare reduction for those at the bottom of the distributions than for those at the higher echelons. A percentage point increase in inequality growth reduces the incomes of those at the 20th, 40th, 60th, and 80th percentiles by 0.25%, 0.21%, 0.17%, and 0.10%, respectively. The effects on consumption welfare are 0.46%, 0.36%, 0.21%, and 0.07%, respectively. However, the incomes of those at the top 20% of the distribution are not affected by inequality. On the consumption side, inequality favours the top 20%. A percentage point increase in inequality growth increases the consumption of the rich by 0.24%. Therefore, in South Africa, inequality begets even more inequality.

The growth rate in mean income raises the income and consumption welfares of those up to the 80th percentile by about similar quanta. A percentage point increase in economic growth raises the incomes of those at the 20th, 40th, 60th, and 80th percentiles by 0.17%, 0.17%, 0.18%, and 0.19%, respectively. The magnitudes are also significant but slightly higher in the consumption models. However, mean income growth raises the incomes and consumptions of the top 20th percentile by a lower percentage (0.06% and 0.14% respectively).

Table 5a: QR on log of per capita income

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	0.2 quantile	0.4 quantile	0.6 quantile	0.8 quantile	1.00 quantile	0.2 quantile	0.4 quantile	0.6 quantile	0.8 quantile	1.00 quantile
INCG+						0.199***	0.225***	0.231***	0.294***	0.145***
						(0.011)	(0.008)	(0.013)	(0.010)	(0.051)
INCG-						-0.140***	-0.104***	-0.120***	-0.024	0.025
						(0.011)	(0.013)	(0.012)	(0.017)	(0.049)
DLNG	-0.251***	-0.207***	-0.171***	-0.103***	-0.039	-0.248***	-0.224***	-0.189***	-0.102***	-0.089
	(0.026)	(0.022)	(0.019)	(0.033)	(0.090)	(0.030)	(0.019)	(0.015)	(0.033)	(0.081)
INCG	0.171***	0.169***	0.180***	0.188***	0.062***					
	(0.007)	(0.005)	(0.004)	(0.007)	(0.016)					
Constant	7.472***	8.011***	8.482***	9.082***	5.944***	7.458***	7.983***	8.456***	9.021***	5.890***
	(0.004)	(0.003)	(0.003)	(0.005)	(0.011)	(0.006)	(0.004)	(0.004)	(0.004)	(0.032)
Obs.	169,530	169,530	169,530	169,530	169,530	169,530	169,530	169,530	169,530	169,530

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The absolute values of positive growth rates increase the incomes of those within the 20th, 40th, 60th, and the 80th percentiles by more percentage points than those at the top 20th percentile. The respective elasticities are 0.20%, 0.23%, 0.23%, 0.29%, and 0.15% (top 20th percentile) for incomes (Table 5a), and 0.28%, 0.29%, 0.34%, 0.45%, and 0.14% (top 20th percentile) for consumptions, respectively. We can deduce that positive economic growth rates favour those at the bottom of the welfare distributions more than those at the very top. Although these elasticities may not translate to significantly higher absolute welfare differences given the high levels of inequality, they are nevertheless encouraging to motivate for more pro-positive economic growth policies in South Africa.

Table 5b: Quantile of growth on log of expenditure

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	0.2 quantile	0.4 quantile	0.6 quantile	0.8 quantile	1.00 quantile	0.2 quantile	0.4 quantile	0.6 quantile	0.8 quantile	1.00 quantile
INCG+						0.278***	0.290***	0.342***	0.445***	0.135***
						(0.008)	(0.007)	(0.012)	(0.014)	(0.030)
INCG-						-0.049***	-0.055***	-0.008	0.102***	-0.027
						(0.010)	(0.010)	(0.009)	(0.019)	(0.030)
DLNG	-0.463***	-0.363***	-0.214***	-0.072**	0.237***	-0.480***	-0.380***	-0.234***	-0.150***	0.189**
	(0.025)	(0.018)	(0.022)	(0.032)	(0.074)	(0.019)	(0.022)	(0.022)	(0.028)	(0.087)
INCG	0.171***	0.183***	0.186***	0.213***	0.082***					
	(0.006)	(0.004)	(0.006)	(0.011)	(0.015)					
Constant	5.724***	6.181***	6.667***	7.391***	4.697***	5.668***	6.125***	6.589***	7.263***	4.676***
	(0.003)	(0.002)	(0.004)	(0.004)	(0.008)	(0.004)	(0.005)	(0.006)	(0.007)	(0.016)
Observations	169,555	169,555	169,555	169,555	169,555	169,555	169,555	169,555	169,555	169,555

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Quite worrying is what can be deduced from the coefficients of the negative economic changes. A percentage point increase in absolute economic decline reduces incomes in the 20th, 40th, and 60th quantiles by 0.14%, 0.10%, and 0.12%, respectively. The coefficients of economic decline on incomes are not significant in the last two top quintiles. We get a similar picture with consumption welfare.

Table 6: Poverty line position relative to quantile mean incomes and expenditures

Quantile	Income per capita	Expenditure per capita	Lower Bound	Upper bound	Food
1	266	250	758	1138	531
2	520	474	758	1138	531
3	953	838	758	1138	531
4	1950	1742	758	1138	531
5	10453	9307	758	1138	531
Exact percentile of income			44th	57th	32th
Exact percentile of exp.			48th	60th	36th

According to Table 6, the upper-bound poverty line lies at 57th percentile of incomes and 60th percentile of consumptions; the lower-bound at the 44th and 48th percentiles of incomes and consumptions, respectively. This is consistent with Statistics South Africa (2017) which showed that about 55% of the South African population are poor. This shifts the middle class further to the right of the distributions. This analysis is to show that, right up to the 60th percentile, we are still dealing mostly with the poor, especially when using household survey data which usually do not capture the incomes of the ultra-rich.

So far, we have established that economic growth reduces poverty, but not enough to compensate for the poverty raising effects of inequality; economic decline raises poverty, but economic prosperity more than compensates, by attenuating poverty levels by a higher magnitude; inequality penalizes the poor in terms of welfare, but leaves the welfares of those at the top untouched. Positive economic growth enhances welfare for the poor in percentage terms relatively more than at the top tier of the distribution; economic decline reduces welfare for the lower tier of the distribution without affecting those at the top; positive economic growth trumps economic decline in terms of effects on the welfares of those at the lower end of the distribution; the combination of high and rising inequality and negative economic growth present a significant jeopardy in poverty reduction efforts, increase of the welfares of the poor and reduction in future inequality. These findings call for formulation of policy measures to curb or reverse the effects and help to propose a path to balanced and equitable development in South Africa, and cushion the poor during times of significant economic decline.

Policy measures to cushion the poor from inequality and economic decline

The South African Government has undertaken various programmes to cushion the burden of poverty on the poor. Those traceable in the household surveys are social grants, free health care, and education services. These are in line with measures assessed by Ngugi et al. (2020) for Kenya. Table 7 shows the proportion of poor and non-poor populations with access to social grants compared with labour incomes and their respective average amounts.

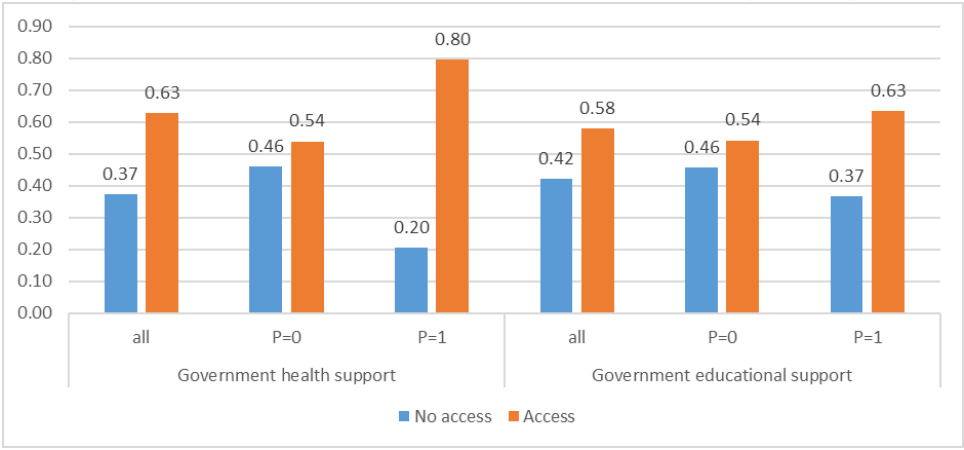
Table 7: Social grants, labour incomes, and government non-wage incomes

	Pop. Share (All)	Average Amount (All)	Pop Share (P=0)	Average Amount (P=0)	Pop Share(P=1)	Average Amount (P=1)
Gov. social grants	60%	1582	47%	1343	80%	1790
Other gov. non-wage	1%	1710	1%	1830	1%	1432
Wage income	53%	6263	57%	8061	40%	3104

Source: Computed from the NIDS data set.

Up to 80% of South Africa's poor population access social grants with an average monthly amount of 1,790 ZAR compared with 40% accessing labour incomes averaging 3,104 ZAR per month. For the non-poor however, 47% access social grants averaging 1,343 ZAR compared with 57% of labour incomes averaging 8,061 ZAR. Figure 2 shows the proportion of population from the NIDS data set accessing free health care and free (no fees) education. It is worth noting that a number of health and educational policy programmes undertaken by the South African Government are accessible through the public health and education system, hence free access to public health care and education captures a number of policies.

Figure 3: Access to free education and health services by poverty status



Source: Computed using information from the NIDS data set.

The poor depend largely on public health (80%) and public education (63%) compared with 54% and 54%, respectively, for the non-poor.

Table 8a: Regression results for policy options

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Logit	Logit	Tobit PG	Tobit PG	Tobit SPG	Tobit SPG
LG_i	0.388***	0.604**	0.138***	0.172***	0.091***	0.099***
	(0.076)	(0.259)	(0.020)	(0.063)	(0.012)	(0.038)
LMINC_i	-0.218***	-0.397***	-0.055***	-0.107***	-0.031***	-0.063***
	(0.015)	(0.053)	(0.004)	(0.013)	(0.002)	(0.008)
DLNG	0.657***	1.155***	0.191***	0.255***	0.114***	0.134***
	(0.056)	(0.194)	(0.015)	(0.048)	(0.009)	(0.029)
INCG+	-0.296***	-0.445***	-0.089***	-0.122***	-0.054***	-0.076***
	(0.022)	(0.076)	(0.006)	(0.019)	(0.004)	(0.011)
INCG-	0.728***	-0.139	0.153***	-0.048	0.088***	-0.027
	(0.154)	(0.825)	(0.036)	(0.189)	(0.022)	(0.112)
GOVHC		-1.023***		-0.261***		-0.151***
		(0.065)		(0.016)		(0.010)
GOVHC#INCG-		-0.013		-0.010		-0.007
		(0.157)		(0.038)		(0.023)
GOVED		-0.864***		-0.228***		-0.133***
		(0.065)		(0.016)		(0.010)
GOVED#INCG-		-0.140		-0.035		-0.020
		(0.169)		(0.041)		(0.025)
EDU1		-0.444		-0.126		-0.077
		(0.457)		(0.105)		(0.063)
EDU2		-0.755*		-0.191*		-0.113*

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Logit	Logit	Tobit PG	Tobit PG	Tobit SPG	Tobit SPG
		(0.455)		(0.105)		(0.062)
EDU3		-1.673***		-0.428***		-0.251***
		(0.466)		(0.107)		(0.064)
EDU1#INCG-		0.178		0.074		0.037
		(0.816)		(0.187)		(0.111)
EDU2#INCG-		-0.382		-0.099		-0.052
		(0.809)		(0.185)		(0.110)
EDU3#INCG-		-0.455		-0.118*		-0.070
		(0.855)		(0.096)		(0.116)
SSG	-0.366***		-0.100***		-0.058***	
	(0.023)		(0.006)		(0.004)	
SSG#INCG-	-0.079		-0.025		-0.017*	
	(0.059)		(0.015)		(0.009)	
LLMI	-0.551***		-0.143***		-0.085***	
	(0.007)		(0.002)		(0.001)	
LLMI#INCG-	-0.076***		-0.014***		-0.008***	
	(0.019)		(0.005)		(0.003)	
Constant	7.237***	5.265***	1.834***	1.440***	1.030***	0.843***
	(0.263)	(1.024)	(0.071)	(0.250)	(0.043)	(0.150)
var(e.)			0.238***	0.201***	0.088***	0.071***
			(0.002)	(0.006)	(0.001)	(0.002)
LR Chi2	11592	1498	11411	1581	10753	1488.
Prob(chi2)	0.000	0.000	0.000	0.000	0.000	0.000
Pseudo R2	0.208	0.107	0.056	0.14	0.12	0.20
Observations	97,926	9,298[2]	97,915	9,298	97,915	9,298

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 8a examines interactions of various policy options with negative economic shocks in poverty regressions, while Table 8b focuses on the incomes of the bottom 40 percentile. While health and educational interventions are poverty reducing, their respective interactions with negative economic shocks, though negative, are not significant. Both education and health policies have the potential, but falls short of easing the effects of negative shocks. However, the instrumental variable regressions in columns 5 and 6 of Table 8b suggest that health and educational policies do raise the incomes of the poor, including in times of negative economic shocks. Combining

2 Note that the policy variables relating to access to free education and health access have limited observations. Free education only concerns children of school going age. Although the observations are limited, the variable is still a nationally representative sample of children accessing free education, hence the low number of observations do not bias the results.

the results with those of poverty models suggests that the benefits of these policies are not enough to have significant effects on poverty during economic downturns. The provision of free public health services in South Africa can have both positive and negative effects on the poor. On the one hand, it has increased access to health care for the poor, who are often unable to afford private health care. On the other hand, it has been hampered by a number of challenges, including inadequate funding, poor infrastructure, and human resource shortages, which have limited its effectiveness.

One of the positive effects of free public health in South Africa is increased access to health care services for the poor. According to Health Systems Trust (2016), the percentage of South Africans who visited a public health facility increased from 54.6% in 2002 to 70.4% in 2015, with the poorest quintile of the population showing the greatest increase (from 42.2% to 66.8%). Moreover, the study found that free public health services have reduced the financial burden on the poor, as they no longer have to pay out of pocket for health care services.

However, the provision of free public health services in South Africa has also been hampered by a number of challenges. One of the main challenges is inadequate funding, which has resulted in shortages of essential medicines, equipment, and personnel. According to the Department of Health, the public health sector is underfunded by approximately R22 billion, which has led to challenges, including equipment and medicine shortages, staff shortages, and poor infrastructure. The public health sector has also been affected by human resource shortages, with many health professionals leaving the country to work abroad or moving to the private sector. There is a shortage of 83,000 health care professionals in the country, with many public health facilities struggling to provide adequate care due to staff shortages.

Table 8b: Policy options for the incomes of the bottom 40 percentile

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	FE	FE	FE	Panel IV	Panel IV	Panel IV
LG_i	-1.893***	-1.138***	-0.976***	-0.902***	-0.613***	-0.535***
	(0.180)	(0.055)	(0.013)	(0.195)	(0.070)	(0.023)
LMINC_i	0.070**	0.106***	0.123***	0.094***	0.163***	0.100***
	(0.031)	(0.010)	(0.002)	(0.036)	(0.012)	(0.004)
DLNG	0.796***	1.154***	0.787***	0.986***	0.585***	0.950***
	(0.127)	(0.041)	(0.010)	(0.216)	(0.075)	(0.026)
INCG+	0.124***	-0.049***	0.068***	0.284***	0.183***	0.132***
	(0.046)	(0.015)	(0.004)	(0.100)	(0.058)	(0.020)
INCG-	-0.535***	-0.064*	-0.020***	-0.383***	-0.823***	-0.315***
	(0.409)	(0.033)	(0.008)	(1.522)	(0.214)	(0.049)
LSSGA	0.003			0.092***		
	(0.020)			(0.033)		
LSSGA#INCG-	0.266***			0.259*		
	(0.063)			(0.145)		
LOGI	0.024**			0.048***		

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	FE	FE	FE	Panel IV	Panel IV	Panel IV
	(0.010)			(0.012)		
LOGI#INCG-	0.016			0.052		
	(0.030)			(0.036)		
LLMI	0.078***			0.001**		
	(0.016)			(0.000)		
LLMI#INC-	0.047			0.339***		
	(0.045)			(0.094)		
GOVHC		0.096***			0.167***	
		(0.012)			(0.021)	
GOVHC#INCG-		0.023			0.415***	
		(0.031)			(0.095)	
GOVED		0.319***			0.387***	
		(0.012)			(0.028)	
GOVED#INCG-		0.081**			0.670***	
		(0.033)			(0.134)	
EDU1			0.035***			0.272***
			(0.004)			(0.012)
EDU2			0.086***			0.303***
			(0.004)			(0.011)
EDU3			0.141***			0.323***
			(0.005)			(0.012)
EDU1#INCG-			0.013			0.070***
			(0.010)			(0.044)
EDU2#INCG-			0.012			0.774***
			(0.009)			(0.043)
EDU3#INCG-			0.020			0.839***
			(0.014)			(0.046)
Constant	10.201***	9.252***	9.559***	8.296***	8.474***	-1.249***
	(0.562)	(0.174)	(0.041)	(0.850)	(0.189)	(0.068)
F-STAT	536	6363	81891	107	973	9884
Observations	749	9,132	159,097	749	9,132	159,097
RMSE				0.30	0.44	0.35
CD F-stat				11.04(10%)	36(5%)	1440(5%)
SARGAN P-val				0.112	0.211	0.108
R-squared	0.89	0.86	0.85	0.62	0.49	0.41

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Free education in South Africa has had a significant impact on the poor, particularly in terms of increasing access to education and reducing financial barriers to education. Spaull and Kotze (2020) have established that the introduction of free primary education in South Africa in 1994 led to a significant increase in school enrolment

rates among the poorest households, particularly in rural areas. They also found that the policy led to a reduction in the poverty gap among households with school-aged children.

However, there are concerns about the quality of public education in South Africa. Department of Basic Education (2021) found that only 37% of Grade 5 learners in public schools achieved the expected level of proficiency in reading in 2019. The report also found significant disparities in educational outcomes between different provinces and socioeconomic groups. There are also concerns about the sustainability of the funding model for free education. National Treasury (2021) has projected the cost of education to increase significantly over the next decade, placing a strain on government finances.

Social grants do help the poor in times of economic downturns, but does not go far enough. Column 5 of Table 8a shows that social grants assist in reducing poverty severity during negative economic shocks, but not significantly so for poverty incidence and intensity. Like free health and education, social grants do raise the incomes of the poor within the bottom 40 percentile, especially in times of economic downturns. Again, the gains are not significant enough to be detected in poverty models. Woolard and Leibbrandt (2016) corroborates this finding that the social grant system played a critical role in reducing extreme poverty in the country, with grants covering over 50% of the food poverty line for the poorest households. However, concerns have been raised about the sustainability of the social grant system, particularly given the significant cost of the programme. According to the National Treasury (2021), social grant spending accounts for around 12% of government expenditure, and is projected to increase further in the coming years. There are also concerns about the impact of the grants on work incentives, with some critics arguing that the grants discourage recipients from seeking employment. Tregenna (2017) found that, while the social grant system had a positive impact on poverty and inequality, it also had a negative impact on labour force participation rates.

The coefficients of both education and labour income, with their respective interaction terms suggest that, while all forms of education from secondary reduces poverty and raises the incomes of the poor, it is tertiary education that can keep the poor afloat in times of economic shocks. Labour incomes reduce all forms of poverty and raise the incomes of the poor, including in times of negative economic shock.

The implication is that, while various social programmes like free health, education, and social grants do help, they do not go far enough. There is room to improve efficiency of these programmes to better assist the poor in times of economic crises and shocks, like during the COVID-19. However, what can sustainably keep the poor afloat remains programmes that give the poor good education up to tertiary and also give them access to the labour market.

5. Conclusion

In conclusion, this research provides important insights into the relationship between economic growth, inequality, and poverty in South Africa. The findings highlight the negative impact of high and persistent inequality on poverty reduction efforts, and the crucial role of positive economic growth in reducing poverty.

Economic growth, while beneficial to reducing poverty, is not enough to compensate for the poverty-raising effects of inequality in South Africa. The study finds that initial inequality is a stronger hindrance to poverty reduction than initial income levels, and that rising inequality erodes poverty reduction gains far more than positive economic growth reduces poverty.

The poor suffer more losses of welfare during economic recessions and depressions than they gain during expansions, and the factors that can assist the poor to stay afloat during times of economic shocks are good education up to tertiary and access to the labour market. The results suggest that policies that reduce inequality and promote economic growth would be beneficial to the poor in South Africa. While social programmes like free health care, education, and social grants do help, they do not go far enough to cushion the poor during times of significant economic decline. The study highlights the need for the government to formulate policy measures to curb or reverse the effects of rising inequality and negative economic growth and help propose a path to balanced and equitable development in South Africa.

Moreover, the study underscores the need for pro-growth policies that also reduce inequality, as well as effective social safety net programmes that can provide respite during times of economic downturns. It also suggests that sustained poverty reduction efforts in South Africa will require a combination of pro-growth policies that reduce inequality, access to tertiary education, and better access to the labour market for the poor.

It is important to note that the findings are subject to certain caveats, such as the limitations of the data used and the complexity of the relationship between economic growth, inequality, and poverty. The study also does not explore the potential interaction effects of various policy interventions. Further research can explore these areas, as well as investigate the impact of other policies such as housing subsidies, job creation programmes, and progressive taxation on poverty reduction during economic shocks.

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