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The dynamics of income inequality in Africa: An empirical investigation on the role of macroeconomic and institutional forces

Michael E. Batuo [a], George Kararach [b], Issam Malki [a,*]

[a] Westminster Business School, University of Westminster, United Kingdom
[b] African Development Bank; Wits School of Governance, University of Witswaters, South Africa

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ABSTRACT

Reducing income inequality is a crucial goal of sustainable development as income inequality often viewed as harmful to economic growth. The main aim of this paper was to empirically assess the macroeconomic and institutional drivers of income inequality in Africa. We use a Kuznets curve framework, which emphasises the role of income per capita in explaining the time path of inequality. In contrast to much of the literature, we explicitly examine the possibility of the existence of multiple income steady states. Using the concept of clubs of convergence, we show that per capita income is divergent and identify four steady states to which groups of economies converge (i.e., high-income to low-income economies). Using panel data models and a data set encompassing 52 African countries spanning the years 1980–2017, we show that once these multiple steady states are accounted for, the Kuznets curve relationship becomes unstable. Our findings suggest that inequality may be increasing in high-income countries in Africa, while decreasing in low-income or the least developed economies. In addition, the role of macroeconomic and institutional factors in explaining income inequality is limited and differ across convergence clubs. Evidence suggests the importance of fiscal, employment and monetary policies and the rule of law to tackle inequality in high-income economies, while they have no statistically significant role in low-income economies' income inequality.

1. Introduction

Over the past few decades, one of the principal aims of economic policy in Africa has been to achieve sustainable poverty reduction to ensure that significant progress is made towards attaining Sustainable Development Goals (SDGs) in the post-2015 development agenda (UNDP, 2017). With this aim, income inequality between countries has been the main issue (Bicaba, Brixiova, & Ncube, 2017). Even though many African countries showed strong economic growth in the last decade, the continent's human development and poverty indicators have not advanced as forecast (Anyanwu, Erhijakpor, & Obi, 2016; Asongu, Orim, & Ntig, 2019; Shimeles & Nabassaga, 2018).

In recent years, discussion amongst researchers has focused on promoting faster growth within the more impoverished regions, particularly in landlocked countries to ensure a connection between increased national prosperity and reduced regional disparities (Anyanwu, 2014; Diao & McMillan, 2018; Rodrik, 2016). However, each economy has a different growth path with a standard feature that is determined as economic growth takes off, transforming the production process from the agricultural sector towards the manufacturing sector and finally services sectors with higher concentration levels in urban areas. This structural transformation is the reallocation of production factors across agriculture, manufacturing and services that underpin economic growth (Kuznets, 1973; Lewis, 1954).

As Boushey (2020, 2015), Alesina and Perotti (1996) and Persson and Tabellini (1994) showed, income inequality considerably slows down the overall economic growth as it restricts the efficient and equitable use of available resources. Income inequality reduces the pace at which growth translates into poverty reduction (Boushey, 2020; Bourguignon, 2004; Kakwani, 1993). Thus, African countries would have achieved much more progress in growth and poverty reduction than they have achieved now had income inequality been lower.

A well-known framework is the Kuznets' curve relationship, which maps the link between economic development and income inequality. Kuznets (1955) suggests a nonlinear quadratic relationship between income inequality and economic development (often proxied by per capita income). This relationship identifies three

* Corresponding author.
E-mail addresses: M.Enowbibatuo@westminster.ac.uk (M.E. Batuo), a.kararach@afdb.org (G. Kararach), i.malki@westminster.ac.uk (I. Malki).

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stages through which income inequality develops: (1) income inequality is low in the low-income phase; (2) increases to the maximum with a certain level of income; followed by (3) a decline in income inequality as income per capita increases further. This relationship states that income inequality is a function of income and its quadratic form. Income is the key driving force to income inequality. While this framework has gained increasing popularity, the empirical literature suffers from methodological shortcomings, which may have been the source of conflicting empirical findings on the determinants of income inequality (Boushey & Price, 2014); and the extent to which inequality is a prevalent issue. For example, the empirical literature such as Persson and Tabellini (1994), Alesina and Perotti (1994, 1996), amongst other researchers, found that this relationship does not hold. Others, such as Wan et al. 2006; Sukiassyan 2007; Majumdar and Partridge 2009; Binatli, 2012; Babu et al., 2016, report an adverse effect of income on income inequality. Still, other empirical evidence suggests a direct positive effect of income per capita on income inequality (see Li & Zou, 1998; Forbes, 2000; Partridge, 1997; Frank, 2009; Muinelo-Gallo & Roca-Sagalés, 2013; Cingano, 2014; Nahum, 2005; Rubin & Segal, 2015; Saari et al., 2015). Meanwhile, Bruno et al. (1996), Fishlow (1995), Ravallion (1995), Huang et al. (2015), and Deininger and Squire (1998) have stated that there is no significant relationship between income and inequality.

Barro (2000) supported a nonlinear relationship between economic growth and income inequality in two ways. First, it maintains the original functional structure of the effect of income on income inequality in a quadratic structure. Second, Barro, 2000 finds that income behaves differently depending on how rich or poor a country is. The effect of income on inequality in prosperous economies is not the same as that on poor economies. In this context, Barro (2000) shows that income negatively affects developing countries' income inequality and positively affects prosperous economies' income inequality. Therefore, the first aim of this paper is to empirically examine the extent to which income per capita affects income inequality in Africa. We conduct this empirical examination within the context of Kuznets curve.

However, much of the literature concerning Africa has had a narrow focus on the dynamics of income inequality. First, the literature mostly implicitly assumed African economies to be a homogenous bloc. This assumption does not allow for cross-sectional variations, which reduces information and efficiency. Second, it has paid less attention to the impact of macroeconomic and institutional forces that may explain the variations in income inequality. Finally, while Barro (2000) offers an insightful view of income inequality dynamics across income groups, it remains restricted by several limitations, including the number of income groups. In addition, the characterization of economies as rich and poor does not reflect their long-run distributional properties. In this context, we relax the assumption that economies can be clustered as rich and poor economies. We allow for further possibilities including clustering economies into high, middle and low income, or into clubs of convergence. This latter accounts for the steady state to which a subset of economies converges over time. Furthermore, identifying clubs of convergence also implies capturing the distributional properties of income of each club. The second aim is, therefore, to examine whether the Kuznets' curve relationship holds across all clubs of convergence.

Thus, we consider the following related issues. First, we investigate the effect of time-varying distributional properties of income on the level of income inequality. It implies we relax the assumption that all economies share the same steady state of income. We extend this to allow for multiple equilibria in income per capita. We test for this using the concept of relative and clubs of convergence proposed by Phillips and Sul (2007, 2009). This latter is incorporated to extend Barro's (2000) framework. This done by allowing two income groups. That gives a more general view of the effect of the time-varying distributional properties of income-on-income inequality. Second, we propose an empirical framework to capture the macroeconomic and institutional determinants of income inequality in African economies.

Using econometric panel data methods, we show that income per capita is indeed divergent. We identify four clubs of convergence (i.e. steady states), three of which are convergent. It implies – in contrast to the dichotomy of rich and poor economies – we have a more comprehensive view of the distributional properties of income across African economies, including high, middle-high, middle-low- and low-income economies. Accounting for these clubs of convergence offers further insights into the validity of the Kuznets curve in Africa. We find evidence that Kuznets' relationship is not stable across economies in Africa. That is consistent with Barro's (2000) model. However, our findings suggest that income inequality is increasing in high-income economies while decreasing in low-income economies. Finally, we found that macroeconomic and institutional factors are only relevant in explaining income inequality in high-income economies. There is minimal evidence to support any meaningful role of these factors in explaining income inequality in clubs of economies with lower income.

We organize the rest of the paper as follows. Section 2 offers a critical review of recent and related literature, while Section 3 outlines the econometric methodology and framework. Section 4 discusses trends in inequality and empirical results. Section 5 concludes the paper.

2. Literature review

Kaldor (1957) and Pasinetti (1962) assumed that income inequality affected economic growth through the saving-investment mechanism. Because individuals with different income levels will choose different savings rates, the income inequality leads the agents to increase the savings and investment, which increases the growth rate. Milanovic (2016) generalized the Kuznets curve into what he calls "Kuznets waves" by explaining the ongoing change in inequality. He points out that the current pickup in inequality is the second Kuznets "wave" in modern times, driven by a technological revolution and a transfer of labour from more homogenous manufacturing into skill-heterogeneous services. That has led to the reduction of middle classes in Western society. He concluded that the combining technological progress and globalization should be viewed as part of regular Kuznets waves. It has logical consequences for the future that this pattern of growth in inequality will increase and eventually reduce like the previous one.

This approach to the study of inequality follows the tradition of Kuznets (1955), Atkinson and Harrison (1978), and Piketty (2014). Kuznets (1955) famously predicted a bell-shaped relationship between income inequality and per capita income. In other words, income inequality is positively related to income growth in the early stages of its expansion. However, when income growth continues over time the distribution of income becomes more egalitarian.

Government expenditure is a crucial factor expected to affect inequality, whose effect has not yet reached a consensus according to the existing literature. Calderon and Serven (2004) observed that government expenditure on infrastructure stimulates economic growth and that this has a significant effect on reducing inequality. Their result was based on a panel of Latin American countries where inequality was highest. Chatterjee and Turnovsky (2012) confirmed this result that government expenditure may reduce inequality in the short-run while increasing

inequality in the long-run. Meanwhile, Blejer and Guerrero (1988) highlighted that government expenditure strongly increases inequality in the Philippines. Likewise, Maestri and Roventini (2012) also found that a higher level of government expenditure is associated with higher income inequality, particularly in some European countries. They found that government expenditure Granger causes earning inequality in countries like the Netherlands, Canada, and the United Kingdom (UK). In contrast, Sarel (1997) proved cross-sectionally that government expenditure has no significant impact on income inequality.

Early empirical studies did not show inflation as a determinant of income inequality, except for Ademan and Fuwa (1992), Sarel (1997), and Blinder and Esaki (1978). The latter used the time series model to find that inflation contributes to cyclical change in income distribution in 12 developed and emerging economies. Easterly and Fischer (2001) found that direct measures of improvement in the well-being of the poor and inflation are negatively correlated in pooled cross-country regressions. Meanwhile, Beetsma and Van der Ploeg (1996) and Romer (1986), and Bulìř and Gulde (1995) present evidence of a strong positive correlation between inequality and inflation.

In countries where there is an adverse domestic condition such as political instability, lack of investment, low levels of human capital and public health, macroeconomic instability, an unskilled labour force, and weak financial institutions, inequalities persist (Persson & Tabellini, 1994; Alesina & Perotti, 1996; Alesina & Rodrik, 1994; Keefer & Knack, 2002; Baumol, 2007). The literature suggests that where income inequalities are high, investment in human capital remains low because the poor do not have enough collateral to finance investment in human capital (Galor & Zeira, 1993; Fishman and Simhon, 2002). Similarly, Barro (2000) uses a panel of 70 countries in his study and shows that investment is "the primary engine for growth". Income inequality hinders investment because only a few wealthier people determine where capital is allocated. According to Alesina and Perotti (1996), income inequality and investment are inversely related. This can prove fatal to the development of an economy, developed or developing.

Regarding finance, studies considered financial depth as typically measured by the ratio of private sector borrowing or broad money to Gross Domestic Product (GDP) (Beck, Demirguc-Kunt & Levine, 2007, and Claessens & Perotti, 2007), while more recent papers look into the macroeconomics impact of the breadth of financial access - or financial inclusion as a multidimensional concept, rather than just depth (Dabla-Norris et al., 2015; Han & Melecky, 2013; Mehrotra & Yetman, 2015; Sahay et al., 2015). The existing empirical evidence shows a significant impact of financial development on poverty and inequality reduction, but there are no cross-country empirical studies of broader concepts of financial inclusion and income inequality.

According to Ricardo (1821), trade theory proposes that countries should concentrate their resources in sectors in which they have a comparative advantage, which will gain from trade. International trade will reduce income inequality, as shown by Jaumotte et al. (2013). Using panel data from 108 countries, Spilimbergo et al. (1999) found that countries highly endowed with land and capital have a less equal income distribution, while skill-intensive countries have more equal income distribution. They also found that the effects of trade openness on income inequality depend on factor endowments. Gourdon et al. (2008) found that openness to trade influences an increase in income inequality in high-income countries and reduces income inequality in low-income countries. More openness to trade is associated with higher inequality in capital-abundant and high skills-abundant countries. While Yang and Greaney (2017) came out with mixed results when doing a comparative study between China, Japan, South Korea, and the United States, they found that trade openness had increased inequality in China, reduce it in Japan and United States, and had no effect in South Korea.

Theoretical studies claim that it is problematic to govern in an unequal society characterized by an undemocratic process: political instability, economic disorder, and ethnic conflict (Persson & Tabellini, 1994; Alesina & Rodrik, 1994). Unequal societies restrict well-coordinated macro-economic policies and have restricted the ability to compete for internationalization. However, several studies have reported controversial outcomes. These studies found that the democratic process enhances fundamental civil rights liberties, stable politics, and an open society. They found that it promotes property rights protection and contract enforcement, discourages corruption and lawlessness, and fosters economic growth and redistribution of income (Olson, 1993; Clague et al., 1996; Minier, 1998; Persson and Tabellini, 2005). In their study on "institutions and poverty," Tebaldi and Mohan (2010) have revealed that an economy with robust corruption-control, an effective government and a stable political system will create conditions to promote growth and minimize income distribution conflicts and reduce poverty. Their findings suggest that the quality of the regulatory system, the rule of law, voice and accountability, and expropriation risk are inversely related to poverty. Hoff and Stiglitz (2004) and Sonin (2003) suggest that an equal distribution of income is a more fertile ground for good institutions.

3. Data and econometric methodology

3.1. Data and sources

The data used in the analysis have been compiled from different sources that have been merged into an original and unique dataset. Due to data availability, the data cover only 52 African countries. While most of the econometric analysis focuses on the period 1980–2017, income convergence tests are based on a longer sample period, from 1970 to 2017. All data are annual.

Data on the GINI index was collected from diverse sources, including the World Bank Institute for Development Economics Research (WIDER, 2017) and World Development Indicators (World Bank, 2020). We collected GDP per capita data from United Nations Conference on Trade and Development (UNCTAD). Institutional data, including the rule of law and transparency, are taken from Varieties of Democracy (V–Dem). The remaining variables – both control and explanatory- are obtained from the World Bank. Table 1 summarises data sources and measurement level.

It worth noting that our data do not account for environmental assets[1], which is a limitation of our analysis due to data availability. Indeed, environmental assets play a crucial role in improving the livelihoods of households in low-income economies; and hence in reducing income inequality (Jagger, 2012; Chhetri et al, 2015). The absence of environmental assets may give a less accurate view on the main factors explaining patterns of income inequality - particularly those related to sustainable development and the environment. Since, environmental assets may reduce income inequality via household income channel (e.g. income per capita), one may expect the potential problem of endogeneity to occur. Therefore, we estimate our models using both Ordinary Least Squares (OLS) and Two-Stage Least Squares (TSLS). This latter accounts for the biases due to endogeneity.

3.2. General overview and baseline model

As discussed earlier key to our work is to propose a new methodological framework to explore the dynamics of inequality

[1] We thank an anonymous referee for pointing out this issue.

Table 1
Variables definitions.

Variables	Definition	Measurement Level/Unit	Sources
Inequality Measures			
GINI	Estimate of Gini index of inequality	Percentage	WIDER and World Bank
Top 10%	Income share held by the highest 10%	Percentage	World Bank
Lowest 10%	Income share held by the lowest 10%	Percentage	World Bank
Macroeconomic Determinants			
Employment	Number of persons engaged	In millions	Penn World 9.1
Government Spending	General Government final consumption expenditure (% GDP)	% of GDP	World Bank
Income	GDP per capita	US dollars at constant prices	UNCTAD
Investment	Gross fixed capital formation.	% of GDP	World Bank
Inflation	Annual percentage change of consumer price index	Percentage	Penn World 9.1
External Debt	Total external debt stocks.	In millions of current US dollars	World Bank
Trade	The sum of exports and imports of goods and services measured as a share of GDP.	% of GDP	World Bank
Other Control Variables			
Education	Gross enrolment ratio is the ratio of total enrolment.	ratio	World Bank
Assistance	Net official development assistance.	In billions of current US dollars	World Bank
Rule of Law	Captures the extent to which laws are laws transparently, independently, predictably, impartially, and equally enforced, and to what extent do the actions of government officials comply with the law?	Index between 0 and 1. 0 being low and 1 being high.	V – Dem
Corruption	Abuse of public office for private gain	Index between 0 and 1. 0 being low and 1 being high.	Transparency International
Transparency	Transparency and predictability of the laws	Interval	V – Dem

and the distributional effects of income. Consequently, we propose a two-step approach to test and examine the relevance of income distributional effect on inequality.

The standard model in the literature assumes that all economies' income are on the same long run equilibrium. Therefore, one can write the basic Kuznets relationship in a panel data framework as follows:

$$GINI_{it} = \alpha + \beta_{g1} GDPC_{it} + \beta_{g2} GDPC_{it}^2 + x_{it}^{'}\beta + z_{it}^{'}\gamma + u_{it} \quad (1)$$

where i refers to economies and t refers to time. The parameters α, β_{g1} and β_{g2} are scalars, which capture intercept, the effects of GDP per capita and the quadratic GDP per capita respectively. β is $K \times 1$ and x_{it} is the ith observation on K macroeconomic variables. γ is $K \times 1$ and z_{it} is the ith observation on K control variables, which are the set of socio -political and human development factors. We define the disturbances term, u_{it}, as a one-way error component with:

$$u_{it} = \mu_i + \upsilon_{it} \quad (2)$$

where μ_i captures the unobservable individual time-invariant effect and υ_{it} is the remainder of the random disturbance term. Under the fixed effect (FE) model, the terms μ_i and λ_t are assumed to be fixed parameters, while the remainder disturbance term υ_{it} is assumed to be independent of the set of explanatory variables for all i and t and υ_{it} $IID(0, \sigma_{\upsilon}^2)$. Substituting (2) into (1), the FE is explicitly expressed, and the model becomes:

$$GINI_{it} = \alpha + \beta_{g1} GDPC_{it} + \beta_{g2} GDPC_{it}^2 + x_{it}^{'}\beta + z_{it}^{'}\gamma + \mu_i + \upsilon_{it} \quad (3)$$

The standard approach treats the model in (3) in two ways: (i) fully homogenous (pooled) or (ii) (partially) heterogenous. This latter is more focused on the error term, which can be defined as either FE or Random Effects (RE). In all cases, however, the standard approach assumes that the slopes are stable and the same across countries. This is very restrictive and limits the differences across countries – heterogeneity – to be due to unobserved country-level characteristics. While this is plausible to a certain extent, it does ignore the case where there are differences due to observed country-level characteristics. Thus, we propose a new methodological framework that allows for the presence of distributional differences across countries. This is consistent with the literature in Barro (2000) and Phillips and Sul (2009), which allow for economies to be located in different steady states. This latter offers a better insight on the role of the distributional effects on development indicators.

3.3. Identifying the distributional clusters (clubs of convergence)

The first stage involves identifying the distributional clusters to which the economies in our sample converge. In this context, we test for the convergence hypothesis of income per capita across African economies. Under overall convergence[2], specification (3) remains valid. If overall convergence is not found, we allow for the possibility of clubs of convergence/divergence. We identify the sub groups of countries that share the same long run time path and group them into clusters (or clubs of convergence). This implies that the model in Equation (3) is modified to reflect these clubs of convergence. The modified model is expressed as follows:

$$GINI_{it}^{s} = \alpha^{s} + \beta_{g1}^{s} GDPC_{it}^{s} + \beta_{g2}^{s} GDPC_{it}^{2,s} + \sum_{q=1}^{k} \beta_{q}^{s} x_{q,it}^{s} + \sum_{r=1}^{k} \gamma_{q}^{s} Z_{q,it}^{s} + \upsilon_{it}^{s} \quad (4)$$

where $s = 1, 2, \cdots, m$ refers to the cluster. Note that since the data are grouped into clubs of convergence, this means that they have the same idiosyncratic error and thus are homogeneous. Therefore, the error term υ_{it}^{s} has the standard properties of a linear regression.

In the second stage, we apply panel data methods to estimate the modified specification in Equation (4) above using both OLS and TSLS based estimators.

We apply the Phillips and Sul (2007, 2009), PS hereafter, approach to identify the distributional clusters of all countries in

[2] Overall convergence refers to the presence of one single long-run level to which all economies converge. In other words, under overall convergence, there is only one cluster.

this study. The PS approach and tests are discussed in the following section.

3.4. Convergence and Phillips and Sul test

To identify the position of each economy in the long-run time path of income per capita, we apply PS approach convergence test. The econometric model is defined as:

$$\log y_{it} = \delta_{it}\mu_t \tag{5}$$

where $\log y_{it}$ refers to income per capita. The variable of interest is defined in a panel data model with the dependent variable observed across $i = 1, 2, \cdots, N$ individuals and over time period $t = 1, 2, \cdots, T$, where μ_t is growth component - common across individuals (i.e. proxy for commonly available world technology). It can also be described as a common stochastic trend in the panel data. The term, δ_{it}, refers to an individual transition factors to measure the individual economic performance in relation to the common stochastic trend, μ_t. In other words, this idiosyncratic term captures the share of common factor μ_t each individual in the panel experiences. Phillips and Sul (2007) defines this term formally as:

$$\delta_{it} = \delta_i + \sigma_i \zeta_{it} L(t)^{-1} t^{-\alpha} \tag{6}$$

where δ_i is fixed, ζ_{it} $iid(0, 1)$ distributed across the observations $i = 1, 2, \cdots, N$ but weakly dependent over time. $L(t)$ is slowly varying function of time, where $L(t) \to \infty$ as$t \to \infty$. This term is key to ensuring convergence towards a common long run path, and thus the smaller the discrepancies between $\log y_{it}$ andμ_t, the more likely the convergence is satisfied. Thus, understanding the dynamics of δ_{it} is of great importance.

The above structure of the idiosyncratic term implies that the null hypothesis of convergence is accepted if for all $\alpha \geq 0$,$\delta_{it} \to \delta_i$. This implies that the analysis of convergence is around the loading coefficient, by using the relative transition coefficient, h_{it}, as a measure of the loading coefficient δ_{it} relative to the cross-sectional average in the panel.

Phillips and Sul (2007) propose the following relationship to approximate the loading coefficient, δ_{it}:

$$h_{it} = \frac{\log y_{it}}{N^{-1}\sum_{i=1}^{N} \log y_{it}} = \frac{\delta_{it}}{N^{-1}\sum_{i=1}^{N} \delta_{it}} \tag{7}$$

The convergence is then assessed based on the loading coefficient, in which PS show: if for all $\alpha \geq 0$, $\delta_{it} \to \delta_i$, then $h_{it} \to 1$ and the cross-sectional variance of h_{it} converges to zero, and we have as $t \to \infty$:

$$\sigma_t^2 = N^{-1}\sum_{i=1}^{N} (h_{it} - 1)^2 \to 0 \tag{8}$$

which is a very important property and essential for testing for the null of convergence and clubs of convergence.

The relative transition time path, h_{it}, captures the divergent behaviour of individuals from the common long-run path, μ_t. The PS procedure is implemented in two stages. First, PS test for the presence of overall convergence, the null hypothesis of overall convergence: $H_0 : \delta_i = \delta$ and $\alpha \geq 0$, against the alternative of no convergence $H_1 : \delta_i \neq \delta$ for all i, or $\alpha < 0$. If the null of convergence is rejected, then the second phase of the test is implemented to test for the presence of clubs of convergence.

The test procedure is applied to the *logt* regression, which is derived based on the cross-sectional variance ratio $\frac{H_1}{H_t}$. The regression is defined as follows:

$$\log\left(\frac{H_1}{H_t}\right) - 2\log L(t) = \widehat{a} + \widehat{b}\log t + \widehat{u}_t \tag{9}$$

where $H_t = N^{-1}\sum_{i=1}^{N}(h_{it} - 1)^2$, $L(t) = \log(t + 1)$, $t = [rT]$ for some trimming rate $r > 0$ and $\widehat{b} = 2\widehat{a}$, with $\widehat{a}$ being the estimated value of α (i.e. the speed of adjustment). The regression is run starting at $t = [rT]$, which is the integer part of rT for some fraction r > 0. PS recommend to use $r = 0.3$. Once the regression is run, the null cannot be rejected if the autocorrelation heteroscedasticity robust one tail $t_{\widehat{b}}$ statistic is above the critical value, c (e.g. at 5% level of significance, fail to reject the null if $t_{\widehat{b}} \geq -1.65$). If the null is rejected, we move to relative clubs of convergence test. In other words, we test whether there are clusters of convergence.

4. Econometric results

4.1. Trends and distributional properties of inequality in Africa

Table 2 reports country level (Panel A) and overall (Panel B) means of three measures of inequality including the GINI index, income shares held by the top 10% and lowest 10% of the population (Top 10% and Low 10%, respectively) and income per capita growth. In general, the overall inequality during the period 1980–2017 is relatively low at about 44%. The gap between income share held by the top 10% of the population and that held by the bottom 10% is relatively wide during the same period. According to findings from the data, over the period 1980–2017 about two thirds of income is held by top 10% of the population, while only about 2.3% is held by the bottom 10%. We also observe that all measures of inequality remained relatively constant over the period 1960–2017. This, however, does not seem to be mitigated by a growing income, which is found to be relatively stable at around 1.3% over the same period. This suggests that, overall, the state of economic inequality is likely to have remained unchanged since the 1980s in Africa.

Panel A, Table 2, reports the mean GINI and income shares across African countries. The GINI index over the period 1980–2017 shows that there are 11 countries with indices exceeding 50%, the mid-point, two of which exhibit strong presence of inequality. The latter are South Africa and Namibia. While – in general – inequality remains either stable or decreasing over decades, inequality seems increasing in some decades in Botswana. We also note that, overall, inequality, has decreased over the years.

We observe a growing inequality between the top 10% and lowest 10% of the population in Africa. The share of income held by top 10% ranges between 24% and 53%. This does not seem to fluctuate much over the decades and the range remain relatively stable. For example, the share of income held by the top 10% is highest in Namibia overall with 53% of income is held by the top 10% of the population quantile. Furthermore, the share of income held by the lowest 10% is least in Lesotho. Overall, the shares of income are relatively stable except for Malawi that shows substantial reduction in the gap between the top and lowest 10% of the population from 61.5% in the 1990s to 36.9% in 2010–2017.

4.2. Clubs of convergence and inequality properties

Table 3 reports GDP per capita clubs of convergence test results for the period 1970–2019[3] using the PS methodology outlined in Section 3.4. The results suggest that overall convergence is not satisfied and there are clubs of convergence in Africa. Indeed, we estimate four clubs, three of which are convergent. There are 20 countries in the first club, 23 countries in the second club, 5 countries in the third club and 2 countries in the fourth club. Countries in the first club are

[3] We used longer time series for better statistical properties and robust statistical results.

Table 2
Trends of Inequality over Decades and across Countries.

	GINI Index					Income share held by the highest 10%					Income share held by the lowest 10%				
Panel A: Country Level Statistics															
Country	**1980–2017**	**1980–89**	**1990–99**	**2000–09**	**2010–17**	**1980–2017**	**1980–89**	**1990–99**	**2000–09**	**2010–17**	**1980–2017**	**1980–89**	**1990–99**	**2000–09**	**2010–17**
Algeria	34.0	40.0	35.9	31.0	27.8	27.5	32.8	26.9	–	22.9	3.2	2.7	2.9	–	4.0
Angola	49.4	53.5	52.5	47.8	42.7	32.3	–	–	32.3	–	2.1	–	–	2.1	–
Benin	41.6	41.9	40.1	39.9	45.4	34.4	–	–	31.1	36.1	2.1	–	–	2.9	1.8
Botswana	59.7	54.8	60.6	63.1	60.6	49.2	42.9	51.2	51.4	–	1.1	1.4	1.2	1.0	–
Burkina Faso	44.5	48.4	48.4	42.9	36.5	35.5	–	41.1	32.9	29.6	2.6	–	2.1	2.5	3.6
Burundi	36.1	33.6	36.8	36.6	37.7	29.6	–	29.7	28.0	31.0	3.0	–	2.6	4.0	2.8
Cameroon	40.7	33.2	42.0	42.8	45.9	34.5	–	36.2	33.3	35.0	2.3	–	2.5	2.5	1.7
Cape Verde	50.8	52.5	52.5	50.1	47.2	39.9	–	–	39.9	–	1.8	–	–	1.8	–
Central African	56.9	63.8	57.4	49.9	56.2	42.3	–	47.7	39.6	–	1.3	–	0.7	1.6	–
Chad	40.0	37.6	39.0	40.8	43.2	31.6	–	–	30.7	32.4	2.2	–	–	2.5	1.8
Comoros	48.5	47.6	47.9	51.5	46.8	40.9	–	–	48.1	33.7	1.6	–	–	1.5	1.6
Congo, Dem. Rep.	42.2	42.3	42.2	42.2	42.1	32.2	–	–	32.4	32.0	2.2	–	–	2.2	2.1
Congo, Rep.	46.8	45.1	46.2	47.5	48.9	37.4	–	–	36.9	37.9	1.8	–	–	2.0	1.6
Cote d'Ivoire	41.8	44.1	39.3	41.9	42.0	31.5	31.4	30.8	32.7	31.9	2.4	2.5	2.5	2.1	2.1
Egypt, Arab Rep.	31.2	30.5	31.3	31.9	31.2	27.1	–	27.0	27.2	27.0	4.0	–	4.0	3.9	4.0
Equatorial Guine	40.0	40.0	40.0	40.0	40.0	–	–	–	–	–	–	–	–	–	–
Eritrea	40.0	40.0	40.0	40.0	40.0	–	–	–	–	–	–	–	–	–	–
Eswatini	56.0	60.5	58.5	52.4	51.5	24.4	–	–	24.5	24.2	3.4	–	–	3.3	3.5
Ethiopia	39.5	47.9	42.6	30.8	36.0	29.6	–	31.8	25.6	29.4	3.3	–	3.3	4.1	2.9
Gabon	47.5	56.5	49.6	42.9	39.3	33.1	–	–	33.1	–	2.3	–	–	2.3	–
Gambia, The	43.5	39.9	46.6	46.7	39.9	34.6	–	37.7	36.9	31.8	2.1	–	1.5	1.8	2.6
Ghana	40.0	37.4	38.8	41.9	42.4	29.9	27.7	29.9	32.7	31.7	2.4	2.9	2.4	1.9	2.0
Guinea	42.9	48.3	45.9	41.2	34.3	31.6	–	33.9	32.1	26.4	2.2	–	1.5	2.4	3.0
Guinea-Bissau	44.6	45.4	42.3	41.4	50.5	34.8	–	34.4	28.1	42.0	2.2	–	2.2	2.9	1.6
Kenya	50.2	62.3	49.0	45.7	42.3	39.6	–	39.8	38.8	–	1.7	–	1.7	1.7	–
Lesotho	56.1	56.4	60.2	53.4	54.2	42.8	43.6	48.3	38.3	40.9	0.8	1.0	0.5	0.9	0.9
Liberia	35.9	36.5	36.5	36.3	33.9	27.2	–	–	28.3	26.0	2.8	–	–	2.4	3.2
Libya	40.0	40.0	40.0	40.0	40.0	–	–	–	–	–	–	–	–	–	–
Madagascar	43.7	46.3	43.3	42.3	42.6	33.7	37.0	32.0	34.5	33.9	2.3	2.0	2.3	2.3	2.3
Malawi	52.9	54.9	63.0	46.8	45.3	43.7	–	61.5	32.8	36.9	2.2	–	1.6	2.9	2.2
Mali	43.2	50.5	48.3	38.9	33.2	31.6	–	40.4	28.7	–	2.5	–	1.7	2.8	–
Mauritania	40.6	46.2	43.4	38.2	33.3	30.9	32.0	35.6	29.4	24.9	2.4	1.4	2.2	2.6	3.0
Mauritius	36.0	37.8	35.2	35.1	35.8	28.9	–	–	28.7	29.0	3.1	–	–	3.1	3.0
Morocco	39.7	39.0	39.4	40.5	39.8	31.7	31.8	30.8	32.6	–	2.7	2.7	2.8	2.6	–
Mozambique	51.4	53.6	53.2	47.4	51.2	41.4	–	43.8	38.1	45.5	1.8	–	1.5	2.0	1.6
Namibia	64.4	63.7	69.8	63.3	60.0	53.3	–	–	53.3	–	1.2	–	–	1.2	–
Niger	37.5	35.1	39.1	41.5	33.7	30.5	–	31.0	33.8	26.7	3.0	–	2.7	2.8	3.5
Nigeria	42.7	38.1	47.4	42.4	43.0	32.6	28.2	36.1	31.3	–	1.8	2.5	1.3	2.1	–
Rwanda	41.5	30.3	40.6	49.7	46.2	39.4	24.6	–	42.4	43.8	2.5	4.4	–	1.9	2.1
Sao Tome	31.7	32.1	32.1	31.6	30.8	33.2	–	–	33.2	–	1.3	–	–	1.3	–
Senegal	45.6	54.5	46.5	40.2	40.2	34.2	–	38.4	31.7	31.0	2.3	–	2.0	2.6	2.3
Seychelles	43.3	42.4	42.1	43.1	46.2	39.9	–	–	–	39.9	1.9	–	–	–	1.9
Sierra Leone	40.1	45.0	41.0	38.9	34.2	29.5	–	–	32.0	26.9	3.0	–	–	2.7	3.3
Somalia	47.5	47.0	47.2	47.7	48.0	–	–	–	–	–	–	–	–	–	–
South Africa	62.3	64.0	60.1	62.0	63.1	49.5	–	47.1	50.1	50.9	1.1	–	1.2	1.1	0.9
Sudan	35.8	36.2	35.9	35.6	35.4	26.7	–	–	26.7	–	2.6	–	–	2.6	–
Tanzania	35.6	30.4	35.9	38.7	38.1	29.7	–	27.1	30.4	31.0	2.8	–	2.7	2.6	3.1
Togo	47.5	53.1	48.1	43.8	44.2	32.9	–	–	32.6	33.1	2.1	–	–	2.5	1.9
Tunisia	39.6	42.1	41.1	38.6	35.9	30.7	34.1	31.2	30.4	27.0	2.4	2.3	2.3	2.5	2.6
Uganda	44.4	49.6	41.4	43.7	42.4	34.3	33.7	33.2	36.1	32.9	2.4	1.9	2.5	2.4	2.5
Zambia	56.0	65.3	52.3	50.0	56.5	40.8	–	39.4	39.9	44.8	1.3	–	1.2	1.7	1.3
Zimbabwe	40.1	37.7	38.0	42.7	43.2	33.8	–	–	–	33.8	2.5	–	–	–	2.5
Panel B: Overall Sample Statistics															
Mean	**44.3**	**45.7**	**45.1**	**43.4**	**42.7**	**34.7**	**33.3**	**37.0**	**34.3**	**33.2**	**2.2**	**2.3**	**2.1**	**2.3**	**2.4**
Std Dev	**7.6**	**9.6**	**8.4**	**7.2**	**7.9**	**6.2**	**5.4**	**8.0**	**6.5**	**6.5**	**0.6**	**0.9**	**0.8**	**0.7**	**0.8**
Max	**64.4**	**65.3**	**69.8**	**63.3**	**63.1**	**53.3**	**43.6**	**61.5**	**53.3**	**50.9**	**4.0**	**4.4**	**4.0**	**4.1**	**4.0**
Min	**31.2**	**30.3**	**31.3**	**30.8**	**27.8**	**24.4**	**24.6**	**26.9**	**24.5**	**22.9**	**0.8**	**1.0**	**0.5**	**0.9**	**0.9**

the countries with high income per capita (i.e. top of the income distribution). Countries in the last club are countries at the bottom of the income distribution.

Furthermore, as shown in Table 3, there is a wide gap between the average annual income per capita among the countries in Club 1 ($ 4026.62 annually) and the remaining countries where Clubs 2, 3 and 4 have average income per capita at $853.32, $576.70 and $227.64 respectively. Fig. 1 illustrates the time path of relative transition curves of income per capita for the respective clubs. The estimated time paths show the presence of differences in income across African economies. While the time path of Club 1 is above the long run level – in red – the time paths for the remaining clubs are below the long-run level. Club 4, however, seems to diverge away from the long run compared to Clubs 1–3.

Table 3
Convergence and Clubs of Convergence Test Results.

Test	$\widehat{b}$	$\widehat{t}$	Countries	Convergence	Mean Income ($/year)
Overall	−0.58	−25.85	All included	NO	
Club 1	0.26	5.82	Algeria, Angola, Botswana, Cape Verde, Egypt, Equatorial Guinea, Gabon, Ghana, Lesotho, Libya, Mali, Mauritius, Morocco, Mozambique, Namibia, Nigeria, Seychelles, South Africa, Sudan, Tunisia.	YES	4026.62
Club 2	0.19	2.86	Benin, Burkina Faso, Cameroon, Chad, Comoros, Congo, Côte d'Ivoire, Ethiopia, Gambia, Guinea, Guinea-Bissau, Kenya, Malawi, Mauritania, Rwanda, Sao Tome and Principe, Senegal, Sierra Leon, Tanzania, Togo, Uganda, Zambia, Zimbabwe.	YES	853.32
Club 3	2.17	4.27	Central African Republic, Congo Dem. Rep, Liberia, Madagascar, Niger.	YES	576.70
Club 4	−1.19	−36.48	Burundi, Somalia	NO	227.64

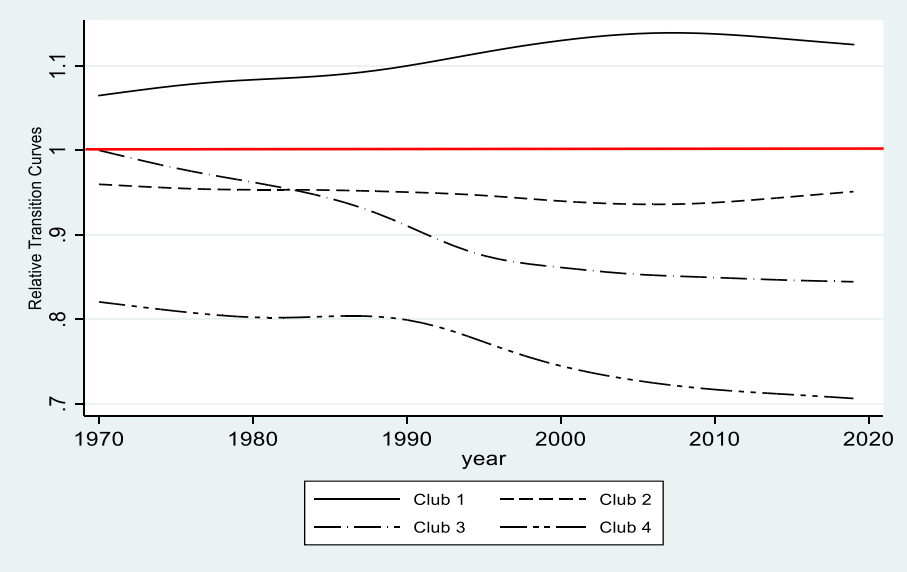

Fig. 1. Relative Transition Curves of Income per Capita by Clubs (Long Run level in red). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Fig. 2 illustrates the mean GINI indices by club over decades. In general, levels of inequality and income concentration are close across all clubs. Overall, economies in Club 4 have a relatively lower inequality level and income concentration compared to economies in Clubs 1–3. There is, however, a tendency of inequality in economies in Club 1 to fall over decades. In contrast, inequality in economies in Club 4 show signs to increase during 2010–2017.

This leads us to rethink the validity of the Kuznets relationship and whether it is stable across all economies with different levels of income. Thus, we propose an empirical modelling strategy to test whether (i) Kuznets relationship is valid for all economies in Africa and (ii) the extent to which macroeconomic variables explain inequality.

4.3. Descriptive statistics and statistical association

Table 4 reports the descriptive statistics of explanatory and control variables. We report both full sample and club – based statistics. The overall statistics show that there are discrepancies across economies. This is shown by the wide ranges (Max - Min) for all variables. This is also observed across clubs. For example, the average income is 6.98 log points (about $1074 per year). The range is, however, wide to some extent, between $103 and $32,402 per year. This shows the large discrepancy across economies in Africa. This has been confirmed with presence of four clubs of convergence. The average level of employment is about 44.93% of the total population annually. Club 1 has an average employment of about 40% of the total population a year, which is relatively the lowest among the other clubs. Club 2 has a higher average employment rate than that of Club 1, but lower than both Clubs 3 and 4. Club 4′s employment average rate is the highest with an annual average rate of about 57%.

We also note that economies in Clubs 1 and 4 have greater government spending, above the overall average of 16.3% of the GDP, while government spending in the Clubs 2 and 3 economies is below the average. Similarly, Club 1 economies have above average levels of several indicators including investment, trade, education, rule of law and transparency. They also fare worse than the average level in other indicators. For example, economies in Club 1 have higher average external debt and the highest recipient of development assistance along with economies in Club 3. In contrast, economies in Club 4 fare below the average across all the indicators. They have lower external debt and receive less funds in form of development assistance.

Table 5 shows the pairwise statistical association between the GINI Index and other variables, in both the full sample and across clubs. There are two broader remarks we can make here. First, the correlation between inequality and other variables is not very strong. Second, the signs – or the direction of the relationship – is not always consistent with the expected signs. For example, for the overall sample, most of the variables are found to have

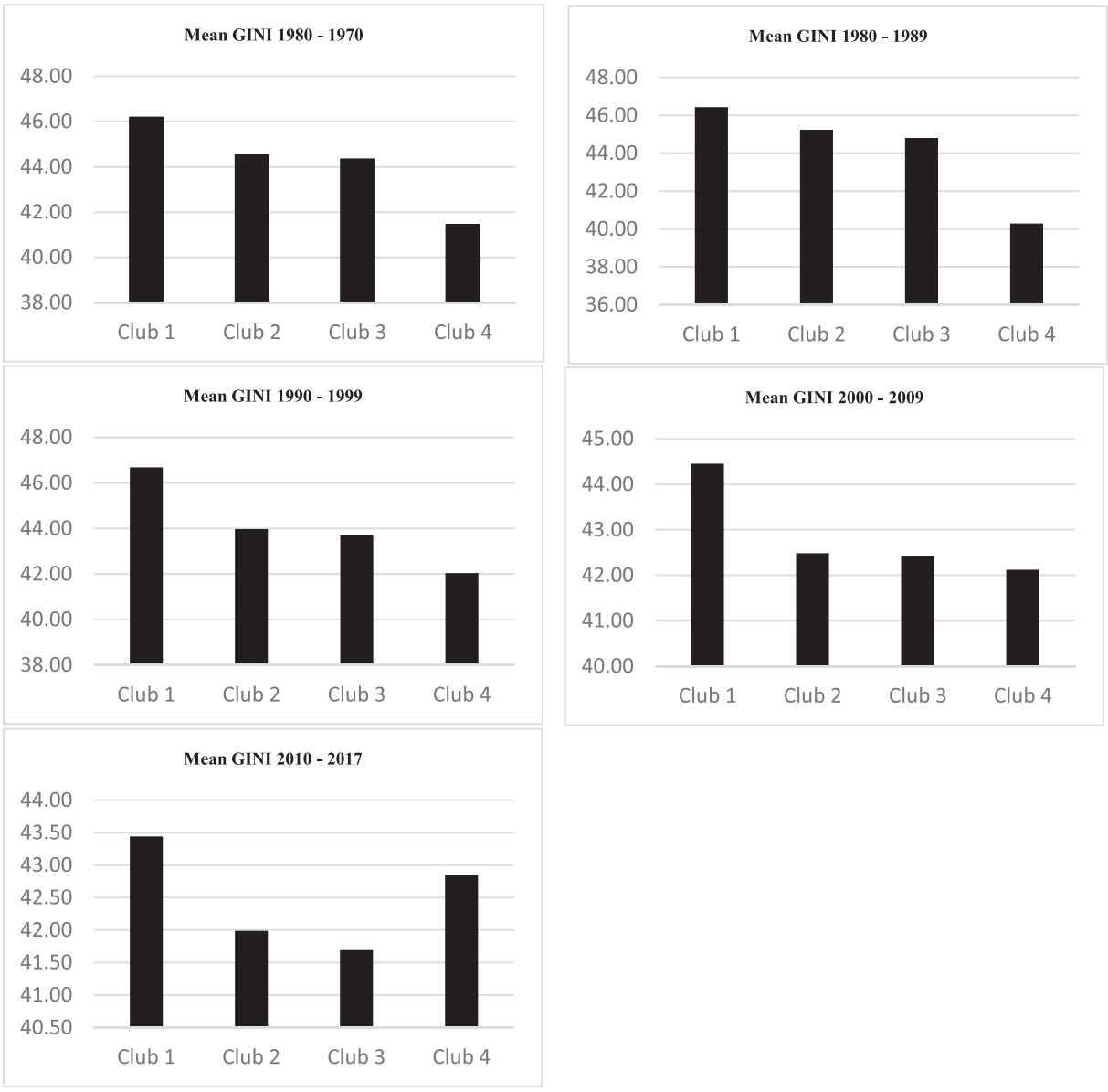

Fig. 2. Mean GINI Index by Decade and Club.

opposite relationship to the expected one. Similarly, the expected signs – as found in the literature – are not consistently predicted using the correlation matrix.

4.4. Econometric results: baseline model

We begin with estimating a baseline specification in which the Kuznets curve model is represented, assuming that all countries are on the same long-run time path of income. We then relax this assumption and allow for multiple equilibria that were estimated. The purpose is to illustrate the extent to which the assumption of overall convergence – one long-run for all countries – may be instrumental in our understanding of the inequality-income nexus.

Table 6A shows the estimated model under the specification in equation (3). We estimate six models using Pooled OLS, FE, RE, Pooled TSLS, FE-TSLS and FE-TSLS. According to our findings, there is no evidence to support the presence of Kuznets' curve relationship. The effect of income per capita and its quadratic terms are only statistically significant when the model is fully homogenous (i.e. Pooled OLS and TSLS). The signs are not consistent with the Kuznets curve inverted U-shape hypothesis, which suggest the presence of a U-shaped relationship. The latter is confirmed using the U-Test[4] statistics, which reject the inverted U-shape hypothesis for all models.

Table 6B reports the estimated results of the modified specification in Equation (4). We estimate the baseline model as in Table 6A but accounting for clubs of convergence. In other words, we estimate a baseline model for each identified club pooling all the countries in their respective groups. These groups reflect multiple long-run levels to which group members converge (or diverge from in the case of Club 4). Since the PS approach is based on accounting for country-specific individual characteristics, the countries can easily be pooled and represent a homogenous bloc. Consequently, we estimate the model using Pooled OLS and TSLS to correct for endogeneity.

[4] The test is proposed by Lind and Mehlum (2010) to formally test for (inverted) U-shaped relationship.

Table 4
Descriptive Statistics of Explanatory and Control Variables (Full Sample and by Clubs).

Variable	Obs	Mean	Std. Dev.	Min	Max
All Countries					
Income	1899	6.984	1.074	4.637	10.386
Employment	1773	5.784	8.117	0.026	65.157
Gov. Spending	1698	16.275	8.745	0	88.983
Investment	1685	21.413	15.731	−2.424	219.069
Inflation	1785	1.24	13.564	−83.068	101.017
External Debt	1734	21.559	1.435	16.971	25.707
Trade	1767	73.177	44.597	6.32	531.737
Education	1584	88.082	29.378	14.109	173.824
Assistance	1603	0.348	1.812	−11.485	5.087
Rule of Law	1975	0.393	0.248	0.03	0.937
Transparency	1975	0.092	1.212	−2.703	3.105
Club 1					
Income	760	7.803	1.092	4.789	10.386
Employment	672	6.923	10.082	0.031	65.157
Gov. Spending	671	17.64	8.309	0	84.508
Investment	661	25.29	20.624	0	219.069
Inflation	684	1.394	14.03	−83.068	101.017
External Debt	564	22.179	1.634	17.489	25.707
Trade	706	85.029	56.197	6.32	531.737
Education	600	94.673	26.158	21.515	173.824
Assistance	669	0.504	1.709	−7.524	5.087
Rule of Law	760	0.458	0.271	0.03	0.937
Transparency	760	0.309	1.23	−2.059	2.355
Club 2					
Income	873	6.598	0.542	5.296	7.915
Employment	873	4.926	6.657	0.026	47.919
Gov. Spending	747	15.457	9.037	2.047	88.983
Investment	746	19.812	11.493	−2.424	212
Inflation	873	1.03	13.381	−65.721	59.084
External Debt	851	21.343	1.252	16.971	23.861
Trade	772	63.576	25.573	19.684	165.646
Education	744	86.136	28.999	17.292	159.353
Assistance	698	0.23	1.71	−8.508	3.912
Rule of Law	873	0.389	0.225	0.051	0.855
Transparency	873	0.148	1.071	−2.187	3.105
Club 3					
Income	190	6.167	0.358	4.637	6.929
Employment	190	6.257	6.519	0.557	29.836
Gov. Spending	176	11.871	4.54	2.058	28.127
Investment	168	15.19	8.016	0	40.318
Inflation	190	1.699	13.351	−59.174	36.816
External Debt	185	21.488	0.973	19.087	23.306
Trade	179	62.698	42.802	20.431	311.355
Education	135	79.783	34.526	21.515	149.307
Assistance	155	0.63	1.833	−4.292	4.494
Rule of Law	190	0.271	0.195	0.036	0.669
Transparency	190	−0.025	1.318	−2.492	2.616
Club 4					
Income	76	5.283	0.475	4.65	5.953
Employment	38	2.978	0.767	1.934	4.64
Gov. Spending	47	16.013	7.177	4.188	31.573
Investment	53	17.09	8.818	2.781	43.081
Inflation	38	0.963	10.212	−18.139	39.348
External Debt	74	21.011	0.728	18.926	21.84
Trade	53	45.406	22.054	20.964	121.667
Education	44	68.46	41.604	14.109	143.914
Assistance	33	−2.705	3.256	−11.485	1.613
Rule of Law	76	0.266	0.213	0.031	0.623
Transparency	76	−1.199	1.085	−2.703	0.188

The findings suggest that the effects of income and its quadratic term are statistically significant using both estimators in all clubs. The nature of the relationship is, however, not consistently the same across clubs. The estimated effect of income and income-squared is found to be negative and positive, respectively, for Clubs 1 and 2. This implies the presence of a U-shaped relationship, which has been confirmed formally using the U-Test statistics. In contrast, the estimated signs of income and income square is found to be positive and negative, respectively, for Clubs 3 and 4. The U-Test statistics also suggest that there is an inverted-U-shaped relationship meaning that the Kuznets' curve relationship holds.

4.5. Econometric results: the role of macroeconomic and control factors

We extend the analysis to include – in addition to income – six other key macroeconomic variables. These include government spending, investment, inflation, employment, trade and external debt. Table 7A reports the estimated results for the clubs we identified. The findings suggest that the income – inequality relation is generally consistent with the baseline model suggesting that earlier findings are robust. This is to say that the Kuznets curve relationship holds for economies in Clubs 3 and 4 – albeit divergent

Table 5
Correlation between GINI Index and Other Variables and Expected Signs.

Variables	Expected Sign	Overall	Club 1	Club 2	Club 3	Club 4
Income	(−)	−0.014	0.026	−0.127	0.303	−0.645
Employment	(−)	−0.135	−0.101	−0.174	−0.272	0.265
Gov. Spending	(−)	0.169	0.453	0.092	0.020	0.238
Investment	(−)	−0.114	0.013	−0.184	−0.365	−0.365
Inflation	(+)	−0.000	−0.007	0.007	0.000	−0.170
External Debt	(+)	−0.235	−0.282	−0.161	−0.485	0.122
Trade	(−)	0.052	0.141	0.024	−0.259	−0.484
Education	(−)	0.067	0.083	0.058	0.116	0.002
Assistance	(−)	−0.050	0.099	−0.092	−0.294	0.286
Rule of Law	(−)	0.138	0.475	−0.017	−0.540	−0.232
Transparency	(−)	0.056	0.350	−0.089	−0.358	0.063

Table 6A
Baseline Model.

	Pooled OLS	FE	RE	TSLS	TSLS-FE	TSLS-RE
Income	−4.054***	−10.261	−10.05	−3.956**	−10.396	−10.175
	(1.376)	(6.69)	(6.611)	(1.721)	(7.01)	(6.923)
Income Square	0.306***	0.644	0.635	0.3**	0.658	0.649
	(0.095)	(0.424)	(0.422)	(0.118)	(0.445)	(0.442)
Intercept	57.639***	84.101***	83.071***	57.199***	84.291***	83.222***
	(4.904)	(25.881)	(25.528)	(6.205)	(27.073)	(26.669)
Observations	2399	2399	2399	2349	2349	2349
R^2/Pseudo R^2	0.01	0.02	0.02	0.01	0.02	0.02
F/Wald Stats	7.06***	1.18	2.31	6.12***	247.02***	2.17
U test	U	U	U	U	U	U

*Robust standard errors are in parentheses. *** p <.01, ** p <.05, * p <.1.* Set of instruments include lagged explanatory variables. *U* test: U refers to the test failure to reject the U shape; IU refers to the test failure to reject the inverted U shape hypothesis (i.e. Kuznets Curve). Equations are exactly identified.

Table 6B
Baseline Model by Clubs.

	Club 1		**Club 2**		**Club 3**		**Club 4**	
	OLS	TSLS	OLS	TSLS	OLS	TSLS	OLS	TSLS
Income	−8.414***	−8.331***	−22.965**	−23.283**	46.654**	53.113**	126.704***	123.344***
	(2.618)	(2.683)	(9.361)	(9.632)	(21.374)	(23.265)	(17.552)	(17.759)
Income Sq.	0.53***	0.525***	1.749**	1.78**	−3.404*	−3.91**	−13.205***	−12.885***
	(0.173)	(0.177)	(0.711)	(0.731)	(1.73)	(1.88)	(1.673)	(1.693)
Intercept	78.414***	78.061***	118.901***	119.617***	−114.294*	−134.847*	−255.841***	−247.098***
	(9.826)	(10.07)	(30.673)	(31.581)	(66.032)	(71.949)	(45.728)	(46.251)
Observations	960	940	1103	1080	240	235	96	94
R-squared	0.012	0.012	0.005	0.005	0.059	0.06	0.853	0.858
F-stat	5.868***	5.479***	3.033**	3.01**	7.486***	7.583***	270.501***	268.512***
U test	U	U	U	U	IU	IU	IU	IU

Robust standard errors are in parentheses. *** p <.01, ** p <.05, * p <.1. Set of instruments include lagged explanatory variables. *U* test: U refers to the test failure to reject the U shape; IU refers to the test failure to reject the inverted U shape hypothesis (i.e. Kuznets Curve). Equations are exactly identified.

– and does not hold for the economies in Clubs 1 and 2. This implies that the higher the economy (or indeed the higher the long-run level of a club of convergence), the higher the discrepancy between the rich and the poor, which is consistent with Clubs 1 and 2. In contrast, the higher the income per capita, the lower inequality in Clubs 3 and 4. Income and its quadratic form are not, however statistically significant in the case of Club 2.

The effect of the macroeconomic factors used to extend the baseline model give generally inconsistent results on the role of macroeconomic variables across the clubs. This includes the signs and significance of the estimated effects of some of the variables. The inconsistencies also include the contradicting findings produced by OLS and TSLS estimators. This may also suggest that the evidence of the role of these effects is just weak. Nonetheless, the results offer some insights on the role of some macroeconomic determinants on inequality in Africa.

There is relatively strong evidence of the statistically significant role that macroeconomic variables may play in explaining inequality in the economies in Club 1. This includes – in addition to income and income square – employment, government spending, investment and external debt. The remaining variables are not statistically significant. While employment and government spending have a positive effect; investment and external debt have an estimated negative effect.

The effect of employment is also found to be positive and statistically significant in economies in Club 3 and Club 4. The TSLS estimator of the latter, however, shows a negative and statistically insignificant effect of employment. Furthermore, the role of investment in Clubs 2 to 3 is like that found in Club 1; a negative and statistically significant effect. While the significant effect of external debt is limited to the specification estimated using OLS, the role of external debt is consistently negative across all clubs with strong evidence of a significant role in Club 3. In contrast to Club 1, government spending is found to have a negative and statistically significant effect in Club 3. Our findings also indicate that government spending does not play a significant role in Club 4. Finally, both trade and inflation are estimated to have insignificant role across all clubs.

Table 7A
Extended Model – The Effect of Macroeconomic Factors.

	Club 1		Club 2		Club 3		Club 4	
	OLS	TSLS	OLS	TSLS	OLS	TSLS	OLS	TSLS
Income	−39.24***	−32.185	−45.49***	−47.09***	14.95	−7.48	713.85***	110337.36***
	(3.991)	(27.829)	(8.929)	(10.189)	(60.037)	(82.207)	(232.036)	(1067.044)
Income Square.	2.757***	2.356	3.405***	3.501***	−0.741	1.052	−62.592***	9571.234***
	(0.275)	(1.622)	(0.677)	(0.785)	(4.736)	(6.45)	(20.146)	(135.591)
Employment	0.13***	0.04	−0.088	0.011	0.398***	0.459***	1.779***	−21.589
	(0.035)	(0.414)	(0.058)	(0.122)	(0.12)	(0.13)	(0.457)	(120.654)
Gov. Spending	0.858***	1.284	0.056**	0.054	−0.44***	−0.591**	0.026	20.617
	(0.067)	(0.812)	(0.026)	(0.041)	(0.149)	(0.265)	(0.054)	(17.352)
Investment	−0.156***	−0.454	−0.087***	−0.109***	−0.388***	−0.472***	−0.094**	−16.499
	(0.049)	(1.024)	(0.029)	(0.039)	(0.066)	(0.113)	(0.044)	(15.907)
Inflation	−0.038	−1.254	−0.01	−0.187	−0.02	0.068	−0.028	−20.873
	(0.024)	(4.622)	(0.017)	(0.331)	(0.035)	(0.308)	(0.019)	(22.282)
External Debt	−1.545***	−2.155	−0.19	−0.435	−6.186***	−7.038***	0.533	−275.33**
	(0.257)	(1.91)	(0.264)	(0.347)	(0.828)	(0.972)	(0.488)	(126.005)
Trade	−0.022	−0.05	0.022*	0.043	−0.005	−0.005	−0.126***	8.66
	(0.015)	(0.048)	(0.012)	(0.031)	(0.015)	(0.022)	(0.041)	(14.363)
Intercept	204.52***	191.949***	198.743***	209.115***	121.534	212.416	−2008.714***	323129.39
	(14.351)	(62.807)	(30.36)	(33.779)	(195.858)	(267.247)	(674.064)	(0)
Observations	487	471	727	704	164	158	37	36
R-squared	0.434	−2.397	0.086	−0.045	0.483	0.437	0.871	−8033.711
F-stat	45.735	7.428	8.454	7.653	18.101	16.165	23.562	7372673.1
U- Test	U	U	U	U	IU	IU	IU	U

Robust standard errors are in parentheses. *** p <.01, ** p <.05, * p <.1. Set of instruments include lagged explanatory variables. *U* test: U refers to the test failure to reject the U shape; IU refers to the test failure to reject the inverted U shape hypothesis (i.e. Kuznets Curve). Equations are exactly identified.

Table 7B
Extended Mode – The effect of Macroeconomic, Human Development and Socio – Political and Human Development Factors by Clubs.

	Club 1		Club 2		Club 3		Club 4	
	OLS	TSLS	OLS	TSLS	OLS	TSLS	OLS	TSLS
Income	−41.403***	−40.697***	−56.002***	−50.595***	98.239	−24.742	618.993*	−33.054
	(3.912)	(4.842)	(10.402)	(14.233)	(60.653)	(141.895)	(318.405)	(1309.548)
Income Square	2.93***	2.925***	4.09***	3.701***	−7.878*	1.184	−54.554*	−2.22
	(0.274)	(0.303)	(0.784)	(1.061)	(4.71)	(10.73)	(27.628)	(95.015)
Employment	0.188***	0.177	−0.126*	−0.246	−0.147	−0.163	0.768	56.746
	(0.041)	(0.16)	(0.066)	(0.232)	(0.104)	(0.161)	(1.902)	(269.097)
Gov. Spending	0.749***	1.04***	0.024	0.077	0.158	0.406*	0.01	−0.009
	(0.072)	(0.338)	(0.027)	(0.064)	(0.119)	(0.238)	(0.063)	(0.706)
Investment	−0.163***	−0.236	−0.094***	−0.082	−0.057	0.115	−0.103	0.255
	(0.05)	(0.236)	(0.034)	(0.076)	(0.06)	(0.119)	(0.059)	(2.035)
Inflation	−0.026	−0.161	0.015	0.3	0.03	0.122	−0.029	0.239
	(0.025)	(0.93)	(0.017)	(0.417)	(0.025)	(0.14)	(0.024)	(1.078)
External Debt	−1.468***	−1.655***	−0.361	−0.135	−4.311***	−5.854***	−1.907	26.246
	(0.259)	(0.318)	(0.311)	(0.522)	(0.717)	(1.748)	(1.138)	(147.649)
Trade	−0.102***	−0.133***	0.017	−0.007	0.021	0.018	−0.1*	0.465
	(0.018)	(0.051)	(0.012)	(0.046)	(0.018)	(0.048)	(0.05)	(2.697)
Education	0.033	0.022	0.024***	0.031**	0.017	0.034	−0.013	−0.217
	(0.021)	(0.081)	(0.009)	(0.014)	(0.015)	(0.023)	(0.034)	(1.049)
Assistance	0.296***	0.426***	−0.12**	−0.314	−0.268***	−0.814***	0.526*	0.282
	(0.082)	(0.105)	(0.051)	(0.202)	(0.048)	(0.316)	(0.284)	(3.814)
Rule of Law	16.382***	14.371**	0.109	1.607	−40.609***	−27.032	−4.893	234.008
	(2.327)	(6.875)	(2.011)	(2.884)	(6.366)	(17.332)	(6.056)	(1142.614)
Transparency	−0.408	−0.123	−0.121	−0.625	2.162*	−1.011	2.135**	−20.985
	(0.553)	(0.986)	(0.402)	(0.629)	(1.107)	(3.308)	(0.89)	(117.78)
Intercept	204.849***	204.836***	241.39***	218.086***	−158.587	280.152	−1673.058*	−515.061
	(14.177)	(16.592)	(36.098)	(51.863)	(200.831)	(490.671)	(924.552)	(0)
Observations	416	384	603	546	130	112	29	26
R-squared	0.568	0.532	0.149	−0.285	0.812	0.804	0.924	−2.653
F-stat	44.181	38.958	8.594	5.252	42.07	35.35	16.316	13399.654
U – Test	U	U	U	U	IU	IU	IU	IU

Robust standard errors are in parentheses. *** p <.01, ** p <.05, * p <.1. Set of instruments include lagged explanatory variables. *U* test: U refers to the test failure to reject the U shape; IU refers to the test failure to reject the inverted U shape hypothesis (i.e. Kuznets Curve). Equations are exactly identified.

We also estimate an augmented specification by including further control variables such as net foreign aid in the form of development assistance, education, the rule law and transparency. The econometric set up is the same as before. This includes maintaining the clubs as identified, using Pooled OLS and TSLS estimators and testing for the presence of an inverted-U-shape relationship.

Table 7B shows the estimation output. Our findings regarding the role of income and its quadratic form remains robust in Clubs 1 and 2. There is weak evidence of the role of income in this

augmented specification for Clubs 3 and 4, which may be due to the low sample sizes when further variables are added[5]. Overall, however, the Kuznets' curve hypothesis has been confirmed using the U-Test for Clubs 3 and 4, while rejected for the remaining two clubs. In other words, income and income square have negative and positive effects – respectively – on inequality in Clubs 1 and 2, both of which are statistically significant. In contrast, the effects of income and income square are reversed and have negative and positive effects – respectively – on inequality in Clubs 1 and 2, both of which are statistically significant.

According to our findings, the presence of control variables offers further insights on the determinants of inequality across clubs in Africa. The macroeconomic factors are estimated to have similar signs and significant roles in determining inequality in Club 1 as previously reported. The only exception is that trade has a significant and negative effect on inequality. Education, however, is found to have no significant role in explaining inequality in Club 1 economies. Inequality in economies in Club 1 is also found to increase following an increase in development assistance. The conclusion is consistent to those obtained by Chong et al (2009), which suggests that development assistance is ineffective in reducing inequality. Furthermore, both institutional factors - rule of law and transparency - have statistically significant role. While rule of law has a positive effect, transparency is found to have a negative effect on inequality.

The estimated effects of these variables are not consistently obtained across the remaining three clubs. Government spending and trade, while maintaining their estimated signs in Club 1, are not statistically significant in most cases. Furthermore, inflation remains statistically significant in all clubs. Unlike Clubs 2 and 4, external debt is statistically significant and has a negative effect on inequality. In addition, our findings also suggest that the role of development assistance is not consistently the same across clubs. In contrast to Clubs 1 and 4, the effect of assistance on inequality is negative in Clubs 2 and 3. This differential could perhaps be explained by variation in the quality of a country's institutions and its effects on economic development. There is need for future research on the effects of the institutional factor and inequality.

The evidence of a significant role of education, rule of law and transparency across clubs are limited. In this context, the role of education is only significant in Club 2, where the estimated effect is positive. Some limited evidence also suggest that the rule of law and transparency are statistically significant. While rule of law is estimated to reduce inequality in only Club 3 economies, transparency is estimated to have positive effect on inequality in Club 3 and 4.

4.6. Discussion and policy implications

Our findings on the key objectives of this study suggest several implications of great policy relevance. The standard literature of income inequality in Africa as illustrated above does not explicitly account for the distributional variations in income across African economies when attempting to determine the effect of income on inequality.

One key contribution to the literature is to account for the distributional properties of income. In this context, our findings are consistent with much of the literature such as Jones (2002), Hammouda et al (2009) and Djennas and Ferouani (2014). In other words, African economies do not share an overall long-run level of income per capita, which is better described by the presence of four clubs – or clusters - of convergence. This is not a surprising conclusion given the prominent differences in natural endowments, history and the presence of spatial discrepancies across African economies.

This may suggest that economic policies to reduce poverty and income inequality may not be the same for all African economies. Therefore, it is plausible to argue that income inequality does not behave the same across these clubs of convergence – and indeed across regions. Accounting for the presence of different development paths around which four mutually exclusive groups fluctuate, leads to estimating different models to explain income inequality for these paths. In this context, our findings suggest that income inequality might be increasing in high-income economies, while decreasing in low-income economies. Thus, sensible policies may need to account for the differences and economies' individual characteristics.

Therefore, the hypothesis that income inequality can be explained using the Kuznets curve framework is not valid for all African economies. According to our findings, the Kuznets curve hypothesis is only valid for countries in Clubs 3 and 4, which are located in lower levels of income per capita. In contrast, Kuznets' curve hypothesis does not hold for economies in Clubs 1 and 2. In other words, income inequality increases with income for these economies. These economies have a relatively higher income per capita than that for economies in Clubs 3 and 4. In all cases, however, income per capita plays a statistically significant role in explaining the variations in income inequality.

As such, economies in Clubs 1 and 2 – with high income and high inequality – may need to pay more attention to the quality of institutions and governance that may generate spatial inequality (Banerjee & Iyer, 2005; Kapur & Kim, 2006). For example, political institutions that determine the distribution of power and fiscal resources between federal, state and local governments can play a major role in determining spatial inequality (Henderson, 2002). Reforming the distribution of power through devolution and fiscal resources - whatever the revenue sharing arrangement - should be the purpose of policy in these regards. Furthermore, Club 3 and 4 economies may need to implement macroeconomic structural reforms to increase their competitiveness and job creation. This will enhance their economic activity and therefore, economic output (income).

Stylised facts[6] from upper middle-income African countries like South Africa and Namibia seem to corroborate Barro (2000) and the implications of our findings suggest the need for some kinds of income policy to redistribute towards the poorer section of society. One way to improve the redistribution of income is via wage policies and cash transfer. Indeed, higher wages for the lowest-paid workers have the potential to help reduce inequality and take people out of poverty and add to their per capita and overall real income as well as boosting aggregate demand. Additionally, increasing the minimum wage does not necessarily hurt employment nor does it retard economic growth. Furthermore, cash transfers can be used as an income redistribution mechanism to boost poorer households' incomes and therefore reducing inequality. As Miller (2011) illustrated, cash transfers in Malawi have helped both the recipients, non-recipients as well domestic businesses since these transfers strengthened domestic markets by providing a steady source of income for businesses and national tax revenue.

Our findings also suggest that public expenditure budget should prioritise spending on the education sector - targeting in the process those at the bottom of income distribution. This may potentially lead to two positive outcomes in the long-run: poverty

[5] The sample size has fallen from 164 (158 using TSLS) to 130 (112 using TSLS) observations in Club 3, and from 37 (using TSLS) observations to 29 (26 using TSLS) observations.

[6] This includes high levels of income inequality and high levels of unemployment – especially among the youth and women (Kararach, 2022).

reduction and wider labour force participation (formal employment) for poorer households, allowing them to break away from the intergenerational poverty trap. According to Boushey and Mitukiewicz (2014), investment in early childhood education improves job quality, which will reduce income inequality of families in the middle of the income distribution. Increasing expenditure on education, however, needs to be reinforced by creating and maintaining competitive and strong investment environment. This will ensure the efficient creation of jobs for skilled labour.

In addition, our findings show that domestic investment decreases income inequality and reduces poverty in all the regions especially in Clubs 1 and 2. This shows the policy relevance of domestic investment to income inequality reduction. Therefore, promoting domestic investment must be pursued as an active government policy objective. A key challenge, however, for these countries is to mobilise and efficiently allocate resources for such high domestic investment goal. This requires a set of actions and measures at both domestic and regional levels. At the domestic level, economies need to enact policies to incentivise domestic savings. This includes, for instance, implementing tax reforms, enhancing the productivity of public spending, and introduction of cost-sharing in the provision of public goods. At the regional level, African economies need to implement trade policies to support poverty reduction and growth strategies.

5. Concluding remarks

The main aim of this paper is to examine the role of macroeconomic and institutional factors in explaining inequality in Africa. The recent literature on income inequality departed from the stable Kuznets curve hypothesis, which predicts a bell-shaped relationship between income inequality and per capita income to hold only for high income economies and invalid for low-income economies. We adopt this view and offer a re-assessment of the validity Kuznets curve in Africa accounting for the steady state level of income of each economy in our sample.

For this purpose, we propose a novel two-stage econometric strategy. Stage 1 includes applying the concept of relative and clubs of convergence of income to test whether multiple steady state equilibria exist. Stage 2 involves constructing homogenous blocks of economies corresponding to the clubs of convergence. All Kuznets curve (baseline and extended) regressions are run for these clubs, which is consistent with accounting for the steady state level of income of each economy in the data.

Our findings have two broader stories to tell. The first is concerning the state of income convergence across African economies. The second highlights the role of macroeconomic and institutional factors in explaining income inequality in Africa across economies with varied levels of income. The findings of the former indicate that there is overall divergence of GDP per capita for the period 1980–2017. There are, however, clubs of convergence in the continent. We found four clusters in which three are convergent. The estimated time paths also confirm the presence of differences in income across clubs in Africa. While time path of Club 1 is above the long run level – in red – the time paths of the remaining clubs are below the long-run level. Club 4, however, seem to diverge away from the long run compared to Clubs 1–3. The results also demonstrate levels of inequality and income concentration are close across all clubs. Economies in Clubs 4 and 3 have, however, a relatively lower inequality levels and income concentration compared to economies in Clubs 1 and 2.

Stage 2 findings show that the Kuznets' relationship is not stable when taking a panel of countries with different levels of income per capita, demonstrating the presence of multiple equilibria of income that may cause this instability. This suggests that the effect of income on income inequality may not consistently be the same across economies. Our findings, in contrast to Barro (2000) and subsequent literature, show that inequality may be increasing in high income countries in Africa, while decreasing in low income or the least developed African economies. When we extend the analysis to include other key macroeconomic and institutional variables (such as investment, inflation, employment, trade, external debt, rule of law and transparency), the findings are generally consistent and robust with the baseline model findings.

Conflicts of interest

The authors declare that there are no conflicts of interest.

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