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Is there a financial Kuznets curve for South Africa?

A Research Report submitted in partial fulfilment of the Degree of
Master of Commerce (Applied Development Economics)
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University of the Witwatersrand

by

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Declaration

I hereby declare that this research report is my work. It is submitted in partial fulfilment of the degree of Master of Commerce by Coursework and Research Report at the University of the Witwatersrand, Johannesburg. It has not been submitted elsewhere for the purpose of being awarded another degree or for examination purposes at any other university.



Louisa Maria Basitere

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All glory, honour and praise go to God. He is faithful, and His mercy endures forever.

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Abstract

This research report analyses the impact of financial sector development on Income inequality in South Africa for the period 1990 - 2021. The research report employs the Autoregressive Distributed Lag (ARDL) using data sourced from the South African Reserve Bank (SARB) and the World Inequality Database. The report finds that there is no evidence of a financial Kuznets curve for South Africa for the period of the study. The report adds to the sparse literature on the nexus between financial sector development and income equality in South Africa by using an index formulated using Principal Component Analysis (PCA) as a proxy for financial sector development and considering the impact of Social protection expenditure. Social protection expenditure, mostly in the form of cash social grants, is used the by South African government as one of the levers to address income inequality in the country.

Keywords: Financial sector development, Gini coefficient, Income inequality, Kuznets, Autoregressive Distributed Lag (ARDL), South Africa.

1. Introduction

South Africa is one of the most unequal countries in the world, as measured by the Gini coefficient. The Gini coefficient for the country stood at 0.76 during 2021 (World Inequality Database, 2022). Raj (2008, p.180) defines economic inequality as "the fundamental disparity that permits one individual certain material choices while denying another individual those very same choices." In the case of South Africa, the high-Income inequality levels have their foundation in the political history of the country as in 1948; the National Party government introduced a system commonly known as "Apartheid" that privileged white people at the expense of other racial groups, native Africans. As part of this policy, the Nationalist government introduced the Native Laws Amendment Act, No. 54 of 1952 and the Bantu Education Act, No, 47 of 1953. The former Act restricted the movement of non-white South Africans, while the latter ensured that the education system was segregated according to race. The Industrial Conciliation Act (No. 28) of 1956 conferred powers to the Minister of Labour to reserve specific jobs for white people to the disadvantage of other racial groups (Byrnes, 1996). The impact of the Apartheid regime on South Africans is evident from the fact that the highest level of per capita inequality is evident in Black Africans compared to the other race groups (Statistics South Africa, 2017).

Income inequality in South Africa can be considered as having a *tunnel* effect since the poor are increasingly becoming impatient with the pace of progress of their inclusion in fruitful economic participation. The concept of the *tunnel* effect was used by Hirschman and Rothchild (1973) to explain how the disenfranchised are willing to tolerate growing inequality during the initial stages of rapid economic growth and how this tolerance reduces over time. They argue further that the tunnel effect can be compared to the relative income hypothesis, where "*the welfare of an individual varies inversely with the income or the consumption of those persons with whom he associate*s" (Hirschman & Rothchild, 1973, p. 546). According to Khan (2013), the elevated levels of poverty and Income inequality in South Africa are the key drivers of the perception that South Africa is the “protest capital of the world". The looting incidents that took place in South Africa during July 2021, mainly in Gauteng and KwaZulu-Natal provinces, serve as a reference point to the dangers of not adequately addressing the growing levels of poverty and inequality in the country. Bhattacharya & Rach (2021) conclude that the unrest in the country was driven more by the persistent levels of Income inequality than by the prevailing political events at the time. The quote below from Wilkinson and Pickett (2011, p. 51) eloquently captures why it is essential to be concerned with issues of income equality:

"Inequality, not surprisingly, is a powerful social divider, perhaps because we all tend to use differences in living standards as markers of status differences. We tend to choose our friends from among our near equals and have little to do with those much richer or poorer. And when we have less to do with other kinds of people, it is harder for us to trust them. Our position in the social hierarchy affects whom we see as part of the in-group and who as out-group - us and them - affecting our ability to identify with and empathise with other people."

Spaull (2019, p.2) argues that in the case of South Africa, it is important to study why despite almost three decades of democracy, inequality persists. He concludes that it is vital to tell a "story about why this level of inequality is acceptable or not". The aim of this research is to add to that "story" by investigating whether the focus on addressing the problem of inequality in the country by promoting the growth of the financial sector leads to the development of financial Kuznets curves in South Africa. The study adds to the existing knowledge by considering the relationship between inequality and the growth of the financial sector for the period 1990 – 2021 for South Africa using data sourced from the South African Reserve Bank (SARB) and the World Inequality Database. Levine (2005, p. 867) concludes that "Research that clarifies our understanding of the role of finance in economic growth has policy implications and shapes future policy-oriented research". Hassan and Meyer (2020) argue that although the issues of the nexus between inequality and financial sector development are essential for developing economies, this area has not received much attention from researchers for South Africa.

The rest of this research report is set out as follows: Section two sets the scene by providing an overview of the state of Income inequality and financial sector development in South Africa. Section three covers the literature review, including the theoretical and empirical aspects. Section four discusses the research framework and methodology. The results are discussed in Section five, while the limitations of the study and conclusion are covered in Sections six and seven, respectively.

2. Inequality and Financial sector development in South Africa

2.1 Inequality

Wilkinson and Pickett (2011), in their book titled "The Spirit Level: Why Greater Equality Makes Societies Stronger", draw a positive relationship between inequality and an increase in health and social problems for a sample of 23 countries. Their sample is based off a 2004 World Bank report on

the 50 richest countries of the world. The index they use in reaching this conclusion includes aspects such as life expectancy, Maths and literacy levels, infant mortality, homicides, imprisonment, teenage births, obesity, mental health (including drug and alcohol addiction) and social mobility. It can be argued that their conclusions hold for South Africa where for example, lower levels of Maths and literacy levels are present in the black population compared to the other race groups. Spaull (2019, 1) finds a historical link between education and the labour market, and that the South African education system directly mirrors their impact. His research shows that even after two decades of democracy, the chances of future success for an average South African child are determined more by skin colour, geographical location, and the wealth of parents than the child's ability or determination.

Table One below shows that inequality was the highest and increased between 2006 (0.54) and 2015 (0.57) in South Africa. The reports showed that:

> *The expenditure share of black Africans was significantly smaller than their large population share in the country; while' the expenditure share of whites remained disproportionately large relative to their small population share. This and the gaps in expenditure and population shares – which we already observed in the differences by mean and median expenditure – highlights the high level of inequality in South Africa* (Statistics South Africa, 2019, pp. 144 – 145).

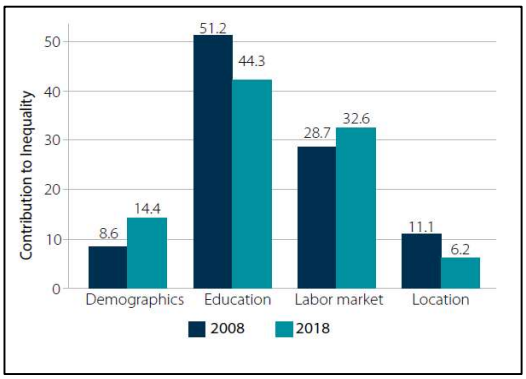
This finding is supported by the World Bank (2022), which considered the issue of inequality by looking at trends for the South African Customs Union (SACU) member countries of Eswatini, Lesotho, Namibia, and South Africa. They found that in 2018 the largest drivers of inequality in South Africa were the labour market and the level of education, as depicted by Figure 1 below. When race is considered, as depicted by Figure1.b, it reduces the effect of all four tracked drivers (demographics, education, labour market and location) and emerges as the key driver of inequality in South Africa.

Table 1: Per capita inequality by race

Population group	Year	Gini coefficient	Theil's indices		Atkinson indices		Palma ratio			
			GE(0)	GE(1)	A(1)	A(2)	Bottom 40%	Middle 50%	Top 10%	Ratio
Black African	2006	0,54	0,51	0,61	0,40	0,58	11,4%	43,7%	44,9%	4,0
	2009	0,57	0,57	0,68	0,44	0,62	10,0%	43,2%	46,8%	4,7
	2011	0,55	0,54	0,63	0,42	0,61	10,4%	44,7%	44,9%	4,3
	2015	0,57	0,59	0,66	0,44	0,64	9,6%	44,2%	46,2%	4,8
Coloured	2006	0,56	0,56	0,60	0,43	0,63	9,9%	45,9%	44,2%	4,5
	2009	0,53	0,50	0,50	0,39	0,61	10,1%	51,2%	38,7%	3,8
	2011	0,53	0,50	0,54	0,40	0,60	10,5%	49,2%	40,3%	3,8
	2015	0,56	0,57	0,58	0,43	0,65	9,2%	48,6%	42,2%	4,6
Indian/Asian	2006	0,52	0,49	0,55	0,39	0,61	11,2%	48,2%	40,6%	3,6
	2009	0,50	0,44	0,48	0,36	0,55	11,4%	50,2%	38,4%	3,4
	2011	0,45	0,37	0,35	0,31	0,53	12,9%	54,3%	32,8%	2,5
	2015	0,45	0,35	0,36	0,30	0,49	13,5%	53,8%	32,7%	2,4
White	2006	0,43	0,32	0,32	0,28	0,49	14,7%	53,8%	31,5%	2,1
	2009	0,39	0,28	0,27	0,25	0,49	16,3%	55,4%	28,3%	1,7
	2011	0,41	0,31	0,30	0,26	0,49	15,4%	54,2%	30,4%	2,0
	2015	0,41	0,30	0,28	0,26	0,48	15,4%	54,8%	29,8%	1,9
Total population	2006	0,67	0,85	0,95	0,57	0,74	6,6%	36,2%	57,2%	8,6
	2009	0,65	0,81	0,86	0,56	0,74	6,5%	40,2%	53,3%	8,1
	2011	0,65	0,80	0,86	0,55	0,74	6,8%	39,9%	53,3%	7,9
	2015	0,65	0,80	0,84	0,55	0,75	6,6%	40,8%	52,6%	7,9

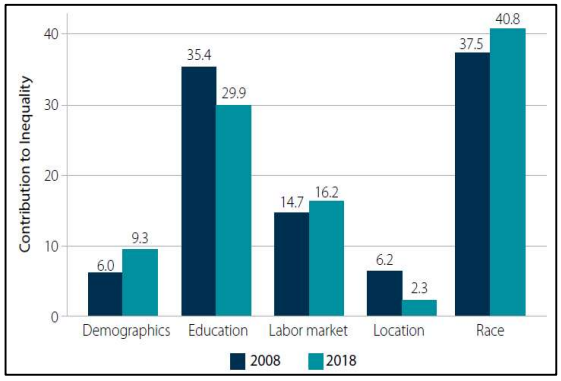
Source: Statistics South Africa, 2019, p. 34.

Figure 1: Drivers of inequality



Source: World Bank, 2022, p.20

Figure 1b: Drivers of inequality by race



Source: World Bank, 2022, p.20

2.2 Financial sector development in South Africa

The definition of financial sector development adopted in this research report is the one from the World Bank who state that it is "a process of reducing the costs of acquiring information, enforcing contracts, and making transactions" (World Bank Group, 2020). Several studies that focus on the development of the financial sector consider it influences and interplays with inequality and/or economic growth without explicitly providing a definition for the term (Kapingura, 2017; Sehrawat and Giri, 2018; Ahmed and Mansur, 2017).

The paper by FESSUD (2017) provides an account of the structural design of the South African economy and it highlights the role that Minerals Energy Complex (MEC) has played in shaping the economy. MEC is defined by Rustomjee (1993:2) as a "system of accumulation, encompassing a number of core economic sectors and imparting a determining influence on the pattern of industrialisation and economic performance." The arguments in FESSUD (2017) support the view that the operation of the MEC promotes sustained levels of inequality. Fine and Rustomjee (1996) as quoted in FESSUD (2017:16) conclude that:

> *[T]he MEC is not to be seen merely as a core set of industries and institutions but also as a system of accumulation and one that has varied over time" (ibid.).3 In this sense, the model is primarily a historical/institutional one of a system of accumulation with several layers of history that may change the appearance or form, but its substance rests in the ability to reproduce massive inequality from epoch to epoch.*

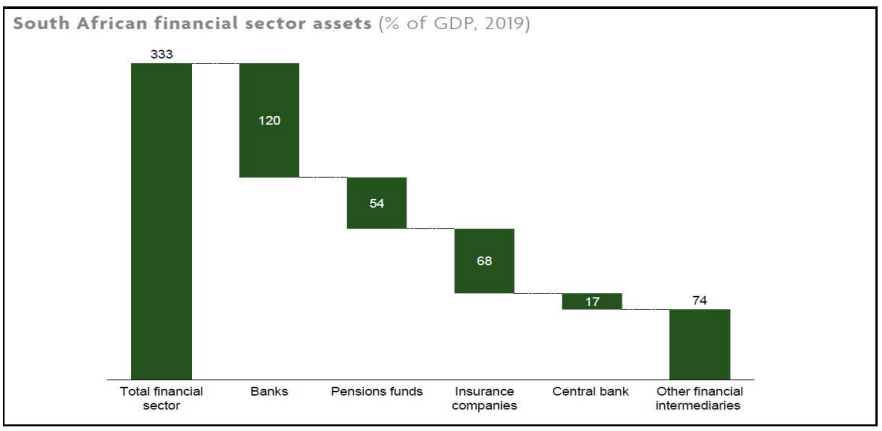
The key argument from the FESSUD paper is that the development of the South African financial sector can be linked in history to the development of the extractive mining sector. The extractive mining sector along with the financial sector are closely linked to the role that the State both pre and post the Apartheid era has played through its policies. It is worth noting that the development of the financial sector for the country could not have evolved outside of the influence of the political environment and institutions. The economic policies adopted by the South African government are seen as perpetuating the effects of MEC thus benefiting the beneficiaries of Apartheid along with a minuscular black middle class instead of addressing the growing inequality (FESSUD, 2017: 24).

The National Development Plan (NDP) published by the National Planning Commission (2012) states that South Africa has two key objectives: to eliminate poverty and inequality by 2030. The NDP aims to reduce inequality as measured by the Gini coefficient to 0.60 by 2030. In order to achieve this objective, the NDP sets out several targets, including increasing the per capita income from R50,000 in 2010 to R120,000 in 2030 and raising the share of national income of the bottom 40 percent of the population (National Planning Commission, 2012, 37). The NPD identifies the financial sector as one of the key drivers that South Africa can use to achieve its target of reducing inequality to 0.60 by 2030. The objective can be achieved by including historically marginalised groups by offering them banking and insurance products. The NDP also identifies that the current product offerings may not be fit for purpose for the poor as such services are primarily offered through traditional channels that the targeted groups may find difficult to access (National Planning

Commission, 2012, 150).

According to the Financial Sector Conduct Authority (Financial Sector Conduct Authority, 2022), South Africa has a sophisticated financial sector larger than most emerging economies, with the largest share of assets held by banks, pension funds and insurance companies (see Table Two below). The sector is generally considered well-developed as well (Odhiambo, 2008). Data from the Statistica website shows that the value added to gross domestic product (GDP) by the finance industry in South Africa increased from R921 billion in 2015 to R1 059 trillion in 2021. A 2022 report by the International Monetary Fund (IMF) into South Africa's Financial Systems Stability showed that banks accounted for approximately 120 percent of GDP, with the five largest banks in the country making up 90% of banking sector assets (International Monetary Fund, 2022, p. 11). The country's financial sector is highly concentrated as a 2020 study by SARB on competition in the South African banking sector found that the sector found evidence of monopoly /or cartel tendencies (South African Reserve Bank, 2020a). Hawkins (2004) concludes that the size of the South African banking sector relative to the GDP serves as a good indicator of its importance and influence relative to the rest of the economy. Her study showed that banking sector assets as a percentage of GDP grew steadily between 1993 and 2002.

Figure 2: South African financial sector by asset size



Source: Financial Sector Conduct Authority, 2022, p. 10.

For purposes of this research financial sector development is defined as the contribution made to the economy through the efficient allocation of allocation and reduced cost to borrowing and financing costs (Sehrawat and Giri (2018).

3. Literature review

Several authors have considered the relationship between Income inequality and the development of the financial sector, although studies that focus on the South African situation are not that extensive (Hassan & Meyer, 2020). The discussion in this section considers the relevant theoretical and empirical literature.

3.1 Theoretical literature on inequality

Johnson (1986) discusses three types of theories on inequality, namely: the economic development model, the political model, and the world-system model. He argues that the economic development model theorises that the level of development affects the level of inequality experienced by a country, with the more developed nations enjoying greater equality compared to developing economies. This model holds the view that the relationship between development and inequality is curvilinear, with a shift in technological development leading to changes in the occupational structure within an economy. Essentially technological development drives a shift from an agrarian economy to one characterised by an emergence of the blue-collar working class and an emerging middle class.

The political model, on the other hand, concerns itself with the importance of political democracy as a means to a more equal society. Johnson (1986) postulates that the assumption made by the political model is that as more people exercise their rights under democratic dispensations, such as the right to vote and to organise themselves within unions and civil rights movements, this will compel the governments within such countries to introduce minimum wages, progressive income taxes and social welfare systems that will ultimately lead to more equitable distribution of income.

Lastly, according to the world-system model, the world is divided into developed "core nations" and the more undeveloped "periphery nations". The level of income distribution is more equal in the core nations as labour is more organised with the support of the state. The periphery nations primarily focus on growing a few exports production sectors for the benefit of the core nations. The elite minority in the periphery nations, which is allowed to earn higher wages compared to the rest of the population, is discouraged from pursuing local productions as this does not benefit the core nations, who are only interested in extracting the natural resources of the peripheral nations. Stack (1980) argues that the political model considers political democracy as the force that can be used to reduce Income inequality.

Stiglitz (2016) considers the “trickle-down” notion as captured in the Marginal Productivity Theory and shows how it outlines issues of inequality. He considers how the Marginal Productivity Theory compares to Karl Marx's theory of Exploitation. According to the Marginal Productivity Theory, in the long run, the factors of production will receive a real rate return equal to their marginal productivity, and their remuneration reflects their individual relative contribution to society (Stiglitz, 2016). The Exploitation theory, on the other hand, argues that the top earners in a society acquire such earnings by taking away from those at the bottom (Stiglitz, 2016).

In considering the theoretical foundations of income distribution, Sandmo (2013) traces the genesis to Classical economists from Adam Smith to John Stuart Mills. His argument is that the Classical School of Thought evaluated income distribution using the functional distribution of income of the factors of production, i.e., wages, profits, and rent. The author also considers the Marxist arguments whose work is built on the ideas of the Classical School of Thought on the functional distribution of income by adding unemployment to the model. The introduction of unemployment showed that a state of full employment could never be achieved as subsistence wage levels create an "industrial reserve army" of people who must endure severe poverty. The emergence of Neoclassical economics brought a marginal approach to income distribution that elevated optimisation and the use of differential calculus (Sandmo, 2013, pp. 7 – 20).

Post the Neoclassical revolution, the "non-marginal" approach emerged that focused on statistical approaches that sought to draw inferences from available statistical data. Some of the prominent contributions from this branch include the Pareto distribution. Lastly, the institutional approach to economics flagged the importance of considering institutions' role in income distribution (Sandmo, 2013, pp. 47 - 49).

Demirgüç-Kunt and Levine (2009, p.291) postulate that total income is comprised of income from wages and claims from physical capital. The diffusion of knowledge and investing in training and skills are considered by Piketty (2014) as the most important reducing drivers for reducing inequality. He argues that although the laws of demand and supply also tend to influence income inequality their impact is that not as important as that of knowledge and skills. He concludes that the two factors are important enough to reduce inequality both inter and intra countries. Mihályi and Szelényi (2019, 65) on the other hand argue that inequality is caused by rent. They identify 13 types of rents that mainly flow from two main categories; namely; scarcity rents and solidarity rents. They also note that the

sub-types of rents that they identified can be modified depending on the type of economy in question.

3.2 Empirical literature on inequality

Kuznets (1955, p.18) explored the causes and long-term changes to personal income and whether the inequality in the distribution of such income is altered throughout a country's economic growth path. In his article, Kuznets considered data for the United States, England, and Germany, and he concluded that there would be widening *inequality "in the early phases of economic growth when the transition from the pre-industrial to the industrial civilisation was most rapid; becoming stabilised for a while; and then narrowing in the later phases."* This assertion formed the basis for what is known as the *Kuznets curve of development*.

Greenwood and Jovanovic (1990) show in their paper that evidence of the Kuznets curve is found in the works by Paukert (1973), Summers, Kravis, and Heston (1984), and Lindert and Williamson (1985). While looking at the relationship between inequality, finance, and economic growth post the 2007 global financial crisis; Nikoloski (2012) finds evidence of an inverted U-shaped relationship between financial sector development and Income inequality. The work by Younsi and Bettini (2018) looked at the relationship between economic growth, financial sector development and income equality among the BRICS countries. They found evidence supporting Kuznets' inverted U-shaped Hypothesis on economic growth and Income inequality linkage.

There are, of course, studies that have found counterevidence to the assertions by Kuznets that as economies develop, they will have an inverted U-curve of Income inequality. The paper by Deininger and Squire (1998), which considered income and land distributions as proxies for inequality, found insufficient support for the Kuznets curve for seven world regions (including Sub-Saharan Africa) over five decades from the 1950s to the 1990s. Li, Squire, and Zou (1998, p.42) find that inequality tends to remain stable over time despite any income increases. Their work looked at a sample of 49 developed and developing economies between 1947 and 1994. They conclude that "*while incomes have almost certainly increased significantly during the 40 years under study suggests that there is unlikely to be much support in the data for the systematic relationship between inequality and income suggested by Kuznets.*

In his study that constructed the annual top income shares series broken down by income source for over 20 mostly western countries covering most of the 20th century Piketty (2005) concluded that the

declines in Income inequality that took place in the 20th century were mostly accidental and could not be ascribed to any Kuznets-type of process. Adeleye, Osabuohien and Bowale (2017) looked into the role of financial institutions on the finance-inequality of 42 South-Saharan African countries (including South Africa) and found that financial sector development does not significantly reduce Income inequality. This finding was also supported by Fowowe and Abidoye (2013), who found that financial sector development has not significantly impacted poverty and inequality in African countries.

The same findings are made by other authors such as Batou, Guidi and Mlambo (2013), who argue that literature on the relationship between financial sector development and inequality remains largely divergent and that the results of their study of 22 African countries do not support the existence of a U-shaped relationship. It is thus important to test the assertions by South African policymakers that an inclusive financial sector is seen as central to the economy and that it will lead to reduced Income inequality (National Planning Commission, 2012; National Treasury; 2011) and whether this focus leads to a Kuznets-type of the outcome.

Clarke, Xu, and Zou (2006) approach the topic slightly different approach to the subject where they test the Income-Narrowing Hypothesis and the Income-Widening Hypothesis. They find that, overall, the development of financial intermediaries can be associated with a positive impact on aggregate income distribution. Their work was extended by that of Nasreddine and Mensi (2016), who, in addition to considering the two Hypotheses, also looked at the inverted U-shape, and they rather find a normal U-shape relationship between financial sector development and Income inequality. The inverted U-shaped is observed only for the high-income countries in their sample.

Lastly, Jung and Cha (2021) found that at a provincial level in China, financial sector development led to deepening Income inequality instead of reducing it. They maintain that China as a developing economy, had not yet reached the turning point of the inverted U-shape.

As mentioned above, financial sector in South Africa comprises the Banking, Insurance and Securities sectors and it is reported to have increased its contribution to the country's growth in both assets and value-added (Hawkins, 2004). She plots the increasing contribution that the financial sector made to the country's Gross Domestic Product (GDP) and showed that between 1993 and 2002, the financial sector grew nearly twice as fast as economic growth. Kapingura (2017) points out that growth in the South African economy through the financial sector needs to be inclusive growth

that promotes access by disadvantaged groups. South Africa's National Treasury (NT) holds in its 2011 Policy Document for a safer financial sector that the sector is a means through which economic growth, job creation and sustainable growth can be attained (National Treasury: 2011, p.1).

Leibbrandt, Finn and Woolard (2012) studied the changes to inequality in South African in its post-apartheid period using the National Income Dynamics Study data, and they found that inequality increased at an intra-racial level with some decline noted at the inter-race level. However, the gap between the earning levels of different races is still very high. Evidence in support of an inverted and non-linear relationship between inequality and financial deepening was found by Biyase and Chisadza (2023) for South Africa. The findings support the assertion of Greenwich and Jovanovic (1990) at the initial stages of development, financial sector development, the benefits that accrue are mostly enjoyed by the rich.

This finding was, however, not supported by Boukraine (2022, p.223), who studies the finance-inequality nexus for the BRICS (Brazil, Russia, India, China, and South Africa) group of countries. He found that there was evidence of an inverted U-shape curve for four of the BRICS countries except for South Africa. As for South Africa, his study did not find evidence of an inverted-long-run relationship between financial deepening and inequality. In a panel study on 48 African countries (including South Africa), Meniago and Asongu (2018, p. 319), based on a Generalised Method of Movements, found that access to Credit and intermediary efficiency had a positive impact on income distribution.

The purpose of exploring the existence of a financial Kuznets is to determine if the assertions by Cecchetti and Kharroubi (2015) that a higher level of growth in the financial sector tends to reduce real growth holds for South Africa. It is important to establish if growing the financial sector in the country can lead to real and inclusive economic growth for the average South African. Nikoloski (2013, p. 897) argues that "*shedding more light onto the inequality–finance–growth nexus is important, not only as an empirical question but also for implementing effective policies that could accelerate the process of poverty alleviation*."

In South Africa, the issues of Income inequality are often considered alongside the twin concerns of poverty. Although this report recognises that two concepts are inherently related, the latter will not form a key focus of this study. This is done for purposes of ease of academic rigour. According to Beteille (2003, p. 4455), *"poverty and inequality do not change at the same pace, and they may even*

change in opposite directions. It is difficult to make any meaningful statement about the relationship between the two without specifying which conception of poverty and which aspect of inequality one has in mind. This study will focus on inequality without considering aspects of poverty in detail.

There seems to be no consensus on the existence on the relationship between financial sector development and income inequality with divergent findings by several researchers. There also does not appear to be no consensus on the existence of financial Kuznets curves in the literature.

3.3 Theoretical literature on financial sector development

Hassan, Samad and Islam (1993) explain that the McKinnon-Shaw model of financial development argues that financial markets in less developed economies are depressed due to artificially low interest rates. The model challenges the Neoclassical view that equilibrium interest rates lead to increased investment and economic growth. According to Lynch (1996) the McKinnon-Shaw model has generally received support from other theorists. The model by Greenwich and Jovanic (1990) postulates that growth and financial structure development are intimately linked with the former driving the growth of the latter. The financial structure in turn contributes to higher growth by allowing for efficient allocation of investment. The endogenous growth model by King and Levine (1993) shows that an improved financial system enhances the probability successful innovation leading to increased economic growth.

4. Research framework and methodology

This study covers a 32-year period from 1990 to 2021. It tests the relationship between inequality and financial sector development (FDI), including GDP per capita, Exports as % of GDP, Government Spending on Social protection, and Inflation for South Africa. All the data used is sourced from the SARB except for data on the Gini coefficient, which is sourced from the World Inequality Database, as outlined in Table 2 below. All the data were transformed to their natural logarithm (ln) except for Net Exports, as the values were negative for 10 of the 32 years under consideration. The benefit of using ln is that it "reduces the sharpness in datasets and provides more efficient results than simple near specifications" (Sehrawat & Giri, 2018, p. 1591).

The general functional form of the model is given below. The Hypothesis that the growth of the financial sector in South Africa leads to an inverted U-shape curve of inequality is tested using a

single model equation as follows (Shahbaz, Tiwari, and Sherafatian-Jahromi, 2012; Shahbaz and Islam, 2011):

$$\text{Gini} = f(\text{FDI, GDP, Export, Inflation, Protection})$$

The linear function formulation of the model is stated as follows (adapted from n, 2012:

$$LGini_t = \beta_0 + \beta_2 FDI_t + \beta_2 FDI_t + \beta_3 GDP_t + \beta_4 Exports_t + \beta_5 Inflation_t + \beta_6 Protection_t$$

To consider the relationship between inequality and financial sector development, the following Hypothesis is considered:

Hypothesis 0

There is no relationship between inequality and financial sector development in the short run and long run.

Hypothesis I

There is an inverted U-curve relationship between inequality and financial sector development in the short-run and long-run.

Table 2: Description of variables

Variables	Abbreviation	Source
2.1.1 Gini coefficient – is a widely used measure of Income inequality that has been used extensively in similar studies (Sehrawat and Giri (2014), Sehrawat and Giri (2018), Ridzuan et al. (2021).	Gini	World Inequality Database
2.1.2 Financial Sector Development (made up of an index of variables 2.1.2.1 – 2.1.2.3) - The derivation of the variable is based on similar work by Sehrawat and Giri (2018). The use of an index is thought to be useful as it reduces the problem of high correlation between the variables.	FDI	Calculated using Principal Component Analysis (PCA)
2.1.2.1 Claims on the domestic private sector as % of Gross Domestic Product (GDP) – although there is no generally accepted proxy for FSD,	Credit	SARB

Variables	Abbreviation	Source
several studies that consider the nexus between financial sector development and income equality tend to use domestic private credit. Nikoloski (2013, pp. 901) maintains that domestic private credit is a useful proxy for the extent of access to credit by private firms and households.		
2.1.2.2 Gross fixed capital formation as % of GDP – (constant 2015 prices - seasonally adjusted at an annual rate) – serves as a driver of growth in gross domestic expenditure as it a significant contributor to GDP (SARB, 2020).	Capital	SARB
2.1.2.3 Total monetary (M2) deposits as % of GDP – consists of M1A and M1) plus other short-term and medium-term deposits held by the domestic private sector (Mohr, 1998, p. 181; South African Reserve Bank, 2021, p. 114). Sehrawat and Giri (2018) consider this variable to represent the monetisation variable for financial sector development. Money supply reflects the size of the financial sector in an economy as money is used to make payments and to save (Kar & Pentecost, 2000, p. 6; Akinboade & Makina, 2006).	M2 % GDP	SARB
2.1.3 Gross Domestic Product (GDP) per capita (at market prices) – is used to measure how economic growth reduces the level of Income inequality (Kapingura (2017). GDP per capita is widely used in similar studies.	GDP per capita	SARB
2.1.4 Net exports as % of GDP - Exports of goods and non-factor services *minus* Imports of goods and non-factor services. The variable measures the extent of openness of the economy. The impact of the openness of an	NetExp % GDP	SARB

Variables	Abbreviation	Source
economy on income distribution is largely inconclusive in literature (Hassan and Meyer, 2020; Boukraine, 2022; Biyase and Chisadza, 2023).		
2.1.5 Inflation – the assumption is that a high inflation environment increases inequality as it negatively impacts low-income individuals the most (Ahmed and Mansur, 2017; Boukraine, 2022).	Inflation	SARB
2.1.6 Social protection expenditure as % of GDP (as per the IMF, 2014 definition) – Social protection expenditure includes Old Age and Family & Children benefits that are offered in cash and kind, with social grants making up the largest portion of the country's Social protection system (World Bank, 2021, pp.11). The poorest decile in South Africa's share of social grant receipts increased from 15% in 1993 to 73% in 2008 (Leibbrandt, Finn and Woolard, 2012, p. 22).	Protection	SARB

The research report uses an Autoregressive Distributed Lag (ARDL) model to test whether there is an inverted relationship between Income inequality and financial sector development. The ARDL is considered a good model for checking cointegration, and it uses a single equation framework (Abonazel & Elnabawy, 2020, p. 25). Another advantage of the ARDL, according to Pesaran, Shin and Smith (2001, p. 315) is that the model "provides a simple univariate framework for testing the existence of a single relationship between Yt and xt when it is not known with certainty whether the regressors purely I (1) or mutually cointegrated. Moreover, it is unnecessary that the order of the underlying regressors is ascertained prior to testing the existence of a level relationship between Yt and xt". The model is particularly useful for this study as it is more efficient and reliable when applied to small samples (Kapingura, 2017, p. 424). According to Nkoro and Uko (2016, p. 68), ARDL is used to determine the long-run relationship between series with different Order of integration where the reparametrised results provide short-run dynamics and the long-run relationship of the variables.

5. Results and discussion

Table Three below shows the summary statistics for the variables used. The mean for the Gini is reported as 0.679, indicating perfect inelasticity as it is closer to 1, confirming a high level of Income inequality (Hassan & Meyer, 2020, p. 342). The corresponding standard deviation as a measure of dispersion shows that the Gini coefficient value of 0.058 shows that the values of the variables are closer to the mean. The table shows that GDP per capita, Net Exports % of GDP, Inflation and Social protection are leptokurtic with kurtosis values higher than 3. The Gini coefficient, Gross fixed capital % GDP, Private sector credit and M2 % GDP are platykurtic with kurtosis values of less than 3.

Table 3: Descriptive statistics

Variable	Gini	GrossFix. Cap % GDP	Pvt. Sec. credit % GDP	M2% GDP	GDP per capita	NetExp %GDP	Inflation	Social protection
Mean	0.6792711	0.015594	0.4190947	0.3415392	68947.78	0.0005172	6.86875	0.0253657
Std. Dev	0.05802	0.0024453	0.2690855	0.2220819	11388.62	0.0016251	3.264515	0.0201179
Min	0.5825761	0.0117364	0.0992607	0.0773006	40725.48	-0.0020282	1.4	0.0033455
Max	0.7464856	0.020761	0.9334635	0.814347	80380.6	0.0076192	15.3	0.0821488
Variance	0.0033663	5.98e-06	0.072407	0.0493204	1.30e+08	2.64e-06	10.65706	0.0004047
Skewness	-0.1867431	.2139737	0.420583	0.5528027	-1.047951	2.407241	1.101196	1.026887
Kurtosis	1.622725	1.801872	1.84089	2.224395	3.39153	12.70078	3.740354	3.392895
Obs	32	32	32	32	32	32	32	32

In order to measure the strength and direction between the variables, the Pearson correlation coefficient is utilised. Table Four above shows that there is a strong positive correlation between the Gini coefficient and Gross fixed capital formation % GDP, Private sector credit % GDP, M2 % GDP, GPD per capita and Social protection spending % GDP. The table also shows that there is a strongly negative linear relationship between the Gini coefficient and Inflation, as well as between GDP per capita and Inflation. The Gini coefficient shows a relatively weak negative correlation with Net Exports % GDP. As expected, Table Four shows a strongly negative correlation between Inflation and Private sector credit as % GDP.

Table 4: Correlation

	Gini	GrossF~D	Privat~P	M2GDP	GDPper~a	NetExp~P	Inflat~n
Gini	1.0000						
	32						
GrossFixed~D	0.7477*	1.0000					
	0.0000						
	32	32					
Privatesec~P	0.9444*	0.6174*	1.0000				
	0.0000	0.0002					
	32	32	32				
M2GDP	0.9295*	0.5785*	0.9961*	1.0000			
	0.0000	0.0005	0.0000				
	32	32	32	32			
GDPpercapita	0.8777*	0.8010*	0.7826*	0.7588*	1.0000		
	0.0000	0.0000	0.0000	0.0000			
	32	32	32	32	32		
NetExpGDP	-0.0485	-0.4344*	0.1249	0.1882	-0.2044	1.0000	
	0.7919	0.0130	0.4960	0.3023	0.2617		
	32	32	32	32	32	32	
Inflation	-0.6249*	-0.3552*	-0.5479*	-0.5536*	-0.7320*	-0.0043	1.0000
	0.0001	0.0460	0.0012	0.0010	0.0000	0.9814	
	32	32	32	32	32	32	32
SocialProt~n	0.8711*	0.4528*	0.9703*	0.9829*	0.6861*	0.3269	-0.5413*
	0.0000	0.0093	0.0000	0.0000	0.0000	0.0678	0.0014
	32	32	32	32	32	32	32

	Social~n
SocialProt~n	1.0000
	32

5.1 Deriving FDI

To derive an index for FDI, Principal Component Analysis (PCA) was utilised using Credit to the domestic private sector % GDP, Gross fixed capital formation % pf GDP and M2 % of GDP. The PCA is a "special case of a more generalised method of factor analysis" (Sehrawat & Gini, 2018, p. 1599). According to Younsi and Bechtini (2018, p. 727), the PCA is a multivariate statistical technique used to assess the inter-correlation for several variables. The authors applied the technique to derive a proxy for financial sector development for a study of the relationship between economic growth, financial development, and income for the BRICS countries. The results of the PCA calculation are shown below in Tables Five and Six. The Eigenvalues of the correlation matrix measure how much variation is explained by each component (Román-Aso, Villalba, Franks and Frigola, 2021, p. 14). The Eigenvalues derived show that the first principal component accounts for 89.41% of the standardised variance. In comparison, the second component explains 10.55% of the variance, and the last component explains less than one percent of the variance. Since the Eigenvalue for the first component explains the highest level of variation, it is used in deriving FDI. The Eigenvectors for the Domestic Private Sector, Gross Fixed Capital Formation and M2 as a percentage of GDP each contribute 59,79%, 53,76% and 59,46%, respectively to the standardised variance of the first principal component (see column 2 of Table 6 below).

Table 5: Calculating the FDI Index

Principal components/correlation			Number of obs	= 32
Rotation: (unrotated = principal)			Rho	= 1.0000
Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.68228	2.3657	0.8941	0.8941
Comp2	0.31658	.315442	0.1055	0.9996
Comp3.	0.00113857		0.0004	1.0000

Table 6: Eigenvectors

Principal components	(eigenvectors)			
Variable	Comp1	Comp2	Comp3	Unexplained
ln_M2GDP	0.5946	-0.4025	0.6961	0
ln_GrFixed~P	0.5376	0.8427	0.0281	0
ln_PrCredi~P	0.5979	-0.3575	-0.7174	0

5.2 Trendlines for the variables used

The trend lines below for the variables used in the study (including the derived FDI) serve as a visual representation of their trends. The Gini coefficient, FDI and social spending trend have a general upward trend which is indicative of a mean that has been changing over time (Nkoro & Uko, 2016). The Gini coefficient rose steadily from 0.58 in 1990 to 0.75 in 2021. As mentined above, this is despite the change in the political dispensation of South Africa in 2004 and the sharp increase in Social Spending by the government. The level of spending on Social protection increased from R5.4 billion in 1990 to R370 billion in 2021. A significant portion of the expenditure on Social protection is on grants such as Old Age and Child Support Grants (CSG). The number of children in South Africa who receive social grants has grown exponentially since its introduction with (Parliament of South Africa, 2021, p.1) At the end of March 2021, of the total 18.440 million beneficiaries who received social grants, 70.46% (12.992 million) beneficiaries received the CSG. The number of households receiving social grants more doubled between 1993 and 2008 (Leibbrandt, Finn and

Woolard, 2012, 27.)

Figure 3: Trend - Gini coefficient



Figure 4: Trend – FDI

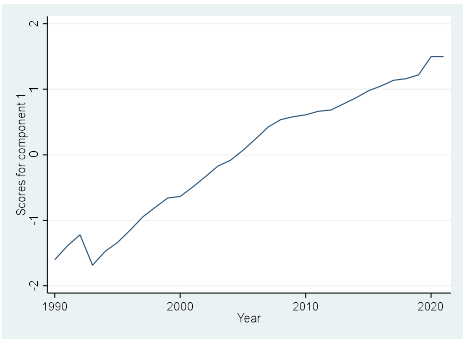


Figure 5: Trend - GDP per capita

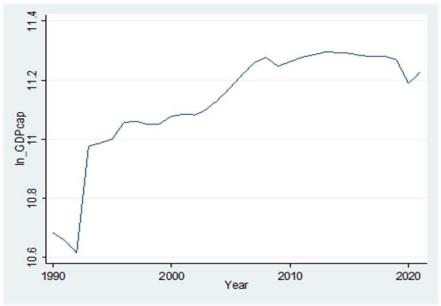


Figure 6: Trend - Inflation

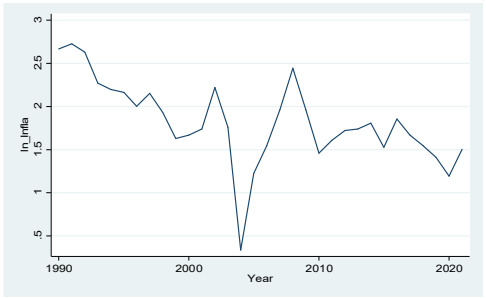


Figure 7: Trend - GDP per capita

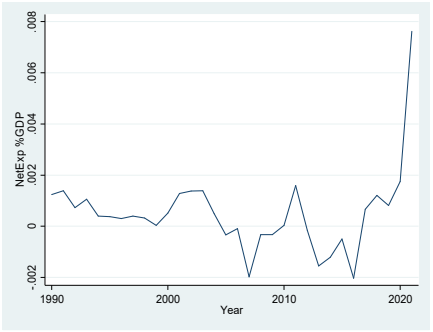
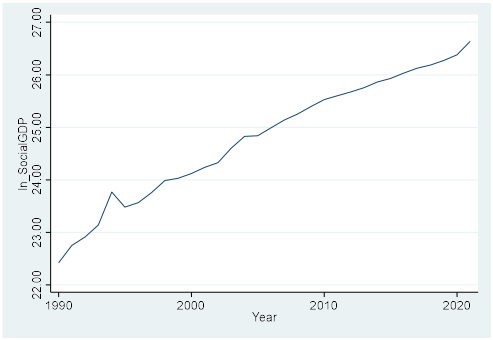


Figure 8: Trend - Social spending



5.3 Lag-order selection criteria

In order to determine the most optimal lags for the variables, the Akaike Information Criterion (AIC) was used. The final lag selection for the model is outlined in Table 7 below. Full details on the AIC calclation output can be referenced in Appendix B.

Table 7: Lag order selection using AIC

Variable	Lag length
Gini	1
FDI	1
GDP per capita	1
Net exports	1
Inflation	1
Social spending	3

5.4 Unit Root Tests

Shahbaz and Islam (2011) advise that stationary tests are crucial when estimating regression to avoid having spurious results. The Augmented Dickey-Fuller (ADF) (Dickey & Fuller, 1975) test is utilised to test the stationarity of the time series used. The results of the ADF test show that the Gini coefficient, FDI, GDP per capita, and social spending are non-stationary. Nkoro and Uko (2016, 66) conclude that "A non -stationary time series is a stochastic process with unit roots or structural breaks. The presence of a unit root implies that a time series under consideration is non-stationary while the absence of it entails that a time series is stationary." The authors also conclude that an ADF value that is less than that of its critical is an indication of non-stationarity. Detailed output of the ADF test is available in Appendix C.

Table 8: Unit root analysis using ADF

Variable	T-statistics	Probability value	T-statistics	Probability value
	Lags specified at 5% significance		Trend at 5% significance	
Gini	0.8431	-0.7141	0.4130	-2.338
FDI	0.6647	-1.221	09711	-0.731
GDP per capita	0.0121	-3.369	0.3615	-2.434
Net exports	0.8737	-0.588	0.9953	0.126
Inflation	0.0163	-3.270	0.0178	-3.776
Social spending	0.3778	-1.808	0.1648	2.892

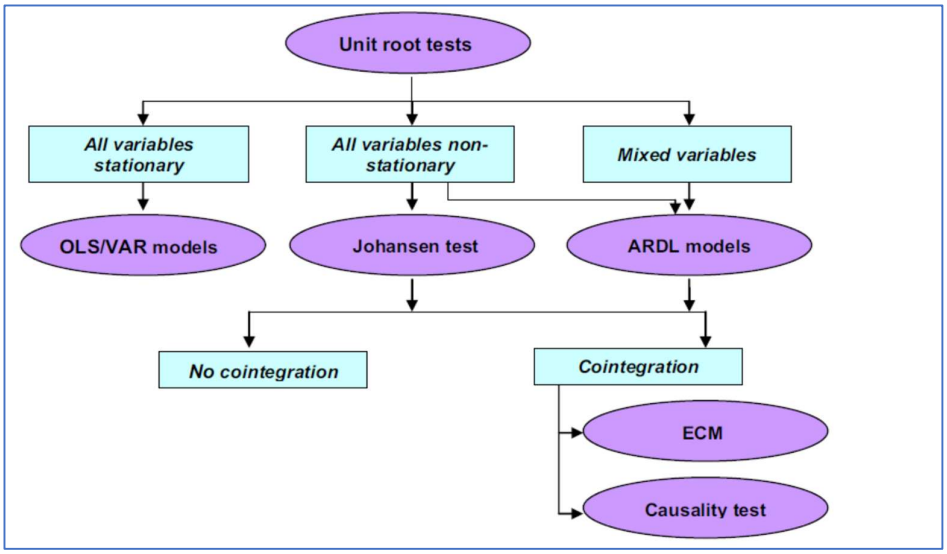
In addition to the ADF test, the Phillips-Perron (PP) test is also considered as per Table 9 below (Phillips & Perron, 1988). The results of the PP unit test also indicate that the Gini coefficient, FDI, Net Export % GDP and Social spending %GDP are not stationary when the lagged outputs are considered. The use of multiple unit root tests is encouraged by Nkoro and Uko (2018) as it is assumed to good way of testing for sensitivity of the results that are obtained. Full details of the output of the PP test is shown in Appendix D.

Table 9: Unit root analysis using PP test

Variable	**Z(t)-statistics**	**p-value 5% critical value**	**Z(t)-statistics**	**p-value 5% critical value**
	Lags specified		Trend	
Gini	-1.059	0.7312	-1.855	0.6777
FDI	-1.164	0.6889	-0.740	0.9704
GDP per capita	-2.643	0.0845	-1.953	0.6268
Net exports	-0.684	0.8509	0.091	0.9950
Inflation	-2.928	0.0422	-3.370	0.0555
Social spending	-2.331	0.1621	-3.708	0.0218

In order to correct the non-stationarity of the variables (Gini coefficient, FDI, Net Export % GDP and Social spending % GDP) differencing is applied, although this method carries the risk of losing the long-run relationship information (Shrestha and Bhatta, 2017). Post differencing, the variables became integrated of Order (I). Figure 9 below shows that applying an ARDL model is appropriate when there are mixed variables (stationary and non-stationary). The ADF unit root tests above demonstrated that Inflation and GDP per capita are stationary.

Figure 9: Choosing appropriate test



Source: Shrestha and Bhatta, G.R, 2017, 76

5.5 ARDL Model

The results of the ARDL run with the lags, as specified above, indicate that the model is not significant as the F-statistic is above 0.05 in the short-run. The R-Squared shows that in the short-run, only 46.72% of the Gini coefficient is explained by the independent variables. Table 10 also shows that only the differential value of FDI at zero lags is significant, as it shows a t-statistic value of 2.17 and a P-value of 0.047. The t-statistic at the first lag for Net Export% GDP is significant at 2.06, although its P-value is slightly above the 5% level at 0.053. The rest of the variables proved to be insignificant. The table also shows that every one percent change in FDI in the short run leads to a 1.4% change in the Gini coefficient.

Table 10: ARDL model output

Sample: 1993 thru	**2021**	**Number of obs**	**=**	**29**
	F(9, 19)	=	1.85	
	Prob > F	=	0.1237	
	R-squared	=	0.4672	
	Adj R-squared	=	0.2149	
Log-likelihood = 103.00186	Root MSE	=	0.0086	

diffGini	Coefficient	Std. err.	t	P>t	[95% conf.	interval]
diffGini						
L1.	.1001442	.2205147	0.45	0.655	-.3613985	.5616869
diffFDI						
-.	.0143689	.0067672	2.12	0.047	.0002051	.0285328
L1.	-.0085538	.0065966	-1.30	0.210	-.0223607	.005253
diffNetExpGDP						
-.	-1.360645	1.178933	-1.15	0.263	-3.82818	1.106889
L1.	3.674194	1.782608	2.06	0.053	-.0568469	7.405234
diffln_SocialGDP	-.0129451	.0146137	-0.89	0.387	-.0435319	.0176418
ln_Infla						
-.	.0016378	.0047243	0.35	0.733	-.0082502	.0115258
L1.	-.0061678	.0049106	-1.26	0.224	-.0164458	.0041103
ln_GDPcap	-.0103934	.0170384	-0.61	0.549	-.0460552	.0252683
_cons	.1299977	.1944509	0.67	0.512	-.2769926	.536988

There are no long-term effects as the R-squared for the long run is 0.6943, and the independent variables explain 54.96% of the change in the Gini coefficient (Nkoro and Uko, 2016). The long-run model is also shown to be insignificant as shown in Table 11 below.

Table 11: Long-run effects

Sample: 1993 thru	2021	Number of obs	=	29
	R-squared	=	0.6943	
	Adj R-squared	=	0.5496	
Log-likelihood = 103.00186	Root MSE	=	0.0086	

D.diffGini	Coefficient	Std. err.	t	P>t	[95% conf.	interval]
ADJ						
diffGini						
L1.	-.8998558	.2205147	-4.08	0.001	-1.361399	-.4383132
LR						

D.diffGini	Coefficient	Std. err.	t	P>t	[95% conf.	interval]
diffFDI	.0064623	.0098832	0.65	0.521	-.0142234	.027148
diffNetExpGDP	2.571022	2.702626	0.95	0.353	-3.08564	8.227683
diffln_SocialGDP	-.0143857	.0154601	-0.93	0.364	-.0467441	.0179727
ln_Infla	-.0050342	.0058771	-0.86	0.402	-.017335	.0072667
ln_GDPcap	-.0115501	.0195764	-0.59	0.562	-.0525239	.0294237
SR						
diffFDI						
D1.	.0085538	.0065966	1.30	0.210	-.005253	.0223607
diffNetExpGDP						
D1.	-3.674194	1.782608	-2.06	0.053	-7.405234	.0568469
ln_Infla						
D1.	.0061678	.0049106	1.26	0.224	-.0041103	.0164458
_cons	.1299977	.1944508	0.67	0.512	-.2769926	.536988

5.6 Bounds Testing

The Pesaran/Shin/Smith Bounds Test indicates that there is no long-run relationship as the F-test is above the upper bound of the 5% level of significance, and the t-statistic is higher than the upper bound (-4.19) at -4.081.

Table 12: Pesaran/ShinSmith Bounds test

H0: no levels relationship	F = 4.479
	t = -4.081
Critical Values (0.1-0.01, F-statistic, Case3	

	[I_0] L_1	[I_1] L_1	[I_0] L_05	[I_1] L_05	[I_0] L_025	[I_1] L_025	[I_0] L_01	[I_1] L_01
k_5	2.26	3.35	**2.62**	**3.79**	2.96	4.18	3.41	4.68

	[I_0] L_1	[I_1] L_1	[I_0] L_05	[I_1] L_05	[I_0] L_025	[I_1] L_025	[I_0] L_01	[I_1] L_01

k_5	-2.57	-3.86	**-2.86**	**-4.19**	-3.13	-4.46	-3.43	-4.79

There is therefore no need to run an error correction model (ECM). An ECM is useful in ARDL models as it assists in providing information on the long-run behaviour of the parameters in a model (Nkoro and Uko, 2016).

Given the results of the model above, there is therefore no basis to reject the null hypothesis that there is no relationship between inequality and financial sector development in the short-run and long-run. The results of the study also find no evidence of a financial Kuznets curve for the South African period under consideration. These results are contrary to the results from the study by Hassan and Meyer (2020,348 p.), who found that financial development exerts a non-linear impact on inequality. In a similar study by Kapingura (2016) that considered the relationship between financial sector development and income equality, the author found that the financial sector in isolation was insufficient to reduce inequality. The findings of this study are also consistent with the findings by (Bourkraine, 2022), who also could not establish a long-term relationship when testing for a finance-inequality nexus. The results of this study are significant for policy considerations as this means that other factiors other than access to the financial sector can significantly impact income inequality. The results indicate that South Africa cannot look at the development of the financial sector as a key level that will address its income inequality challenges. As mentioned above the country's Gini Coefficient has remained stubbornly high despite the significant contribution made by the financial sector to the country's GDP. The trickle-down" effect of the Marginal Productivity Theory does not appear to hold true for South Africa. This does not mean that the country should decelerate the important objective of financial inclusion for the historically excluded. Piketty (2014, p. 21) reminds us that the "history of the distribution of wealth has always been deeply political, and it cannot be reduced to purely economic mechanisms. Although South Africa is considered to be the most financially included country on the continent some significant gaps since persist. Data from Finscope 2021 shows that although most adults have bank accounts the level of uptake and use of other types of financial products such as property insurance and retirement products is still lacking. The level of unsecure credit usage (such as clothing and retail revolving credit) is considered to be high when compared to secured types of credit such as mortgages and loans to find business operations (TransUnion, 2023). All these challenges provide strong incentive for state intervention initiatives into the sector both to promote uptake and usage as well as to enhance protection mechanisms.

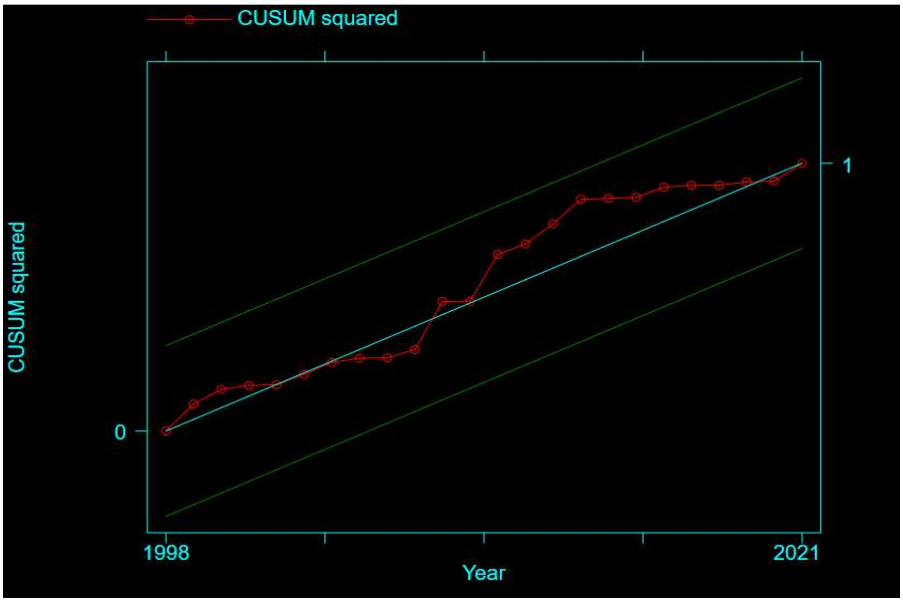
5.7 Testing for model stability

The Breusch-Godfrey LM test is used to test for autocorrelation, while the cumulative sum of recursive residuals (CUSUM) test is used to test the model's stability. The LM test results indicate that there is no serial correlation in the model, as the chi2 value is above 0.10 at 18.678. The CUSUM squared output below in Figure 10 shows that the model considered in the study is stable as the line lies with the 5 percent critical levels.

Table 13: Testing for correlation

Lags(p)	chi2	df	Prob > chi2
10	18.678	10	0.0446

Figure 10: Cusum squared



6. Limitations of the study

This study does not consider the finance-growth nexus that is often considered by researchers interested in Income inequality issues. Levine (2005) shows that there is no consensus in the literature on the role of the financial sector in the growth of an economy. It would therefore be important to consider the impact of financial sector development on Income inequality while also considering the

overall impact on economic growth. The study also does not consider the interplay between Income inequality and poverty. In the case of South Africa, income equality and poverty are often seen as "two sides of the same coin", although the two do not always move in tandem. The proportion of the population living below the lower-bound poverty line declined between 2006 and 2015 despite the stubbornly high levels of Income inequality (Statistics South Africa, 2015, 19). Lastly, the study does not consider the possible impact of insurance access as a proxy for financial development. Data from the 2021 Finmark Trust Finscope survey shows that funeral insurance was considered by their respondents as the most important type of cover, especially after the recent experience with the Covid-19 pandemic.

The important issue of rents extraction is not considered in this research report. Čihák and Sahay (2020) maintain that the expansion of the financial sector to lower-income households and small businesses is a useful lever for improving inclusivity within economies but such a lever is not well managed it widen inequality by pushing up rents. Their paper identifies a number of financial sector rents including rising asset management fees, higher compensation, high-risk and high-return financial products. Biven and Mishel (2013, 62) argue that rent seeking is often considered negatively as “ill-gotten” gains. They define rents as “income received…in excess of what was needed to induce the person to supply labor and capital”. The results of their study show that rents make a significant contribution to the incomes of the Top 1 percent. Khan (2000) takes what can be considered as a balanced view to rents as he postulates that in certain circumstances rents can assist in the growth and development of an economy. Further research on the interplay between income inequality, rents and the financial sector is proposed.

7. Conclusion

This research report considered whether there is a financial Kuznets curve for South Africa by considering the relationship between Income inequality and the financial sector development for the period 1990 - 2021. Inequality was measured using the Gini coefficient, and an index was created using PCA for financial sector development (FDI). The FDI index used the Claims on the domestic private sector as % of GDP, Gross fixed capital formation as % of GDP, and M2 % of GDP. The report found no short-term nor significant long-term relationship between Income inequality and financial sector development. However, there is a positive relationship between the FDI Index used in the study and the Gini coefficient as a proxy of income inequality. The findings suggest that there is scope to reduce inequality by expanding the financial sector although this cannot be the key driver to a more equitable distribution of income for South Africa. The results of the study indicate that despite the growth of the financial sector in South Africa, it is currently not a key driver in reducing inequality in the country. The results, therefore, do not support the Income-Narrowing Hypothesis, since, despite the sector's growth, this has not led to a reduction in inequality. However, the results also do not explicitly indicate any existence of a financial Kuznets curve.

The study's findings have policy implications, as the expansion of the financial sector has not addressed the country's unacceptably high levels of inequality. Further research is recommended to explore how an expansion of the financial sector in South Africa can be pursued in a manner that could lead to significantly more inclusive income distribution.

References

Abonazel, M. R. and Elnabawy, N. (2020). Using the ARDL bound testing approach to study the inflation rate in Egypt. *Economic Consultant*, 31 (3), 24-41. doi: 10.46224/ecoc.2020.3.2

Adeleye, N. Osabuohien, E. and Bowale, E. The Role of Institutions in the Finance-Inequality Nexus in Sub-Saharan Africa. *Journal of Contextual Economics*, 137 (2017), pp. 173 – 192.

Ahmed, A.R. and Mansur, M. (2017). What is the link between financial development and Income inequality? Evidence from Malaysia. INCEIF, Malaysia.

Akinboade, A.O. and Makina, D.(2006). Financial Sector Development In South Africa, 1970-2002. *Studies in Economics and Econometrics*, 2006, 30(1).

Batuo, M., Guidi, F., and Mlambo, K. (2013). Financial Development and Income inequality: Evidence from African Countries. Africa Economic Conference.

Beteille, A. (2003). Poverty and Inequality. *Economic and Political Weekly*, Oct. 18-24, 2003, Vol. 38, No. 42 (Oct. 18-24, 2003), pp. 4455–4463.

Bhattacharya, S. and Rach, T. (2021). Social Strife of South Africa in 2021 Fueled by Economic Issue than Political Instability. *International Journal of Research in Engineering, Science and Management*, Volume 4, Issue 8, August 2021.

Bivens, J. and Mishel, L. (2013). The Pay of Corporate Executives and Financial Professionals as Evidence of Rents in Top 1 Percent Incomes. *Journal of Economic Perspectives*, Vol. 27, Number 3, Summer 2013, pp. 57–78.

Biyase, M. and Chisadza, C. (2023). Symmetric and asymmetric effects of financial deepening on Income inequality in South Africa. *Development Southern Africa*, DOI: 10.1080/0376835X.2022.2163226

Boukraine, W. (2022). The Finance-Inequality Nexus in the BRICS Countries: Evidence From An ARDL Bounds Testing Approach. *Focus on Research in Contemporary Economics*, 3(1), pp. 214

– 230.

Byrnes, R.M. (1996). South Africa: A Country Study. Washington: GPO for the Library of Congress, 1996.

Cecchetti, S.G. and Kharroubi, E. (2015). Why does financial sector growth crowd out real economic growth? Bank of International Settlements. BIS Working Papers No 490.

Čihák, M. AND Sahay, R. (2020). Finance and Inequality. IMF Staff Discussion Note. SDN/20/01.

Clarke, R.G., Xu, L.C. and Zou, H.(2006). Finance and Income inequality: What Do the Data Tell Us? *Southern Economic Journal*, 72(3), 578 – 596.

Deininger, K. and L. Squire. (1998). New Ways of Looking at Old Issues: Inequality and Growth. *Journal of Development Economics*, 57, 1998, 259–87.

Demirguc-Kunt, A. and Ross, L.(2009). Finance and Inequality: Theory and Evidence. Annual Review of Financial Economics, 1: 287–318.

Dickey, D.A. and Fuller, W.A. (1975). Distribution of the estimators for autoregressive time series with a unit root. *Journal of American Statistical Association*, pp. 74, 427-431.

Engle, R.F. and C.W.J. Granger (1987), .Cointegration and Error Correction Representation: Estimation and Testing. *Econometrica*, 55: 251-276.

FESSUD, (2017). Studies in Financial Systems No. 15: The South African Financial System.

Financial Sector Conduct Authority. (2022). Financial Sector Outlook Study.

Finmark Trust. (2021). FinScope South African Consumer Survey.

Fine, B. and Rustomjee, Z.A.R. (1997). South Africa's Political Economy: From Minerals-Energy Complex to Industrialisation, Johannesburg: Wits University Press.

Fowowe, B. and Abidoye, B. (2013). The effects of financial development on poverty and inequality in African Countries. *The Manchester School*, Vol 81, No. 4 562–585, July.

Greenwood, J. and Jovanovic, B. (1990). Financial Development, Growth, and the Distribution of Income. *Journal of Political Economy*, Oct. 1990, Vol. 98, No. 5, Part, pp. 1076–1107.

Hassan, M.K., Samad, A., and Islam, F. (1993). A Reexamination of McKinnon-Shaw Hypothesis: Evidence from Five South Asian Countries. *The Bangladesh Development Studies*, December, - Vol. No. 4, pp. 77 – 88.

Hassan, A. S. and Meyer, D. F., (2020). Financial Development – Income inequality Nexus in South Africa: A Nonlinear Analysis. *International Journal of Economics and Finance Studies*, 12 (2): 335- 351. Doi: 10.34109/ijefs.202012206.

Hawkins, P. (2004). South Africa's financial sector ten years on: performance since democracy Penelope Hawkins. *Development Southern Africa*, Vol. 21, No. 1, March 2004.

Hirschman, A.O. and Rothchild, M. (1973). The Changing Tolerance for Income inequality in the Course of Economic Development Author(s): *The Quarterly Journal of Economics*, Nov., Vol. 87, No. 4 (Nov. 1973), pp. 544-566.

International Monetary Fund. (2014). Government Finance Statistics Manual.

International Monetary Fund. (2022). South Africa Financial Sector Assessment Program Financial System Stability Assessment.

Johnson, R.B. (1986). Income inequality in the third world: a comparison of three theories. *International Review of Modern Sociology*, Spring 1986, Vol. 16, No. 1, pp. 69–81.

Jung, S.M. and Cha, H.E. (2021). Financial Development and Income inequality: Evidence From China, *Journal of the Asia Pacific Economy*, 26:1, pp. 73-95.

Levine, R. (2005). Finance and Growth: Theory and Evidence, in P. Aghion and S. Durlauf (eds), *Handbook of Economic Growth*, Vol. 1, Part A, The Netherlands,

Elsevier Science, pp. (865).–934.

Li, H., Squire, L. and H. Zou. (1998). Explaining International and Intertemporal Variations in Income inequality. *Economic Journal*, 108, pp. 26–43.

Lynch, D. (1996). Measuring Financial Sector Development: A Study of Selected Asia-Pacific Countries. *The Developing Economies*, XXXIV-1, March.

Kapingura, F. M. (2017). Financial sector development and Income inequality in South Africa. *African Journal of Economic and Management Studies*, Vol. 8 No. 4, 2017 pp. 420-432.

Kar, M. and Pentecost, E. J. (2000). Financial Development and Economic Growth in Turkey: Further evidence on the causal issue. Economic Research Paper No.00/27. Centre for International, Financial and Economics Research, Loughborough University.

Khan, F. (2013). Poverty, grants, revolution and 'real Utopias': society must be defended by any and all means necessary! *Review of African Political Economy*, Vol. 40, No. 138.

King, R., and Levine, R. (1993). Finance, Entrepreneurship, and Growth – Theory and Evidence. Journal of Monetary Economics, Vol. 32, No. 3, December.

Kuznets, S. (1955). Economic Growth and Income inequality. *The American Economic Review*, Vol. XLV, No. 1, March.

Leibbrandt, M.; Finn, A. and Woolard, I. (2012). Describing and decomposing post-apartheid Income inequality in South Africa. *Development Southern Africa*, Vol. 29, No. 1, March, pp. 19 – 34.

Lindert, P.H. and Williamson, J.G. (1985). Growth, Equality, and History. Explorations in Economic History. Vol. 22, October, pp. 341-77.

Meniago, C. and Asongu, S. (2018). Revisiting the finance-inequality nexus in a panel of African countries. *Research in International Business and Finance*, Vol. 46, pp. 399 – 419.

Mihályi, P. and Szelényi, I. (2019). *Rent-Seekers, Profits, Wages and Inequality. The Top 20%.*

London: Palgrave Macmillan.

National Planning Commission (NPC) 2012. National Development Plan (NDP): Vision for 2030.Pretoria: Presidency.

National Treasury, (2011). A safer financial sector to serve South Africa better. National Treasury Policy Document, Republic of South Africa, 23 February 2011.

Nasreddine, K. and Mensi, S. (2016). Financial Development and Income inequality: The Linear versus the Nonlinear Hypothesis. *Economics Bulletin*, Volume 36, Issue 2, pp. 609-626.

Nikoloski, Z. (2013). Financial sector development and inequality: Is there a financial Kuznets curve? *Journal of International Development*, 25, pp. 897–911.

Nkoro, E. and Uko, A.N. (2016). Autoregressive Distributed Lag (ARDL) cointegration technique: application and interpretation. *Journal of Statistical and Econometric Methods*, Vol. 5, No. 4, pp. 63 – 91.

Odhiamo, N. (2009). Finance-Growth-Poverty Nexus in South Africa: A Dynamic Causality Linkage. *The Journal of Socio-Economics*. Vol, pp. 320 – 325.

Parliament of South Africa. (2021). Social Grant Performance as at March 2020/2021.

Paukert, F. (1973). Income Distribution at Different Levels of Development: A Survey of Evidence. *International Labor Revue*, Vol.108, August-September, pp. 97–125.

Pesaran, M. H., Shin, Y. and Smith, R.J. (2001). Bounds testing approaches to the analysis of level of relationship. *Journal of Applied Econometrics*, 16 (3), 289–326.

Phillips, P.C. B. and Perron, P. (1988). Testing For A Unit Root In Time Series Regression. *Econometrica*, Vol. 55, pp. 277 – 301.

Piketty, T. (2005). Top Income Shares in the Long-Run: An Overview. *Journal of the European Economic Association*, Volume 3, Issue 2-3, 1 May 2005, pp. 382–392.

Piketty, T. (2014). *Capital in the Twenty-First Century*. Cambridge: Belknap Press.

Raj, D. (2008). *Development Economics*. Princeton University Press. ISBN 13:978-0-691-01706-8.

Ridzuan, A. R., Zakaria, S., Fianto, B. A., Yusoff, N. Y. M., Sulaiman, N. F. C., Razak, M. I. M., Siswantini, S., & Lestari, A. (2021). Nexus between Financial Development and Income inequality before Pandemic Covid-19: Does Financial Kuznets Curve Exist in Malaysia, Indonesia, Thailand and Philippines? *International Journal of Energy Economics and Policy*, 11(2), pp. 260–271.

Román-Aso, J. A., Fernando, C.V. Franks, V.M. and Frigola, I.B (2021): Using Principal Component Analysis to create an index of financial conditions in Spain. Differences by firm size and industry, ZBW - Leibniz Information Centre for Economics, Kiel, Hamburg.

Rustomjee, Z.A.R. (1993). The Political Economy of the South African Industrialisation – The Role of the Minerals-Energy Complex. Thesis submitted for the degree of Doctor of Philosophy at the School of Oriental and African Studies, University of London. ProQuest Number: 10731722.

Sandmo, A. (2013). The Principal Problem in Political Economy: Income Distribution in the History of Economic Thought. Discussion Paper, Department of Economics, Norwegian School of Economics (NHH), N-5045.

Sehrawat, M. and Giri, A.K. (2014). Financial development and poverty reduction in India: an empirical investigation. *International Journal of Social Economics*, Vol. 13, No. 2, pp. 106 – 122.

Sehrawat, M. and Giri, A.K. (2018). The impact of financial development, economic growth, Income inequality on poverty: evidence from India. *Empirical Economics*, vol. 5, pp. 1585 – 1602.

Shahbaz, M. and Islam, F. (2011). "Financial Development and Income Distribution in Pakistan: an application of ARDL approach". *Journal of Economic Development*, Vol. 36 No. 1, pp. 35-58.

Shahbaz, M., Tiwari, A.K. and Sherafatian-Jahromi, R. (2012). Financial Development and Inequality: Is there any Financial Kuznets Curve in Iran? MPRA Paper No. 40899, posted 29.

August 2012 04:21 UTC

Shrestha, M.B and Bhatta, G.R. (2017). Selecting appropriate methodological framework for time series data analysis. *Journal of Finance and Data Science*, Vol. 4 , pp. 71-89.

South African Reserve Bank. (2020a). Competition in South African Banking: An assessment using the Boone Indicator and Panzar–Rosse approaches. Working Paper Series WP/20/02.

South African Reserve Bank. (2020b). Unpacking Gross Fixed Capital Formation in South Africa.

South African Reserve Bank. (2021). Note on banknotes and coin in South Africa.

Spaull, N. (2019). Equity: A Price Too High to Pay? In Spaull, N. and Jansen, D. (Eds), South African Schooling: The Enigma of Inequality A Study of the Present Situation and Future Possibilities, pp. 1–21, Switzerland: Springer.

Stack, S. (1980). The Political Economy of Income inequality: A Comparative Analysis. Canadian *Journal of Political Science / Revue canadienne de science politique* , Jun., Vol. 13, No. 2 pp. 273-286

Statistica Website.
Sourced:https://www.statista.com/statistics/1121221/finance-sector-value-added-to-gdp-in-south-africa/

Statistics South Africa. (2017). Poverty Trends in South Africa: An examination of absolute poverty between 2006 and 2015.

Statistics South Africa. (2019). Inequality Trends in South Africa: A multidimensional diagnostic of inequality.

Stiglitz, J.E. (2016). Inequality and Economic Growth, chapter in *Rethinking Capitalism*. Wiley-Blackwell Publishers. ISBN 9781119120957.

Summers, R., Kravis, I. B. and Heston, A. (1984). Changes in the World Income Distribution. *Journal*

of Policy Modeling. Vol. 6, May, pp 237-69.

TransUnion, (2023). Industry Insight Report: Quarterly Overview of the Consumer Credit Trends, First Quarter.

Wilkinson, R and Pickett, K. (2011). The Spirit Level: Why Greater Equality Makes Societies Stronger. Bloomsbury Press, New York.

World Bank. (2020). Global Financial Development Report: Bank Regulations and Supervision a Decade after the Global Financial Crisis.

World Bank. (2021). South Africa: Social Assistance Programs and Systems Review.

World Bank. (2022). Inequality in South Africa. An Assessment of the South African Customs Union.

World Inequality Database. (2022). Pre-tax national income Gini coefficient adult sequel split South Africa. Accessed 08 August 2022. https://wid.world/data/#countrytimeseries/gptinc_p0p100_z/ZA/1980/2021/eu/k/p/yearly/g

Younsi, M. and Bechtini, M. (2020). Economic Growth, Financial Development, and Income inequality in BRICS: Does Kuznets' Inverted U-Shaped Curve Exist? *Journal of the Knowledge Economy*, Vol.11, 721 – 742.

Appendix A: Optimal lag selection

Gini

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	43.7628				.002761	-3.05449	3.03994	-3.00691
1	96.8489	106.17*	1	0.000	.000067*	**-6.77492***	-6.74583*	-6.67977*
2	96.9271	.15641	1	0.692	.000071	-6.70908	-6.66544	-6.56634
3	97.0748	.29528	1	0.587	.000076	-6.6482	-6.59002	-6.45788
4	97.6687	1.1879	1	0.276	.000078	-6.61919	-6.54647	-6.3813

FDI

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-49.4481				2.15026	3.60344	3.61798	3.65102
1	3.03568	104.97*	1	0.000	.054388*	**-.073977***	-.044887*	.02118*
2	3.12319	.17503	1	0.676	.058085	-.0088	.034836	.133937
3	3.4535	.66062	1	0.416	.061	.039035	.097217	.22935
4	3.45363	.00025	1	0.987	.065641	.110455	.183181	.348349

GDP per capita

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	23.8716				.01143	-1.63369	-1.61914	-1.58611
1	64.7599	81.777*	1	0.000	.000662*	**-4.48285***	-4.45376*	-4.38769*
2	64.8292	.13849	1	0.710	.000708	-4.41637	-4.37273	-4.27363
3	64.9715	.28476	1	0.594	.000753	-4.35511	-4.29693	-4.1648
4	66.0771	2.2112	1	0.137	.000749	-4.36265	-4.28993	-4.12476

Net Exports

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	138.981		06		3.1e-	-9.85576	-9.84121	-9.80818
1	142.895	7.8279*	1	0.005	2.5e-06*	**-10.0639***	-10.0348*	-9.96874*
2	142.896	.00356	1	0.952	2.7e-06	-9.9926	-9.94896	-9.84986
3	142.992	.19158	1	0.662	2.9e-06	-9.92801	-9.86983	-9.73769
4	143.972	1.9596	1	0.162	2.9e-06	-9.92657	-9.85384	-9.68867

Inflation

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-13.8822				.169511	1.06301	1.07756	1.11059
1	-10.474	6.8164*	1	0.009	.142754*	**.890999***	.92009*	.986157*
2	-9.74641	1.4552	1	0.228	.145643	.910458	.954094	1.05319
3	-9.56239	.36804	1	0.544	.154561	.968742	1.02692	1.15906
4	-9.54771	.02936	1	0.864	.166147	1.03912	1.11185	1.27702

Social Spending

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-37.9559				.946215	2.78256	2.79711	2.83014
1	16.3172	108.55*	1	0.000	.021062	-1.02266	-.993567	-.9275*
2	17.5964	2.5584	1	0.110	.020658	-1.0426	-.998963	-.899863
3	19.4042	3.6156	1	0.057	.019522*	**-1.1003***	-1.04212*	-.909982
4	19.5701	.33183	1	0.565	.02076	-1.04072	-.967993	-.802826

Appendix B: Unit Root Test Output (ADF)

Gini

Variable:	Gini	Number	of	obs	=	30
	Number	of	lags	=	1	

H0: Random	**walk with or**	**without drift**		
		Dickey–Fuller		
Test	**--------**	**critical value**	**---------**	
statistic	1%	5%	10%	
Z(t)	-2.338	-4.334	-3.580	-3.228

MacKinnon	approximate	p-value	for	Z(t)	=	0.4130.

FDI

Variable:	FDI	Number of obs = 30
	Number of lags = 1	

0: Random	walk with or without	drift		
		Dickey–Fuller		
Test -	-----	critical value	---------	
statistic	1%	5%	10%	
Z(t)	-2.081	4.334	-3.580	-3.228

MacKinnon	approximate	p-value	for	Z(t)	=	0.5566.

GDP per capita

Variable:	ln_GDPcap	Number of obs = 30
	Number of lags = 1	

H0: Random	walk with or	without drift		
		Dickey–Fuller		
Test	--------	critical value	--------	
statistic	1%	5%	10%	
Z(t)	-2.434	-4.334	-3.580	-3.228

MacKinnon	approximate	p-value	for	Z(t)	=	0.3615.

Inflation

Variable:	ln_Infla	Number	of	obs	=	30
	Number	of	lags	=	1	

H0: Random	walk with or	without drift		
		Dickey–Fuller		
Test	--------	critical value	--------	
statistic	1%	5%	10%	
Z(t)	-3.776	-4.334	-3.580	-3.228

MacKinnon	approximate	p-value	for	Z(t)	=	0.0178.

Net Export

Variable:	NetExpGDP	Number	of	obs	=	30
	Number	of	lags	=	1	

H0: Random	walk with or	without drift		
		Dickey–Fuller		
Test	--------	critical value	--------	
statistic	1%	5%	10%	
Z(t)	0.126	-4.334	-3.580	-3.228

MacKinnon	approximate	p-value	for	Z(t)	=	0.9953.

Social spending

Variable:	ln_SocialGDP	Number	of	obs	=	28
	Number	of	lags	=	3	

0: Random	walk with or without	drift		
		Dickey–Fuller		
Test -	-----	critical value	--------	
statistic	1%	5%	10%	
Z(t)	-2.892	4.352	-3.588	-3.233

MacKinnon	approximate	p-value	for	Z(t)	=	0.1648.

Appendix C: Unit Root Test Output (PP)

Gini

pperron Gini, lags(1)			
Phillips–Perron test for unit root	Number of obs	=	31
Variable: Gini	Newey–West lags	=	1
H0: Random walk without drift, d =	0		

	Dickey–Fuller		
Test	------- critical value	---------	
statistic	1% 5%	10%	
Z(rho)	-1.058	17.608 -12.692	-10.320
Z(t)	-1.059	-3.709 -2.983	-2.623
MacKinnon	approximate p-value	for Z(t) = 0.7312.	

FDI

pperron FDI, lags(1)						
Phillips–Perron test	for	unit	root	Number of obs	=	31
Variable: FDI		Newey–West lags	=	1		

H0: Random walk without drift, d = 0		
Dickey–Fuller		
Test -------- critical value	---------	
statistic 1% 5%	10%	
Z(rho) -1.197 -17.608 -12.692	-10.320	
Z(t) -1.164 -3.709 -2.983	-2.623	
MacKinnon approximate p-value for Z(t) = 0.6889.		

GDP per capita

pperron ln_GDPcap, lags(1)			
Phillips–Perron test for unit root	Number of obs	=	31
Variable: ln_GDPcap	Newey–West lags	=	1
H0: Random walk without drift, d =	0		

	Dickey–Fuller		
Test	------- critical value	---------	
statistic	1% 5%	10%	
Z(rho)	-4.496	17.608 -12.692	-10.320
Z(t)	-2.643	-3.709 -2.983	-2.623
MacKinnon	approximate p-value	for Z(t) = 0.0845.	

Net Export %GDP

pperron NetExpGDP, lags(1)				
Phillips–Perron test for unit	root	Number of obs	=	31
Variable: NetExpGDP	Newey–West lags	=	1	

0: Random	walk without drift,	d = 0	
	Dickey–Fuller		
Test	------- critical value	---------	
statistic	1% 5%	10%	
Z(rho)	-5.646	17.608 -12.692	-10.320
Z(t)	-0.684	-3.709 -2.983	-2.623
MacKinnon	approximate p-value	for Z(t) = 0.8509.	

Inflation

pperron ln_Infla, lags(1)				
Phillips–Perron test for unit	root	Number of obs	=	31
Variable: ln_Infla	Newey–West lags	=	1	

0: Random	walk without drift,	d = 0	
	Dickey–Fuller		
Test	------- critical value	---------	
statistic	1% 5%	10%	
Z(rho)	-12.739	17.608 -12.692	-10.320
Z(t)	-2.928	-3.709 -2.983	-2.623
MacKinnon	approximate p-value	for Z(t) = 0.0422.	

Social protection

pperron ln_SocialGDP, lags(3)			
Phillips–Perron test for unit root	Number of obs	=	31
Variable: ln_SocialGDP	Newey–West lags	=	3

H0: Random walk without drift, d = 0	
Dickey–Fuller	
Test -------- critical value	---------
statistic 1% 5%	10%
Z(rho) -1.030 -17.608 -12.692	-10.320
Z(t) -2.331 -3.709 -2.983	-2.623
MacKinnon approximate p-value for Z(t) = 0.1621.	

Gini

pperron Gini , trend	lags(1)				
Phillips–Perron test	for unit	root	Number of obs	=	31
Variable: Gini		Newey–West lags	=	1	

H0: Random walk with or without drift					
Dickey–Fuller					
Test --------+ critical value			---------		
statistic 1% 5%			10%		
Z(rho) -9.060 -23.268 -18.356			-15.888		
Z(t) -1.855 -4.325 -3.576			-3.226		
MacKinnon approximate p-value for Z(t) = 0.6777.					
pperron FDI, trend lags(1)					
Phillips–Perron test for unit	root	Number of obs	=	31	
Variable: FDI	Newey–West lags	=	1		

GDP per capita

pperron ln_GDPcap , trend lags(1)			
Phillips–Perron test for unit root	Number of obs	=	31
Variable: ln_GDPcap	Newey–West lags	=	1

0: Random	walk with or without drift	
	Dickey-Fuller	
Test -------- critical value	---------	
statistic 1% 5%	10%	
Z(rho)	-6.744 -23.268 -18.356	-15.888
Z(t)	-1.953 -4.325 -3.576	-3.226
MacKinnon	approximate p-value for Z(t) = 0.6268.	

Net Export %GDP

pperron NetExpGDP ,	trend lags(1)			
Phillips–Perron test	for unit root	Number of obs	=	31
Variable: NetExpGDP	Newey–West lags	=	1	

H0: Random walk with or without drift	
Dickey–Fuller	
Test -------- critical value	---------
statistic 1% 5%	10%
Z(rho) 0.626 -23.268 -18.356	-15.888
Z(t) 0.091 -4.325 -3.576	-3.226
MacKinnon approximate p-value for Z(t) = 0.9950.	

Inflation

pperron ln_Infla, trend lags(1)			
Phillips–Perron test for unit root	Number of obs	=	31
Variable: ln_Infla	Newey–West lags	=	1

0: Random	walk with or without drift	
	Dickey-Fuller	
Test -------- critical value	---------	
statistic 1% 5%	10%	
Z(rho)	-17.933 -23.268 -18.356	-15.888
Z(t)	-3.370 -4.325 -3.576	-3.226
MacKinnon	approximate p-value for Z(t) = 0.0555.	

Social protection

pperron ln_SocialGDP , trend	lags(3)			
Phillips–Perron test for unit	root	Number of obs	=	31
Variable: ln_SocialGDP	Newey–West lags	=	3	

H0: Random walk with or without drift	
Dickey-Fuller	
Test -------- critical value	---------
statistic 1% 5%	10%
Z(rho) -11.928 -23.268 -18.356	-15.888
Z(t) -3.708 -4.325 -3.576	-3.226
MacKinnon approximate p-value for Z(t) = 0.0218.	