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Impact of social protection policies on inclusive growth in Sub-Saharan Africa: evidence from bias-corrected dynamic panel

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ABSTRACT

This study examines the role of social protection policies as a driver of inclusive growth. While some research argues that social protection policies empower marginalized groups, promote human capital, reduce inequality, alleviate poverty and contribute to long-term sustainable development, other studies contend that these policies can create disincentives and potentially exacerbate poverty. This inconclusive evidence may stem from the complex nature of these welfare indicators. We deviate from existing literature by examining the potential role of social protection policies on inclusive growth. As such, we aim to elucidate the inconclusive debate on the impact on social protection policies on welfare at the macro level. We used a panel of 48 countries in sub-Saharan Africa (SSA) over the period 1990–2022. By using the least squares dummy variable corrected (LSDVC) estimator the results confirm that social protection policies significantly contribute to inclusive growth. This finding is consistent with the Rawlsian theory of justice. We also show that factors such as real effective exchange rate (REER), foreign direct investment (FDI), CO_2 emissions and infrastructure positively influence inclusive growth whereas corruption and inflation exert a negative effect. The study underscores the urgency for policy interventions to reinvigorate social protection systems to facilitate inclusive growth in the SSA region.

IMPACT STATEMENT

This study sheds light on the crucial role of social protection policies in fostering inclusive growth across Sub-Saharan Africa. By analyzing data spanning over three decades and utilizing advanced econometric techniques, the research reveals that well-structured social protection systems can significantly reduce inequality, uplift marginalized populations, and drive sustainable economic progress. The findings challenge the long-held belief that social protection merely creates disincentives for growth, demonstrating instead that these policies, when effectively implemented, serve as a cornerstone for equitable development. This work holds immediate relevance for policymakers, emphasizing the need for robust and adaptive social safety nets to support long-term inclusive growth, especially in regions grappling with economic disparity and vulnerability. It provides a blueprint for designing social interventions that empower societies to overcome structural inequalities, paving the way for shared prosperity.

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1. Introduction

Between 2011 and 2019, Sub-Saharan Africa (SSA) achieved an average growth rate of 3.8%, as reported by the IMF (2022). However, the benefits of this growth have not been equitably shared among the population. The World Bank's 2022 annual report highlights that 60% of the global poor are in SSA, underscoring significant disparities in resource distribution within the region. Moreover, SSA not only grapples with severe poverty but also faces the highest levels of income and gender inequality worldwide. For example, the World Income Inequality Report of 2022 reveals that the richest 10% of the population controls 56% of the region's total income, illustrating the stark income divide.

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The exclusive nature of growth in the region transcends the sphere of poverty and inequality and is very detrimental to enhancing equal opportunities. This has shifted the policy discourse from solely focusing on pro-poor growth to a more inclusive growth since the latter is instrumental to improving shared prosperity and accelerating poverty reduction (World Bank, 2009). Focusing solely on economic growth is not sufficient to enhance the living standards, reduce inequalities and foster development (OECD, 2019). Globally, there is a consensus on the need for a more socially inclusive growth (Samans et al., 2015). Inclusive growth creates an avenue for everyone to share in the growth benefits ranging from productive employment generation, territorial development, systemic competitiveness (Anyanwu, 2013). However, despite the imperative nature of inclusive growth, its attainment remains primarily an aspiration especially in context of developing countries with emphasis on SSA region where growth is highly exclusive. Inclusive growth leverages income and non-income avenues such as redistributive policies in creating achieving inclusive growth (Reinders et al., 2019).

In this regard, social protection policies have been pivotal in achieving inclusive growth, serving as key mechanisms that align with the global and continental development frameworks. Specifically, these policies support the objectives of the United Nations' 2030 Sustainable Development Goals and the African Union's Agenda 2063. Due to that, several countries have adopted this social mechanism to tackle developmental challenges. Prior studies have also shown that social safety nets play a critical role in bridging the gap created by pro poor growth (see Alderman & Yemtsov, 2014). Through schemes such as cash transfer, old pensions, in-kind transfers and disability benefits, these programs serve as macroeconomic stabilizer and enable the poor to overcome social exclusion and poverty in both developing and developed countries (Bachelet & ILO, 2012). In sharp contrast, other school of thought posits that social protection policies impedes inclusive growth through its negative redistribution effect channels such as cash transfers serving as disincentive instruments reducing productivity and thereby affecting growth. To that end, the nexus between social protection policies and inclusive growth remains inconclusive and poorly documented especially at the macro level (Arjona et al., 2002; OECD, 2019).

Thus, our contribution to the literature is as follows; (i) Prior studies have often employed limited economic measures to evaluate inclusive growth (e.g. Raheem et al., 2018; Oyinlola & Adedeji, 2019; Adeniyi et al., 2021). We fill this gap by developing a comprehensive and robust index that captures a broader spectrum of inclusive growth beyond mere economic growth to unravel the complex effects and consequences of social protection in the context of SSA (Devereux & McGregor, 2014). (ii) Prior scholarship has been skewed towards the micro and meso-level analysis of social protection policies (e.g. Alzúa et al., 2013; Asfaw et al., 2014; Banerjee et al., 2017; García & Saavedra, 2017; Handa et al., 2022). We extend the discourse by contributing to the literature through a macro level causal analysis in the SSA context. (iii) To the best of our knowledge, this study presents the most extensive longitudinal analysis to date on this discourse, spanning a 32-year period, which stands in stark contrast to prior research that typically covers shorter spans (e.g. Andrée, 2017; Pouw et al., 2020; Bhorat et al., 2017; Mutiiria et al., 2020; Bello et al., 2023). (iv) Previous research often considers social protection as mere control variable, thus not fully examining the potential impact on inclusive growth (see Roelen et al., 2017; Bello et al., 2023; Alekhina and Ganelli, 2023; Avcı & Tonus, 2022; Woldegiorgis, 2022). In contrast, our study recognizes the central importance of these policies, establishing direct causality with inclusive growth through both static and dynamic models. (v) Our study extends existing discussions by exploring the heterogeneity in the effects of social protection on inclusive growth across different income classifications within the region. Specifically, we differentiate between low-income and middle-income countries (MIC), uncovering nuanced variations in how social protection influences economic inclusivity.

To achieve the objective of the study, a panel of 48 SSA countries (N) spanning a period of 32 years (T) and eight control variables were selected – control of corruption, exchange rate, foreign direct investment (FDI), inflation, informality, infrastructure, education and CO_2 emissions whilst static and dynamic models are leveraged to establish causality. The findings from this study insinuate the urgency for policy makers to expand the coverage of effective social protection policies within the SSA region.

The remainder of this article is organized as follows; Section 2 reviews the recent literature on inclusive growth and social protection policies followed by empirical evidence. Section 3 discusses the data and methodological approach used in the study. Section 4 discusses the findings and then summarizes the findings from the study and offer policy recommendations.

2. Literature review

2.1. Inclusive growth

In the scholarly discourse on inclusive growth, researchers and policymakers have grappled with its precise definition, leading to divergent perspectives (Kireyev & Chen, 2017). For instance, the World Bank (2009) defines inclusive growth as one that enhances equal opportunities among individuals and firms through access to resources and markets. This perspective is echoed by the Asian Development Bank, which underscores the essence of promoting equity, fairness, and opportunities for all. Zhang and Wan (2017) further classifyied the concept into two fundamental dimensions: growth and equality, suggesting any economic factor which positively impacts income and benefits the poor aligns with inclusive growth. Expounding on this, Ostry et al. (2014) argue that addressing inequality is crucial to inclusive growth. The OECD (2019) offers a broader interpretation, viewing inclusive growth as an improvement in the living standards and shared prosperity across all social groups, focusing on the pace and structure of growth. This connotes inclusive growth boils down to reducing inequalities through increased opportunities for less privileged section of the population to have access to health, education, social integration, and nutrition. Ramos et al. (2013) chipped in a comprehensive perspective of inclusive growth which encapsulates pro poor growth as well as an avenue for the benefits from the growth process to be shared by the participants. A central insight from these discussions is that inclusive growth primarily focuses on ensuring that economic progress benefits people across various socio-economic backgrounds.

2.2. Social protection policies

Social safety nets are generally considered as policies aimed at preventing and reducing poverty, vulnerability and social exclusion throughout the entire lifespan of a person (Desa, 2018; Mathers & Slater, 2014). Stiftung (2018) offers a broader perspective and conceptualized social protection policies as all forms of government and private initiatives concerning the transfer of income to the destitute, prevent the vulnerable people of being poor and thus, improve the right and social strata of the marginalized.

ILO (2021) classified social safety nets into nine categories: support for children and families, safeguards during maternity, assistance for the unemployed, benefits for work-related injuries, sickness benefits, medical health coverage, provisions for the elderly, disability coverage and benefits for survivors. Social safety nets tackle these domains through a merger of contributory (such as social insurance) and non-contributory (like tax-supported social help) (Ortiz et al., 2019).

Several scholars detail how, in theory, social protection programs reduction has also been instrumental in reducing poverty as well as vulnerability to risks (Barrientos et al., 2011). In that regard, Schüring and Loewe (2021) operationalized three main functions of social protection systems: protective function, promotive function and preventive function. The protective function implies how social protection policies alleviate poverty by supporting people living below a nationally defined poverty line with cash or in-kind transfers or subsidies. Successively, the promotive function then helps fight poverty thereby reducing the overall vulnerability of people by stabilizing the future income streams. The decrease in uncertainty for the future spurs people to embrace new risks in their income-generating projects. Next, the preventive function implies how social protection systems cushions people to mitigate against risks, for instance, unemployment, pension and sickness. This feature clears any impediment to achieving greater social equality. Expounding on Guhan's (1994) novel concept, Deveraux and Sabates-Wheeler (2004) contributed a transformative component to the functions the three established merits of social protection policies, one that focuses on eliminating barriers to achieving greater increased social equality, fostering inclusion, and enabling social mobility.

2.3. Theoretical review

The theoretical framework for this study emanates from two school of thoughts; one in which social protection might be good for inclusive growth and the other in which social protection might be inadequate for inclusive growth.

2.3.1. Rawlsian theory of justice

Various theories support the idea that social protection promotes inclusive growth. Drawing insight from Rawls' theory of social justice, specifically presented in his seminal work 'A Theory of Justice' provide a direct link of how social protection policies contributes to inclusive growth. His theory is underpinned by two key principles: the principle of equal liberty and the difference principle. The first principle (the 'liberty principle') emphasize that 'each person is to have an equal right to the most extensive liberty compatible with a similar liberty for others' (Rawls, 1972). This insinuates in the context of social protection policies, it translates to ensuring that all citizens, regardless of their socio-economic condition, have access to fundamental rights and liberties. Likewise, the difference principle plays an instrumental role in the pursuit of inclusive growth since Rawls highlighted that social and economic inequalities are to be arranged to benefit the least advantaged members of society. In practice, this principle supports argument for social protection systems such as social welfare programs (Barr, 2004). Kuznet's theory also had an aspect of how redistributive policies and labor-protective legislation help remediate the impact of inequality created by economic growth. Social exclusion theory as propounded by Silver (1994) echoes the impact of social protection on inclusive growth. This theory underscores the importance of social protection that transcend beyond mere income support to encapsulate access to services, empowerment and participation in societal activities.

2.3.2. The disincentive theory

Conversely, other schools of thought argue that social protection policies hinder inclusive growth. Their line argument stems from the fact that social protection policies can result in increased taxation and public debt and eventually crowding out private investments and hindering economic development (Saint-Paul & Verdier, 1993; Galor & Zeira, 1993; Perotti, 1994; Alesina & Perotti, 1997). This theoretical argument posits that the individuals with higher income tends to have to save at a higher rate compared to those with lower incomes, thus, social redistribution systems result in the aforementioned effect. Mirrlees (1971) echoed on this point and even alluded that such increase in taxation due to redistributive policies will not only affect economic development but rather innovation as well. The last strand of support for this school of thought is the disincentive effect theory. In that generous social benefits might discourage work efforts, reducing labor market participation and productivity, as alluded by (Lindbeck, 1995) analysis of unemployment benefits and work incentives. To that end, this theoretical review presents a multifaceted nature of social protection's impact on inclusive growth.

2.4. Empirical review

Deducing from the theoretical juxtaposition discussed above, the empirical studies linking social protection and inclusive growth are inconclusive, indeterminate and mixed. There has not been much empirical works specifically done on how social protection policies impacts inclusive growth. As such, we review some of the works done from the global perspective and then narrowed to the SSA region.

Alekhina and Ganelli (2023) leveraged the fixed effect (FE) panel model to analyze the contributing factors of inclusive growth in Southeast Asia, the findings show that the implementation of fiscal redistribution and labor-market oriented structural reforms significantly affected inclusive growth. Koutronas (2020) analyzing the scope of social protection in Malaysia reported that it plays an integral role in combating poverty, involving the vulnerable, and should thus, be a component of national development policies to attain inclusive growth. Tsapko-Piddubna (2021) conducting a comparative analysis and leveraging cross-country regression mode alluded public social protection policies contributes significantly to decreasing poverty, vulnerability, and marginalization without impeding economic growth. Avcı and Tonus (2022) using ARDL tested the relationship between fiscal policies and inclusive growth and realized that social transfers contributed positively to inclusive growth in Turkey.

Conversely, empirical evidence points to the potential negative impacts of social protection on inclusive growth. One of the early scholars asserted that government social safety nets are likely to result in unintended effect of impeding economic growth in both advanced and emerging economies (Terasawa & Gates, 1998). This assertion is further supported by Gwartney et al. (1998), Hansson and Henrekson (1994), Nördstrom (1992), Perotti (1996) and Weede (1986) that aside the discouraging work effort it also increases tax burdens which in turn affect inclusive growth. Recently, Banerjee et al. (2017) also raised

concerns about the long-term dependency created by some of the social safety nets, which hinders labor market participation and economic dynamism.

In context of African and SSA specifically, Andrée (2017) conducted a country level analysis on SSA region spanning 11-year period concluded that social protection policies particularly insurances programs, play an instrumental role in promoting inclusive growth and reducing income inequality. Bhorat et al. (2017) using simple ordinary least square regression concluded that increased coverage of the poorest quintile and increased value of transfers are significantly associated with a reduction in inequality assessed the effect of social safety net on poverty and inequality in 38 African countries. The study spanned 2000–2017. Using fixed and random effects, the results affirmed that an increase in social protection leads to a decrease in poverty and inequality. Considering country specific analysis, Pouw et al. (2020) examined the effect on social protection through inclusive growth in Ghana and Kenya utilizing qualitative impact assessment technique. The study found that social protection systems significantly affected food, education and health. Hassan (2010) using generalized method of moments (GMM) assessed the role social protection on inclusive growth in Sudan. The study covered the period from 1970 to 2011. The results indicated that social protection had a positive effect on economic growth in the short and long run. Mutiiria et al. (2020) examined the effect of infrastructure on inclusive growth spanning 2013–2017 and asserted that the infrastructure positively influences inclusive growth.

In sharp contrast, a recent study by Bello et al. (2023) using modified system-GMM based on a panel data covering a period of 2005–2020 recorded a negative effect of social protection policies on inclusive growth in the SSA region. Likewise, Roelen et al. (2017) emphasized that despite the benefits of social protection programs in terms of preventing loss of parental care and improving child wellbeing, the study alluded that social protection systems may result in unintended effect as result of the financial incentives and work requirements for the transfer. Devereux and White (2010) observed from their study that insufficient funding and mismanagement hinder the effectiveness of social protection programs and as result contribute negatively to inclusive growth. The empirical evidence presents a nuanced perspective on the impact of social protection on inclusive growth.

3. Data and methodology

3.1. Data

We retrieve data for the entire 48 countries from the SSA region spanning the period of 1990–2022 from the following databases; World Development Indicators Databank (2023a, 2023b), The Atlas of Social Protection – Indicators of Resilience and Equity (ASPIRE), World Business Enterprise Survey, International Monetary Fund and United Nations Educational, Scientific and Cultural Organization (UNESCO). Owing to the paucity in the data, we relied on machine learning imputation technique known as 'MissForest' to make the dataset balanced. The MissForest package in R is a non-parametric method that operates by initially fitting random forest on the observed values and then predicts missing part through a multiple iterative process (Stekhoven & Bühlmann, 2012). The MissForest package offers a significant advantage in missing data imputation, as it does not mandate the specification of a particular regression model. It adeptly handles non-linear relationships between variables, as noted by Girón and Kazemikhasragh (2022). Many studies highlight MissForest's ability to preserve the intrinsic relationships between existing and missing variables, underscoring its robustness and efficacy in various contexts (Shah et al., 2014; Tang & Ishwaran, 2017; Svefors et al., 2019). Lastly, because some of our variables were not standalone, we relied on the principal component analysis (PCA) in the computation of an index for inclusive growth, infrastructure index and FDI.

3.2. Measurement of inclusive growth (dependent variable)

The dependent variable of the study is inclusive growth and is not directly accessible hence the need to compute an index that captures inclusive growth. In developing our composite index of inclusive growth, we first considered the three growth dimensions proposed by Ramos et al. (2013) – poverty, inequality and economic participation proxied by Poverty headcount ratio at $2.15 a day, Gini index and

labor force participation respectively. We then followed Ali and Son (2007) and Anand et al. (2013) who theorized the concept of growth via the social welfare literature. They postulate that inclusive growth is hinged on two factors: income growth proxied by GDP per capita and income distribution proxied by the Gini index (however, we have already captured the inequality component). For the other variables, Mlachila et al. (2017) proposed a quality growth index which harbors both intrinsic nature of growth and social dimensions. Thus, we also add other social metrics of inclusive growth such as human capital index, gender equality, government expenditure on education and health, women in parliament and for the health component we added infant mortality rate and Life expectancy after birth.

We then follow Bello et al. (2023), Ofori and Asongu (2021) and Kouladoum (2023) to use PCA to generate an index for inclusive growth. Although PCA is a dimension reduction approach, it is able to resolve biases in any objective weight assigning can create. Since the variables used in generating the PCA had different scales, we normalized them to a mean of zero (0) and a standard deviation of (1) (Jolliffe, 2002). We then run three preliminary tests to validate our PCA findings; (i) we checked if the sample is adequate for inclusive growth (ii) the strength of relationship between the variables and lastly (iii) the strength of both partial and overall intercorrelations. As a rule of thumb, the Kaiser–Meyer–Olkin (KMO) statistics of 0.785 signifies the sample leveraged in generating the inclusive growth index is adequate (Kaiser, 1958). Also the Bartlett chi-square of 9366.870 with a is significant at 1%. Using the PCA also aids to capture the contribution of each variable to the value of the indicator at hand that is inclusive growth. Baccini (2010) affirms PCA is preferable because most of the variables comes from varied domains and as a result present heterogeneity of measurement units. Thus, following the Kaiser rule of eigenvalues as used by Tchamyou (2017) and Ofori and Asongu (2021), we retained the first three (3) component since they are greater than one (1) to get a composite index of inclusive growth. Figure 1 represents the scree plot of inclusive growth index as consistent with Table 1.

3.3. Independent variable of interest

Our primary variable of interest is coverage of social protection and labor programs (% of total population for each country. This variable was retrieved from ASPIRE database. The variable captures the proportion of the population participating in social insurance, social safety net and unemployment benefits and active labor market programs. Scholars that leveraged this variable as a proxy for social protection in the literature include Bello et al. (2023) and Ofori and Asongu (2021). Figure 2 represents coverage of social protection and labor programs in the SSA region. The map shows that South Africa (ZAF) records the highest coverage followed by Botswana (BWA) and Gabon (GAB). Congo Democratic (COD) republic records the lowest coverage in the region.

Figure 3 depicts the relationship between social protection coverage and inclusive growth across the 48 SSA countries spanning 32 years. The fitted line suggests a positive correlation between inclusive growth and social protection and labor programs, indicating that high social protection coverage is

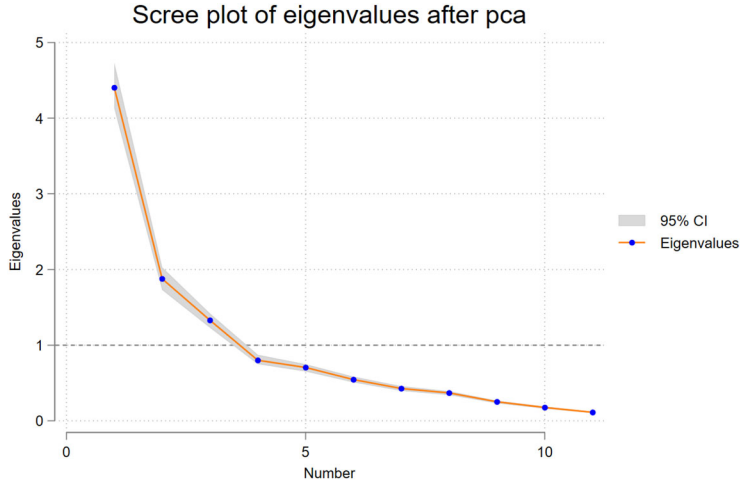

Figure 1. Scree plot of eigenvalues after PCA (inclusive growth). On the Y-axis is the eigen values of each component and on the x-axis is the number of principal components. Source: Authors' own generation.

Table 1. Principal component and eigen values (inclusive growth).

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	4.403	2.524	0.400	0.400
Comp2	1.879	0.549	0.171	0.571
Comp3	1.330	0.530	0.121	0.692
Comp4	0.801	0.095	0.073	0.765
Comp5	0.706	0.160	0.064	0.829
Comp6	0.545	0.118	0.050	0.879
Comp7	0.427	0.058	0.039	0.917
Comp8	0.369	0.117	0.034	0.951
Comp9	0.252	0.076	0.023	0.974
Comp10	0.176	0.064	0.016	0.990
Comp11	0.112	.	0.010	1.000
Kaiser–Meyer–Olkin(KMO)				0.785
Bartlett specificity test ($\chi 2$)				9366.870***

The table reports the results from a PCA of the inclusive growth index, detailing 11 components. The eigenvalue indicates the amount of variance explained by each component. The proportion and cumulative columns show the percentage of total variance explained by each component and cumulatively.
***p Value < 0.01.
Source: Authors.

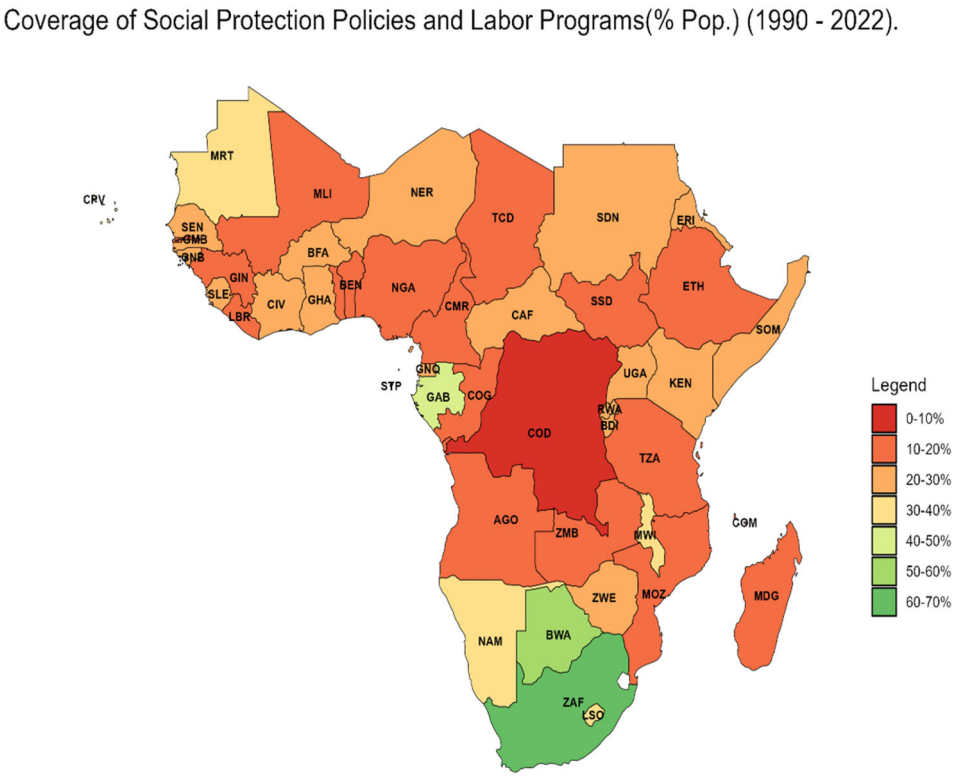

Figure 2. Coverage of social protection policies in SSA. The values on the legend correspond the level of social protection policies in each of the selected countries. Green indicates higher social protection policies, while red indicates lower social protection policies. *Source:* Authors' own generation.

associated with better outcomes in inclusive growth. Countries above the fixed line are summed to have a higher level of inclusive growth, while countries below the fixed line are assumed to have a lower level of inclusive growth. At a glance, one can observe that South Africa has a higher level of social protection policies and a higher level of inclusive growth. This is also true for Swaziland and Botswana. On the other hand, we observe that countries like Sudan, Gabon, Ethiopia, Nigeria, Madagascar and Tanzania tend to have lower social protection policies and a lower level of inclusive growth.

3.4. Control variables

The covariates employed in the study were pulled from the previous literature and under five (5) main themes; economic, environmental, governance and developmental factors.

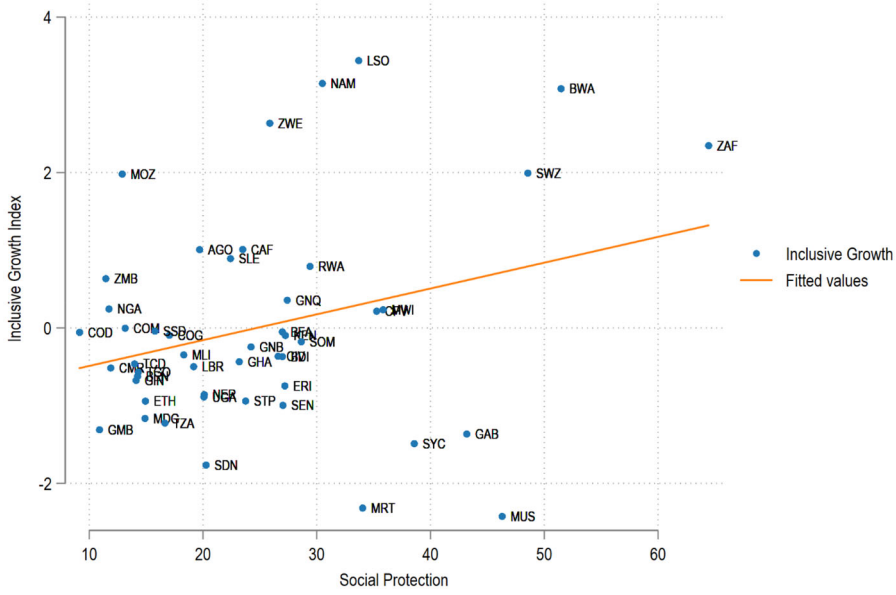

Figure 3. Relationship between inclusive growth and social protection coverage. Source: Authors' own generation.

Concerning the economic conditions we leveraged inflation rate, real effective exchange rate (REER) and FDI to proxy for the internal and external economic conditions within the selected SSA countries. For REER as outlined by Anand et al. (2013), using it to assess the influence of competitiveness on inclusive growth. We expect that a well-aligned REER, reflective of true purchasing power parity, is expected to foster economic inclusivity by enhancing competitiveness, while a misalignment may inhibit growth. Additionally, inflation measured by consumer price index (CPI) are included following insights from Madurapperuma (2016), Kasidi and Mwakanemela (2013), and Umaru and Zubairu (2012); we anticipate that stable CPI levels contribute positively to economic stability and thus inclusive growth and vice versa. Furthermore, FDI is integrated as a pivotal economic indicator drawing from the work of Asongu and Odhiambo (2020), Ofori and Asongu (2021) and Ngounou et al. (2024) who underscores FDI's roles in job creation and productivity enhancement. To capture the broader financial environment, we generate a composite index derived from PCA which includes road Money (% of GDP), Domestic Credit to Private Sector (% of GDP), and Domestic Credit provided by Financial Sector (% of GDP) following the same process we discussed in obtaining the index for inclusive growth. We present the PCA table and the scree plot to indicate the components that we retained to generate the index in the appendix.

In our study, governance is proxied by control of corruption, drawing on insights from Mutiiria et al. (2020), Kodongo and Ojah, (2016) and Ofori et al. (2023), along with foundational concepts from Acemoglu and Robinson (2010). Effective control of corruption is posited to enhance governance quality, thereby fostering inclusive growth by creating a more equitable and transparent environment. This indicator helps us analyze the influence of governance practices on economic inclusivity in the region.

Informed by the research of Amponsah et al. (2021) and Njoya et al. (2024), our analysis incorporates a control for informality, using the percentage of unregistered firms as a proxy. Considering the region's significant prevalence of informality, its potential influence on inclusive growth is considerable. We project informality to have a negative effect on inclusive growth since high levels of informality reflects less efficient labor market with poor work protections, potentially stifling income quality and fair access to economic opportunities. Also other logical channels for the effects is through reduced tax base which in turn limits governments revenue thereby reducing public investment in critical areas such as infrastructure, health and education, which are integral for sustainable inclusive growth.

We anticipate a positive impact of education, or human capital development, on inclusive growth, using gross secondary school enrollment as a proxy. Drawing on insights from Woldegiorgis (2022), we posit that an increase in secondary school enrollment enhances the skill level of the workforce and broadly stimulates societal capacity for innovation and growth.

Table 2. Descriptive statistics – full sample.

Variable	Obs	Mean	Std. Dev	Min	Max
Inclusive growth	1584	0	1.737	−4.101	17.296
Social protection	1584	24.721	12.701	0.514	84.212
Corruption	1584	−0.638	.628	−1.937	1.698
Exchange rate	1584	4.719	.208	3.85	6.236
Foreign direct investment	1584	0	1	−1.719	6.111
Inflation	1584	51.796	627.541	−16.86	23773.132
Informality	1584	4.165	0.171	2.839	4.556
Infrastructure	1584	0	1	−0.395	7.253
Education	1584	37.794	21.656	4.721	118.7
CO_2 emissions	1584	0.146	0.132	0.022	1.551

Table 2 reports the summary statistics of respective variables used in the study. For each variable the table lists the mean, standard deviation, minimum and maximum values.
Source: Authors.

Next, for the developmental theme in our study, we construct a composite infrastructure index using PCA – we present the PCA table and scree plot in the appendix following the same approach we used in generating the inclusive growth index. Following Mutiiria et al. (2020), this index includes four key indicators: access to clean fuels and technologies for cooking, access to electricity, railways goods transported and the percentage of the population using at least basic sanitation services. This comprehensive measure allows us to assess the impact of physical infrastructure development on inclusive growth within the region (Beyer et al., 2021 and Ngounou et al., 2024).

Lastly our analysis of environmental conditions affecting inclusive growth, we include CO_2 emissions, measured CO_2 emissions (kg per 2017 PPP $ of GDP), as a proxy. This choice is based on findings by Woldegiorgis (2022), who demonstrates that CO_2 emissions negatively influence inclusive growth. The rationale is that increased CO_2 emissions exacerbate climate change, which disproportionately impacts marginalized communities and exacerbates existing inequalities. Thus, understanding the role of CO_2 emissions is crucial for assessing environmental factors that may hinder inclusive growth in the region.

3.5. Summary statistics

Table 2 offers a detailed overview of the key variables examined in our study. Inclusive growth, with a mean of zero and a standard deviation of 1.737, demonstrates notable variability, highlighting the uneven nature of economic growth across SSA. Social protection coverage has an average value of 24.721, but with a substantial standard deviation of 12.701, indicating significant disparities in social safety net provisions. The mean corruption index sits at −0.638, pointing to widespread governance challenges within the region. Exchange rates and FDI, both scaled between zero and one, exhibit limited variability, with standard deviations of 0.208 and 1, respectively. CO_2 emissions average 0.146, juxtaposed against the extreme swings in inflation, which averages 51.796 and spikes up to 23,773.132, reflecting acute economic instability. Finally, the Infrastructure development index, ranging from −0.395 to 7.253, underscores the varied stages of infrastructure advancement across the region.

3.6. Empirical models

Considering the dependent variable, the main explanatory variable of interest along with the justification of the control variables, the model posits the relationship between inclusive growth and social protection.

$$incg_{it} = f\ (soc_{it},\ corrup_{it},\ lnreer_{it},\ fdi_{it},\ infcpi_{it},\ lnfirms_{it},\ infra_{it,}\ \mathrm{sec\_sch}_{it},\ co2_{it}) \tag{1}$$

Re-specifying the model;

$$\begin{aligned} incg_{it} = {} & \beta_0 + \beta_1 soc_{it} + \beta_1 corrup_{it} + \beta_2 lnreer_{it} + \beta_3 fdi_{it} + \beta_4 infcpi_{it} \\ & + \beta_5 lnfirms_{it} + \beta_6 infra_{it} + \beta_7\, sec\_sch_{it} + \beta_8 co2_{it} + \mu_{it} d \end{aligned} \tag{2}$$

where

i. β's represents the coefficients of the empirical model.

ii. $incg_{it}$ represents inclusive growth composite index for country i at time t.
iii. soc_{it} represents coverage of social protection and labor programs for country i at time t.
iv. soc_{it}, $corrup_{it}$, $lnreer_{it}$, fdi_{it}, $co2_{it}$, $infcpi_{it}$, $infra_{it}$, $lnfirms_{it}$, $infra_{it}$, sec_sch_{it}, $co2_{it}$ represents Social Protection Corruption, Exchange Rate, FDI, Inflation, Informality, Infrastructure, Education and CO2 Emissions for country i at time t, respectively.
v. μ_{it} represents the model's random error term that encompasses all unmeasured variables that can affect inclusive growth.

Thus, integrating a panel dimension into Equation (2) yield the following output:

$$incg_{it} = \beta_0 + \beta_1 soc_{it} + \beta_2 \sum X_{it} + \mu_{it} \tag{3}$$

where $incg_{it}$, β's, soc, μ, i and t holds as already defined, X captures all the other covariates mentioned in equation (1).

3.6.1. Estimation technique

We first estimated the static model with a pooled Ordinary Least Square (OLS) and Fixed Effect (FE), with the inclusion of the FE being appropriate since the specific set of individual countries were not randomly selected in this study. However, for the first two models to be suitable it ought to satisfy these axioms in no order of importance. First, absence of serial correlation is required. Also, the variance of the error term should not vary across the observations (heteroskedasticity). The distribution ought to be normal and should be free from cross-sectional dependence. Thus, on the grounds of the Pooled OLS or FE model not being able to pass these assumptions, then their respective estimation will be considered biased. To address the challenge inherent in the OLS and FE, we leverage the Driscoll–Kraay estimation technique since its robust against serial correlation, heteroskedasticity and cross-sectional dependence following a non-parametric covariance matrix estimator (Driscoll & Kraay, 1998; Sarkodie & Adams, 2020).

To address the challenge of measurement errors and unobserved heterogeneities in static panels we introduce a lagged term of the dependent variable which also help estimate the potential dynamic effect of social protection on inclusive growth. However, whenever the lagged term is introduced ($incg_{it-1}$), the problem that normally occur is persistent correlation of the lagged term with the error term (μ_{it}) (Baltagi, 2013). This is known as Nickell's bias which implies that the non-zero correlation between the lagged dependent variable and the individual-specific effects render the conventional the conventional panel estimation techniques such as FE biased for data sample with small time T dimension regardless of the size of N. Nonetheless, when N is finite in this case 48, variance of the estimates may increase asymptotically, thereby curating considerable bias. One of the approaches in remediating this bias is the System GMM. The System GMM distinguishes itself by utilizing explanatory variables derived from both their lagged levels and first differences. Despite its advantages, a notable challenge emerges due to the weak instrumentation of these lagged variables, which can lead to biased outcomes in finitesamples. This concern is extensively explored in the foundational study by Blundell and Bond (1998).

To effectively mitigate the challenges outlined previously, we employ the least squares dummy variable corrected (LSDVC) estimator, developed by Bruno (2005). A significant advantage of the LSDVC estimator is its capacity to address potential endogeneity issues, particularly when social protection, used as a lagged explanatory variable, might influence the model's dynamics. Also, empirical work by Buddelmeyer et al. (2008) further accentuated that LSDVC yields consistent and reliable estimates instances where the T dimension is less than the N dimension under study (Sbia & Hamdi, 2020). Monte Carlo simulations further corroborate the effectiveness of the bias-corrected LSDVC estimator, which frequently surpasses IV-GMM estimators in terms of reduced bias and lower root mean squared error (RMSE). Supporting this assertion, Judson and Owen (1999) present additional Monte Carlo evidence demonstrating the superiority of the LSDVC approach, particularly in macro panels with a smaller number of units, such as the 48 countries in our study. Moreover, considering the cross-sectional element of the data, for the middle-income and low-income bring 25 countries and 23 countries, respectively, over a span of 25 years yielding small sample size, the system GMM regression could result to small sample bias

problem. Bruno's (2005) LSDVC approach which is an extension of Kiviet (1998) is also robust against the small sample bias problem.

On this basis, we proceed with the LSDVC estimator by implementing the command 'xtlsdvc' developed by Bruno (2005) in Stata. Per the command options, we initialized the model with the Blundel and Bond estimator (bb) due its efficiency in utilizing both levels and differences of variables, significantly enhancing the robustness and reducing potential biases associated with weak instruments in dynamic panel data analysis. We implemented recursive bias correction up to $N^{-1}T^{-2}$ with time FEs to reduce the bias more effectively in our dynamic panel estimation. Additionally, we conducted 100 bootstrapped replications to robustly assess the statistical significance of the coefficients, ensuring our results are reliable even under various sampling conditions (Bruno, 2005).

Thus, below is the empirical approach for the LSDVC estimator in Equation (4)

$$incg_{it} = \beta_0 + \beta_1 incg_{it-1} + \beta_2 soc_{it} + \beta_3 X_{it} + f_i + \mu_{it} \tag{4}$$

where $incg_{it}$ is the dependent variable for country i at time t; $incg_{it-1}$ is identified as the lagged dependent variable characterized by a first-order autoregressive process. *Soc* represents social protection policy rating (main explanatory variable of interest). The incorporation of the FEs f_i helps to adjust for non-random observations that were selected, and X captures all the covariates and lastly μ_{it} represents the error term.

4. Empirical results

4.1. Correlation analysis

Table 3 presents pairwise correlations among key variables. Inclusive growth shows positive correlations with social protection and corruption, suggesting that regions with higher governance challenges and social safety nets tend to have more inclusive growth. A notable negative correlation exists between Informality and several variables, including FDI and human capital, indicating that higher informality levels may be associated with lower investments and educational attainment. Inflation displays low correlation with most variables, reflecting its distinct dynamics. Infrastructure development is strongly positively correlated with human capital, underscoring the link between educational advancement and infrastructure. CO_2 emissions show moderate to high correlations with several economic indicators, highlighting the environmental impact of economic activities.

4.2. Fisher unit root test

Since panel data is a merger of both time series and cross-sectional data, we need to verify the stationarity of the variable to ensure they do not fluctuate the mean (Baye et al., 2021). Also, the model will predict spurious results with nonstationary variables and this can yield unintended findings. Hence, we utilize the Augmented Dickey–Fuller to check the stationarity option under null hypothesis; all panels have a unit root, as against the alternative of no unit root. Table 4 presents the findings of the Fisher unit root on the variables used in the model. The test results confirm that all the variables were stationary (at the first level) at 1% level of significance except corruption that was significant at 5% level.

Table 3. Pairwise correlations.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Inclusive growth	1.000									
Social protection	0.185	1.000								
Corruption	0.228	0.555	1.000							
Exchange rate (log)	0.127	−0.089	0.059	1.000						
Foreign direct investment	0.255	0.728	0.534	−0.074	1.000					
Inflation	0.135	−0.055	−0.113	0.170	−0.003	1.000				
Informality (log)	−0.364	−0.651	−0.603	0.044	−0.793	0.030	1.000			
Infrastructure	0.193	0.620	0.357	−0.112	0.828	−0.033	−0.681	1.000		
Education	0.062	0.702	0.567	−0.162	0.735	−0.125	−0.701	0.575	1.000	
CO_2 emissions	0.462	0.365	0.096	−0.059	0.469	0.041	−0.339	0.519	0.213	1.000

Source: Authors.

Table 4. Fisher unit root test.

	Levels	
	Statistic	*p* Value
Inclusive growth	225.9575	0.0000
Social protection	283.0440	0.0000
Corruption	126.9666	0.0188
Exchange rate (log)	177.4399	0.0000
Foreign direct investment (FDI)	292.8116	0.0000
CO_2 emissions	149.1815	0.0000
Inflation	527.2076	0.0000
Informality (log)	276.1576	0.0000
Infrastructure	320.9893	0.0000
Education	131.6015	0.0000
CO_2 emissions	149.1815	0.0004

Source: Authors.

Table 5. Variance inflation factor.

	VIF	1/VIF
Social protection	1.537	0.651
Corruption	1.687	0.593
Exchange rate (log)	1.68	0.595
Foreign direct investment (FDI)	3.472	0.288
CO_2 emissions	1.14	0.877
Inflation	1.723	0.58
Informality (log)	3.475	0.288
Infrastructure	2.626	0.381
Education	1.722	0.581
Mean VIF	**2.052**	.

Note: The bold 2.052 indicates acceptable multicollinearity with a mean VIF below 10. *Source:* Authors' own generation.

4.3. Pre-testing of the model

As we previously defined in the estimation technique, through a static lens, we assessed whether social protection is significant driver of inclusive growth by using FE and pooled OLS. As indicated in Table 3, the results are regarded as inefficient since it does not pass the necessary diagnostic checks.

First, with respect to the pooled OLS we used the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity and per the *p* value we fail to accept the null hypothesis that the variance of the residuals is constant across the observations for all the full sample, and sub-regional classifications. Table 5 reports the output of the variance inflation factor (VIF) test for multicollinearity. Following the guideline that a variable with a VIF exceeding 10 indicates significant multicollinearity (Gujarati and Sangeetha, 2008), our analysis found no VIF values above this threshold, confirming the absence of multicollinearity in our model.

Our analysis rigorously assessed cross-sectional dependence within the FE model framework, utilizing Pesaran's test for the full sample ($T < N$) and the Breusch-Pagan Test ($T > N$). As detailed in the appendix E, cross-sectional dependence is evident in the full sample and notably persists among low-income countries (LIC). In contrast, the middle-income group exhibits no such dependence.

Furthermore, we investigated the presence of serial correlation using the Wooldridge test, which confirmed significant serial correlation within the FE model. These findings underscore that static models, including Pooled OLS and FE s, may yield biased standard errors and are susceptible to small sample bias, compromising the reliability of causal inferences. As pre-testing table E in the appendix, the combined effects of panel serial correlation, heteroscedasticity and cross-sectional dependence critically challenge the validity of causal interpretations derived from these models.

4.4. Estimating social protection's impact on inclusive growth: static results with Driscoll–Kraay

We applied the Driscoll-Kraay estimation technique to examine the relationship between inclusive growth and social protection policies. We accounted for heteroskedasticity, serial correlation, and cross-sectional dependence in the fixed effects (FE) and ordinary least squares (OLS) models. Table 6 presents the results of the static effect of social protection on inclusive growth.

Table 6. Regression results by Driscoll–Kraay.

	Driscoll–Kraay		
Variables	(Full sample) ing	(MIC) ing	(LIC) ing
Social protection	0.0235***	0.0339***	0.0095
	(0.0074)	(0.0116)	(0.0067)
Corruption	−0.313***	0.214	−0.526***
	(0.0723)	(0.1760)	(0.1510)
Exchange rate (log)	0.528**	0.223	0.493***
	(0.234)	(0.405)	(0.163)
Foreign direct investment	0.331***	0.170	0.645***
	(0.118)	(0.153)	(0.202)
Inflation	−3.78e-05***	0.0004**	−5.69e-05***
	(7.95e-06)	(0.000156)	(1.14e-05)
Informality (log)	−0.579***	−0.917*	−0.853***
	(0.190)	(0.489)	(0.291)
Infrastructure	0.590**	0.587**	−0.0237
	(0.241)	(0.263)	(0.505)
Education	0.00540**	0.00294	0.000262
	(0.00214)	(0.00335)	(0.00236)
CO_2 emissions	1.237***	1.044**	4.162***
	(0.319)	(0.432)	(1.417)
Constant	0.155	2.933	1.711
	(1.757)	(3.457)	(1.810)
Year fixed effects	Yes	Yes	Yes
Observations	1,584	825	759
Number of countries	48	25	23

Notes: The table presents regression results with standard errors in parentheses. Results are shown for the overall sample and disaggregated by country income levels: MIC (Middle Income Countries) and LIC (Low Income Countries). Ing represents the dependent variable – inclusive growth. Year Fixed Effects are included in each model. The variation in the number of observations and countries across models reflects the classification into different income groups Standard errors in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.
Source: Authors' own generation.

This study's static analysis reveals several key insights into the factors influencing inclusive growth across SSA. Social protection programs significantly enhance inclusive growth, with a 1% increase in coverage leading to growth increases of 0.0235 and 0.0339 index points for the full sample and MIC, respectively. Conversely, corruption detracts from inclusive growth, with a 1% increase decreasing inclusive growth by 0.313 and 0.526 units in the full sample and LIC, respectively. Economic conditions also play a crucial role; a competitive REER and FDI foster inclusive growth, although high inflation negatively impacts it. Infrastructure development positively affects inclusive growth by 0.590 units in the full sample and 0.587 units in MIC. Surprisingly, CO_2 emissions show a positive impact on growth across all income groups, suggesting a complex relationship between industrial activity and inclusive growth. Education, through increased secondary school enrollment, also contributes positively, enhancing workforce skills and economic potential. These findings align with empirical research by scholars such as Andrée (2017), Ofori and Asongu (2021), and Woldegiorgis (2022), highlighting the multifaceted influences on inclusive growth in the region.

4.5. Exploring the dynamic impact of social protection on inclusive growth: LSDVC analysis results

The primary focus of this study is to explore the dynamic impact of social protection on inclusive growth in the SSA region, and we employ the LSDVC estimator to achieve this goal. We present our central findings in Tables 7–9, detailing results for the full sample and further segmented by income level according to the World Bank income classification criteria. We employed the LSDVC estimation technique, initialized using the approach outlined by Blundell and Bond (Bruno, 2005), with corrections for bias up to $O(1/NT^2)$. The positive and significant coefficient of the lagged dependent variable underscores that current levels of inclusive growth are influenced by previous patterns, confirming the suitability of the dynamic panel model for analyzing these relationships. We explain each variable's effect via the 'all other things being equal' assumption.

The dynamic analysis across different income groups reveals that social protection policies consistently foster inclusive growth, though the impact varies by economic context. Specifically, a 1% increase in social protection coverage leads to a 0.00669 increase in the inclusive growth index for the full sample, with a

Table 7. Dynamic effect of social protection on inclusive growth – full sample.

Variables	(1) LSDVC_1	(2) LSDVC_2	(3) LSDVC_3	(4) LSDVC_4	(5) LSDVC_5	(6) LSDVC_6	(7) LSDVC_7	(8) LSDVC_8	(9) LSDVC_9
Lagged inclusive growth	0.7010***	0.7280***	0.7250***	0.7120***	0.7110***	0.7090***	0.6960***	0.6960***	0.6850***
	(0.0218)	(0.0210)	(0.0209)	(0.0212)	(0.0212)	(0.0209)	(0.0213)	(0.0211)	(0.0214)
Social protection	0.0083***	0.0068**	0.0084**	0.0074**	0.0075**	0.0074**	0.0050	0.0048	0.0067**
	(0.00301)	(0.00324)	(0.00333)	(0.00329)	(0.00326)	(0.00324)	(0.00332)	(0.00337)	(0.00335)
Corruption		−0.1090	−0.0994	−0.1080	−0.1080	−0.1220	−0.1490*	−0.1550**	−0.1630**
		(0.0749)	(0.0748)	(0.0745)	(0.0744)	(0.0746)	(0.0761)	(0.0756)	(0.0745)
Exchange rate (log)			0.2280**	0.2410**	0.2610**	0.2590**	0.2500**	0.2580**	0.3340***
			(0.1020)	(0.1010)	(0.1030)	(0.1030)	(0.1020)	(0.1020)	(0.1030)
Foreign direct investment				0.2050***	0.2100***	0.2030***	0.1690***	0.1650***	0.1580***
				(0.0520)	(0.0526)	(0.0528)	(0.0530)	(0.0530)	(0.0532)
Inflation					−2.69e-05	−2.76e-05	−2.65e-05	−2.68e-05	−2.92e-05
					(2.27e-05)	(2.26e-05)	(2.27e-05)	(2.25e-05)	(2.22e-05)
Informality (log)						−0.4060	−0.3270	−0.3090	−0.3040
						(0.2600)	(0.2600)	(0.2630)	(0.2600)
Infrastructure							0.2810***	0.2800***	0.2160***
							(0.0820)	(0.0821)	(0.0838)
Education								0.0015	0.0019
								(0.0025)	(0.0024)
CO_2 emissions									0.7400***
									(0.2240)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,536	1,536	1,536	1,536	1,536	1,536	1,536	1,536	1,536
Number of countries	48	48	48	48	48	48	48	48	48

Notes: This table outlines the dynamic effects of social protection on inclusive growth in low-income countries, utilizing LSDVC estimation methods enhanced by bootstrapping with 100 replications and adjusted for recursive bias using $N^{-1}T^{-2}$. Year Fixed Effects are included, with observations totaling 1,536 across 48 countries. The varying coefficients across models reflect the evolving influence of these variables over time on inclusive growth. Standard errors are shown in parentheses.$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.
Source: Authors' own generation.

Table 8. Dynamic effect of social protection on inclusive growth – middle-income countries.

Variables	(1) LSDVC_1	(2) LSDVC_2	(3) LSDVC_3	(4) LSDVC_4	(5) LSDVC_5	(6) LSDVC_6	(7) LSDVC_7	(8) LSDVC_8	(9) LSDVC_9
Lagged inclusive growth	0.6920***	0.6910***	0.6920***	0.6830***	0.6800***	0.6760***	0.6560***	0.6580***	0.6440***
	(0.0273)	(0.0290)	(0.0281)	(0.0273)	(0.0272)	(0.0271)	(0.0274)	(0.0275)	(0.0283)
Social protection	0.0117**	0.0121**	0.0143**	0.0132**	0.0125**	0.0128**	0.00972*	0.00950*	0.0117**
	(0.0057)	(0.0057)	(0.0059)	(0.0059)	(0.0057)	(0.0057)	(0.0057)	(0.0057)	(0.0057)
Corruption		0.0775	0.0760	0.0663	0.0757	0.0601	0.0070	−0.0066	−0.0553
		(0.1550)	(0.1550)	(0.1560)	(0.1550)	(0.1580)	(0.1610)	(0.1670)	(0.1660)
Exchange rate (log)			0.2000	0.2210	0.1880	0.2010	0.1750	0.1930	0.3330*
			(0.1840)	(0.1830)	(0.1870)	(0.1880)	(0.1870)	(0.1900)	(0.1870)
Foreign direct investment				0.1550**	0.1370*	0.1370*	0.0880	0.0892	0.0828
				(0.0745)	(0.0759)	(0.0763)	(0.0740)	(0.0740)	(0.0731)
Inflation					0.0003	0.0003	0.0002	0.0002	0.0002
					(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Informality (log)						−0.5170	−0.3700	−0.3460	−0.3460
						(0.5000)	(0.5040)	(0.5020)	(0.4960)
Infrastructure							0.3430***	0.3410***	0.2740**
							(0.1150)	(0.1150)	(0.1180)
Education								0.0022	0.0018
								(0.0049)	(0.0049)
CO_2 emissions									0.6710*
									(0.3480)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	800	800	800	800	800	800	800	800	800
Number of countries	25	25	25	25	25	25	25	25	25

Notes: This table outlines the dynamic effects of social protection on inclusive growth in low-income countries, utilizing LSDVC estimation methods enhanced by bootstrapping with 100 replications and adjusted for recursive bias using $N^{-1}T^{-2}$. Year fixed effects are included across all models, and each consists of observations from 25 countries totaling 800 observations, demonstrating how social protection impacts inclusive growth over time within this income group. Standard errors are provided in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.
Source: Authors' own generation.

stronger impact of 0.0117 in MIC, both statistically significant. However, the effect remains positive but insignificant in LIC, suggesting variability in the efficacy of these programs based on regional economic conditions. Dynamic interpretations emphasize the role of social protection in creating sustained economic inclusion over time. Unlike static analyses, which capture immediate effects, the dynamic approach reflects the cumulative and lagged impacts of social policies, illustrating how past levels of social protection

Table 9. Dynamic effect of social protection on inclusive growth – low-income countries.

Variables	(1) LSDVC_1	(2) LSDVC_2	(3) LSDVC_3	(4) LSDVC_4	(5) LSDVC_5	(6) LSDVC_6	(7) LSDVC_7	(8) LSDVC_8	(9) LSDVC_9
Lagged inclusive growth	0.8230***	0.8080***	0.8000***	0.7820***	0.7780***	0.7770***	0.7760***	0.7760***	0.7680***
	(0.0272)	(0.0275)	(0.0288)	(0.0295)	(0.0293)	(0.0296)	(0.0297)	(0.0300)	(0.0293)
Social protection	0.0007	0.0021	0.0028	0.0032	0.0034	0.0026	0.0028	0.0030	0.0029
	(0.0038)	(0.0039)	(0.0038)	(0.0038)	(0.0038)	(0.0041)	(0.0041)	(0.0040)	(0.0041)
Corruption		−0.1410*	−0.1260*	−0.1570**	−0.1570**	−0.1740**	−0.1700**	−0.1770**	−0.1630**
		(0.0749)	(0.0749)	(0.0737)	(0.0734)	(0.0737)	(0.0738)	(0.0737)	(0.0744)
Exchange rate (log)			0.2020**	0.2010**	0.2470**	0.2300**	0.2310**	0.2270**	0.2210**
			(0.1010)	(0.1000)	(0.1010)	(0.1010)	(0.1000)	(0.1020)	(0.1020)
Foreign direct investment				0.4280***	0.4440***	0.4170***	0.4000***	0.4050***	0.3550***
				(0.0956)	(0.0953)	(0.0970)	(0.0960)	(0.0979)	(0.1030)
Inflation					−3.22e-05*	−3.25e-05*	−3.26e-05*	−3.26e-05*	−3.24e-05*
					(1.81e-05)	(1.81e-05)	(1.79e-05)	(1.79e-05)	(1.78e-05)
Informality (log)						−0.3700	−0.4220	−0.4440	−0.5370*
						(0.258)	(0.286)	(0.283)	(0.275)
Infrastructure							−0.159	−0.165	−0.222
							(0.277)	(0.279)	(0.278)
Education								−0.000132	−9.31e-05
								(0.00223)	(0.00221)
CO_2 emissions									1.8650**
									(0.9090)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	736	736	736	736	736	736	736	736	736
Number of countries	23	23	23	23	23	23	23	23	23

Notes: This table outlines the dynamic effects of social protection on inclusive growth in low-income countries, utilizing LSDVC estimation methods enhanced by bootstrapping with 100 replications and adjusted for recursive bias using $N^{-1}T^{-2}$. The analysis incorporates year fixed effects and compiles data from 23 countries with a total of 736 observations, illustrating the nuanced impacts of various economic factors on growth within these economically challenged settings. Standard errors are bootstrapped and indicated in parentheses. Standard errors are indicated in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.
Source: Authors' own generation.

Table 10. LSDVC Results Initialized by AH & AB.

	Full Sample		MIC		LIC	
Variables	(AH) LSDVC_1	(AB) LSDVC_2	(AH) LSDVC_1	(AB) LSDVC_2	(AH) LSDVC_1	(AB) LSDVC_2
Lagged inclusive growth	0.6560***	0.6570***	0.6100***	0.6150***	0.7280***	0.7340***
	(0.0230)	(0.0223)	(0.0307)	(0.0299)	(0.0307)	(0.0303)
Social protection	0.0075**	0.0076**	0.0128**	0.0127**	0.00274	0.0029
	(0.0035)	(0.0032)	(0.0062)	(0.0053)	(0.0039)	(0.0037)
Corruption	−0.1610**	−0.1580**	−0.0271	−0.0274	−0.1460*	−0.1550**
	(0.0777)	(0.0712)	(0.1770)	(0.1540)	(0.0746)	(0.0663)
Exchange rate (log)	0.3240***	0.3270***	0.2760	0.2980*	0.2150**	0.2100**
	(0.1110)	(0.1020)	(0.2010)	(0.1790)	(0.1040)	(0.0962)
Foreign direct investment	0.1600***	0.1590***	0.0824	0.0802	0.3110***	0.3340***
	(0.0561)	(0.0532)	(0.0792)	(0.0694)	(0.1010)	(0.0932)
Inflation	−2.92e-05	−2.92e-05	0.00021	0.00021	−3.44e-05*	−3.42e-05**
	(2.36e-05)	(2.23e-05)	(0.00015)	(0.00013)	(1.78e-05)	(1.72e-05)
Informality (log)	−0.3460	−0.3320	−0.4110	−0.4010	−0.5220*	−0.5300**
	(0.2690)	(0.2530)	(0.5240)	(0.4660)	(0.2690)	(0.2570)
Infrastructure	0.2300***	0.2140***	0.2880**	0.2700**	−0.2160	−0.2640
	(0.0832)	(0.0776)	(0.1280)	(0.1080)	(0.2710)	(0.2560)
Education	0.00132	0.0012	0.0013	0.0013	−0.0010	−0.00035
	(0.0026)	(0.0023)	(0.0053)	(0.0045)	(0.0023)	(0.0021)
CO_2 emissions	0.7790***	0.6920***	0.7370**	0.6310*	1.6530*	1.6710**
	(0.2320)	(0.2170)	(0.3760)	(0.3270)	(0.9010)	(0.8290)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,536	1,536	800	800	736	736
Number of countries	48	48	25	25	23	23

Notes: This table presents the dynamic effects of social protection and other variables on inclusive growth, employing LSDVC estimation initialized with Anderson-Hsiao (AH) and Arellano-Bond (AB) techniques for robustness checks. The analysis incorporates year fixed effects and is disaggregated by income groups – full sample, middle-income countries (MIC) and low-income countries (LIC). Standard errors in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.
Source: Authors' own generation.

continue to influence present economic outcomes. This highlights the importance of maintaining and expanding social protection frameworks to ensure that benefits accrue over time, leading to long-term improvements in living standards. The robust impacts observed in MIC may be attributed to stronger

institutional capacities and greater financial resources, which enable more effective implementation of social protection measures. In contrast, the muted effects in LIC underscore challenges such as limited funding and institutional barriers, which may dilute the immediate effectiveness of social protection initiatives. This dynamic understanding aligns with theoretical insights from Rawls' theory of justice and Social Exclusion theory, suggesting that equitable access to opportunities and systemic adjustments to benefit the least advantaged are crucial for sustained inclusive growth. These insights are supported by the empirical work of scholars like, Andrée (2017), Ofori and Asongu (2021), Woldegiorgis (2022), Bello et al. (2023), Waqas et al. (2022) and Velkovska and Trenovski (2023), who collectively highlight the critical role of social protection in fostering an inclusive and resilient economic landscape across diverse global regions.

Dynamic analysis reveals that corruption significantly undermines inclusive growth across different income groups, with a 1% increase in corruption reducing inclusive growth by 0.163 in both the full sample and LIC. This effect is starkly negative, emphasizing corruption's detrimental impact on equitable development. In MIC, however, the impact of corruption is positive but not statistically significant, hinting at possibly stronger institutional mechanisms that mitigate its harmful effects. This ongoing challenge necessitates robust governance frameworks that not only curb corruption but also foster an environment where economic inclusivity can flourish. Supporting these findings are studies by Acemoglu and Robinson (2010), Kodongo and Ojah (2016), Mutiiria et al. (2020) and Ofori et al. (2023), which collectively underscore the importance of transparency and accountability in enhancing long-term economic stability and growth.

SSA's economies dynamically respond to macroeconomic variables, revealing how REER, FDI and inflation distinctively influence inclusive growth. Specifically, a 1% elevation in REER promotes significant growth increments of 0.334, 0.333 and 0.221 across full, middle-income, and low-income samples, respectively. This enhancement corroborates Anand et al. (2013), emphasizing that competitive exchange rates bolster economic inclusivity. Additionally, FDI emerges as a pivotal driver of inclusive growth, increasing by 0.158 in the full sample and markedly by 0.355 in LIC, aligning with findings from Ngounou et al. (2024), which highlight its role in fostering job creation and infrastructure enhancements. Conversely, inflation primarily exerts adverse effects, particularly in LIC by deteriorating real incomes and purchasing power, a detrimental impact validated by Madurapperuma (2016), Kasidi and Mwakanemela (2013), and Umaru and Zubairu (2012). Collectively, these macroeconomic factors critically sculpt the regional economic landscape, steering stability, and the equitable distribution of growth benefits.

Infrastructure investment significantly boosts inclusive growth; a 1% increase results in growth increases of 0.216 units for the full sample and 0.274 units for MIC. This investment enhances access to vital services and economic efficiency, fostering broader participation and stability, as supported by studies from Beyer et al. (2021), Ngounou et al. (2024) and Mutiiria et al. (2020). Conversely, a 1% rise in informality leads to a 0.537 reduction in inclusive growth in LIC, indicating that informality may exacerbate income disparities and limit formal employment. This adverse effect is corroborated by Amponsah et al. (2021) and Njoya et al. (2024), highlighting the challenges posed by informality to sustainable economic development.

Concerning infrastructure, a unit increase in the level of infrastructure results in increase in inclusive growth by 0.590 and 0.587 for the full sample and MIC respectively, all other things being equal. This insinuates infrastructure development positively influences inclusive growth across both the full sample and MIC by improving access to essential services and enhancing economic efficiency, which supports broader economic participation and stability (Beyer et al., 2021; Mutiiria et al., 2020; Ngounou et al., 2024). CO_2 emissions effect on inclusive growth presents a counterintuitive positive effect across all groups, contributing to 1.237 units, 1.044 units and 4.162 units, respectively, for full sample, MIC and LIC, respectively. This diverges from the commonly expected negative impact. Woldegiorgis (2022) identified a negative effect, aligning with conventional expectations; however, broader studies by Nketia et al. (2022) and Mardani et al. (2019) observed positive effects. This paradoxical finding can be explained by Asane-Otoo (2015), who notes that Africa's carbon emissions primarily arise from industrial and transportation sectors, significant indicators of economic activity. Thus, an increase in CO_2 emissions, often a byproduct of economic expansion, is linked with employment creation, enhanced infrastructure, and improved access to goods and services. These developments contribute to economic inclusion by fostering better living standards and economic opportunities across different societal segments, thereby facilitating inclusive growth despite the environmental costs.

Lastly, CO_2 emissions have surprisingly shown a positive impact on inclusive growth across all groups, with increases of 0.740 units in the full sample, 0.671 units in MIC, and 1.865 units in LIC, challenging the expected negative effects. While Woldegiorgis (2022) supports the traditional view of negative impacts, broader research by (Nketia et al., 2022) and Mardani et al. (2019) highlights positive correlations. Asane-Otoo (2015) suggests that in Africa, CO_2 emissions, primarily from industrial and transportation sectors, are closely linked to economic activities that drive employment and infrastructure improvements. These activities not only enhance access to goods and services but also improve living standards, thereby supporting inclusive growth by integrating more of society into the economic benefits, even amidst environmental challenges.

4.6. Robustness check

To ensure the results are robust and consistent, we further went ahead and initialized the LSDVC estimator by Anderson-Hsiao (AH) and Arellano-Bond (AB), maintained the recursive bias up to $N^{-1}T^{-2}$ and also bootstrapped up to 100 replications. The AH method addresses autocorrelation and endogeneity using first-differenced instrumental variables, while the AB approach enhances this by leveraging lagged differences and levels as instruments, ensuring a thorough examination across the full sample and sub-groups.

The robustness checks employing AH and AB estimators reinforce the consistency of the dynamic effects observed across the full sample, MIC and LIC (Table 10). These estimations confirm the direction and magnitude of impacts from social, economic, and environmental variables on inclusive growth are robust, showing similar patterns of influence across different estimation techniques. This consistency highlights the reliability of the dynamic models used in the study and supports the robustness of our findings, ensuring that the effects observed are not artifacts of specific model specifications but are representative of genuine economic phenomena. For instance, the lagged value of inclusive growth was significant for all the groups initialized by both AH and AB signifying the delayed effect of inclusive growth on the current value. Lastly, for the variable of interest, social protection and labor programs, the direction of effect was consistent across all samples and more pronounced for middle income countries with the SSA region as we recorded with BB estimation.

5. Conclusion and policy implications

This study comprehensively assessed the dynamic relationships between social protection policies and inclusive growth within SSA, using a LSDVC estimation approach to ensure accuracy while accounting for potential biases. Using a panel of 48 countries in SSA, and further grouped the countries into LIC and MIC, we observed that social protection initiatives drives inclusive growth. This effect is particularly strong in MIC where infrastructural and institutional frameworks are robust. In contrast, the effects of social protection policies in LIC were statistically muted. A reason for this is because resource constraint and effective implementation of these policies. After controlling for several other variable, our results showed that an increase in REERs and an inflow of FDI s positively improved inclusive growth in the select countries. This underscores notion that a stable exchange rate and inflow of FDI may be a precursor to inclusive growth. However, high inflation rates were consistently detrimental, eroding real income and economic stability. Infrastructure development emerged as a critical driver of growth, enhancing service delivery and economic efficiency, which, in turn, supports broader economic participation and stability.

The findings advocate for a proactive reinforcement of social protection frameworks across SSA, urging policymakers to broaden the scope and depth of these programs to better shield vulnerable populations from economic adversities and to leverage these systems for sustainable economic upliftment. The study underscores the necessity for targeted interventions in LIC, focusing on scaling up investments in social protection, strengthening institutional capacities, and fostering transparent governance to maximize the effectiveness of these initiatives. Furthermore, enhancing macroeconomic stability through prudent fiscal and monetary policies will also be essential. Policies that stabilize inflation and optimize exchange rate mechanisms can mitigate negative impacts on living standards and enhance the overall investment climate. Simultaneously, advancing infrastructure and education should remain top priorities, as these sectors are pivotal in perpetuating the cycles of economic growth and social inclusion. Collectively, these strategies will not only address immediate economic disparities but also set a

foundation for enduring economic resilience and inclusive growth, aligning with global development goals, and improving the quality of life across diverse communities within SSA.

Future research should actively expand cross-regional comparisons between SSA and other developing regions to uncover unique challenges and effective strategies within social protection policies. Researchers need to assess how political stability and governance quality influence the effectiveness of these policies, particularly focusing on the impacts of corruption on fund allocation and program efficacy. Additionally, delving into sector-specific impacts within social protection – such as healthcare, education, and unemployment benefits – will clarify which aspects significantly drive inclusive growth. This focused approach will provide critical insights for optimizing social protection strategies worldwide.

Authorship contribution statement

The authors have made significant contributions to this research article. K.O. conceptualized the study, conducted the literature review, collected data, and discussed the findings and conclusions. R.S.B. wrote the abstract and introduction, and designed the methodological framework. Both authors collaborated on the empirical estimations and reviewed the final draft.

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Data availability statement

The data that support the findings of this study are available from the corresponding author, K.O., upon reasonable request.

References

Acemoglu, D., & Robinson, J. A. (2010). Why is Africa poor? *Economic History of Developing Regions*, *25*(1), 21–50. https://doi.org/10.1080/20780389.2010.505010

Adeniyi, O., Ajayi, P. I., & Adedeji, A. A. (2021). Education and inclusive growth in West Africa. *Journal of Economics and Development*, *23*(2), 163–183. https://doi.org/10.1108/JED-04-2020-0036

Alderman, H., & Yemtsov, R. (2014). How can safety nets contribute to economic growth? *The World Bank Economic Review*, *28*(1), 1–20. https://doi.org/10.1093/wber/lht011

Alekhina, V., & Ganelli, G. (2023). Determinants of inclusive growth in ASEAN. *Journal of the Asia Pacific Economy*, *28*(3), 1196–1228. https://doi.org/10.1080/13547860.2021.1981044

Alesina, A., & Perotti, R. (1997). Fiscal adjustments in OECD countries: Composition and macroeconomic effects. *Staff Papers - International Monetary Fund*, *44*(2), 210–248. https://doi.org/10.2307/3867543

Ali, I., & Son, H. (2007). Measuring inclusive growth. *Asian Development Review*, *24*(01), 11–31. https://doi.org/10.1142/S0116110507000024

Alzúa, M. L., Cruces, G., & Ripani, L. (2013). Welfare programs and labor supply in developing countries: Experimental evidence from Latin America. *Journal of Population Economics*, *26*(4), 1255–1284. https://doi.org/10.1007/s00148-012-0458-0

Amponsah, M., Agbola, F. W., & Mahmood, A. (2021). The impact of informality on inclusive growth in Sub-Saharan Africa: Does financial inclusion matter? *Journal of Policy Modeling*, *43*(6), 1259–1286. https://doi.org/10.1016/j.jpolmod.2021.03.009

Anand, R., Mishra, S., & Peiris, S. (2013). *Inclusive growth revisited: Measurement and determinants*. Economic Premise. World Bank.

Andrée, K. (2017). *The Kuznets theory revisited: Determinants of inclusive growth in 21st century Sub-Saharan Africa*. Stockholm: Stockholm University, Swedish Institute for Social Research.

Anyanwu, J. C. (2013). *Determining the correlates of poverty for inclusive growth in Africa*. Working Paper Series No. 181, African Development Bank.

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*, *68*(1), 29–51. https://doi.org/10.1016/0304-4076(94)01642-D

Arjona, R., Ladaique, M., & Pearson, M. (2002). Social protection and growth. *OECD Economic Studies*, *2002*(2), 7–45. https://doi.org/10.1787/eco_studies-v2002-art8-en

Asane-Otoo, E. (2015). Carbon footprint and emission determinants in Africa. *Energy*, *82*, 426–435. https://doi.org/10.1016/j.energy.2015.01.053

Asfaw, S., Davis, B., Dewbre, J., Handa, S., & Winters, P. (2014). Cash transfer program, productive activities, and labor supply: Evidence from a randomized experiment in Kenya. *The Journal of Development Studies*, *50*(8), 1172–1196. https://doi.org/10.1080/00220388.2014.919383

Asian Development Bank. (2012). *Infrastructure for supporting inclusive growth and poverty reduction in Asia*. Asian Development Bank.

Asongu, S. A., & Odhiambo, N. M. (2020). Foreign direct investment, information technology and economic growth dynamics in Sub-Saharan Africa. *Telecommunications Policy*, *44*(1), 101838. https://doi.org/10.1016/j.telpol.2019.101838

Avcı, B. S., & Tonus, Ö. (2022). The impact of fiscal policies on inclusive growth in Türkiye. *Journal of Economy Culture and Society*, *66*, 293–306. https://doi.org/10.26650/JECS2021-1018055

Baccini, A. (2010). Multidimensional Descriptive Statistics (for Dummies). *Toulouse Institute of Mathematics-UMR CNRS*, *5219*.

Bachelet, M., & International Labour Office. (2012*). Social protection floor for a fair and inclusive globalization*. International Labor Office.

Baltagi, B. H. (2013). Panel data forecasting. *Handbook of economic forecasting* (Vol. 2, pp. 995–1024). Elsevier. https://doi.org/10.1016/B978-0-444-62731-5.00018-X

Banerjee, A. V., Hanna, R., Kreindler, G. E., & Olken, B. A. (2017). Debunking the stereotype of the lazy welfare recipient: Evidence from cash transfer programs. *The World Bank Research Observer*, *32*(2), 155–184. https://doi.org/10.1093/wbro/lkx002

Barr, N. (2004). *Economics of the welfare state* (4th ed., pp. 52–54). Oxford University Press.

Barrientos, A., Niño-Zarazúa, M. (2011). - Social transfers and chronic poverty: Objectives, design, reach and impact. *Chronic Poverty Research Centre Report. https://mpra.ub.uni-muenchen.de/30465/*

Baye, R. S., Olper, A., Ahenkan, A., Musah-Surugu, I. J., Anuga, S. W., & Darkwah, S. (2021). Renewable energy consumption in Africa: Evidence from a bias corrected dynamic panel. *The Science of the Total Environment*, *766*, 142583. https://doi.org/10.1016/j.scitotenv.2020.142583

Bello, A. A., Renai, J., Hassan, A., Akadiri, S. S., & Itari, A. R. (2023). Synergy effects of ICT diffusion and foreign direct investment on inclusive growth in Sub-Saharan Africa. *Environmental Science and Pollution Research International*, *30*(4), 9428–9444. https://doi.org/10.1007/s11356-022-22689-3

Beyer, R. C., Franco-Bedoya, S., & Galdo, V. (2021). Examining the economic impact of COVID-19 in India through daily electricity consumption and nighttime light intensity. *World Development*, *140*, 105287. https://doi.org/10.1016/j.worlddev.2020.105287

Bhorat, H., Cassim, A., Ewinyu, A., & Steenkamp, F. (2017). Social protection and inequality in Africa: Exploring the interactions. In H. Bhorat, K. Naidoo, A. Odusola, G. A. Cornia, & P. Conceição (Eds.), *Income inequality trends in Sub-Saharan Africa: Divergence, determinants, and consequences* (pp. 178–201). United Nations Development Programme. https://doi.org/10.18356/62569a39-en

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, *87*(1), 115–143. https://doi.org/10.1016/S0304-4076(98)00009-8

Bruno, G. S. (2005). Estimation and inference in dynamic unbalanced panel-data models with a small number of individuals. *The Stata Journal: Promoting Communications on Statistics and Stata*, *5*(4), 473–500. https://doi.org/10.1177/1536867X0500500401

Buddelmeyer, H., Jensen, P. H., Oguzoglu, U., & Webster, E. (2008). Fixed effects bias in panel data estimators. *Institute for the Study of Labor (IZA)*. Available at http://nbn-resolving.de/urn:nbn:de:101:1-2008052773
Desa, U. (2018). *Promoting Inclusion through social protection: Report on the world social situation 2018*. United Nations.
Deveraux, S., & Sabates-Wheeler, R. (2004). *Transformative social protection*. IDS Working.
Devereux, S., & White, P. (2010). Social protection in Africa: Evidence, politics and rights. *Poverty & Public Policy*, *2*(3), 53–77. https://doi.org/10.2202/1944-2858.1078
Devereux, S., & McGregor, J. A. (2014). Transforming social protection: Human wellbeing and social justice. *The European Journal of Development Research*, *26*(3), 296–310. https://doi.org/10.1057/ejdr.2014.4
Driscoll, J. C., & Kraay, A. C. (1998). Consistent covariance matrix estimation with spatially dependent panel data. *Review of Economics and Statistics*, *80*(4), 549–560. https://doi.org/10.1162/003465398557825
Galor, O., & Zeira, J. (1993). Income distribution and macroeconomics. *The Review of Economic Studies*, *60*(1), 35–52. https://doi.org/10.2307/2297811
García, S., & Saavedra, J. E. (2017). Educational impacts and cost-effectiveness of conditional cash transfer programs in developing countries: A meta-analysis. *Review of Educational Research*, *87*(5), 921–965. https://doi.org/10.3102/0034654317723008
Girón, A., & Kazemikhasragh, A. (2022). Gender Equality and Economic Growth in Asia and Africa: Empirical Analysis of Developing and Least Developed Countries. *Journal of the Knowledge Economy*, *13*(2), 1433–1443. https://doi.org/10.1007/s13132-021-00782-1
Guhan, S. (1994). Social security options for developing countries. *International Labor Review*, *133*(1), 35–54. https://researchrepository.ilo.org/esploro/outputs/journalArticle/Social-security-options-for-developing-countries/995274713302676#file-0
Gujarati, D. N., & Sangeetha, M. *Basic econometrics*. The McGraw Hill Irwin, New York (2008). 4.
Gwartney, J., Lawson, R., & Holcombe, R.G. (1998). *The size and functions of government and economic growth*. Joint Economic Committee of US Congress
Handa, S., Otchere, F., & Sirma, P. (2022). More evidence on the impact of government social protection in sub-Saharan Africa: Ghana, Malawi, and Zimbabwe. *Development Policy Review*, *40*(3), e12576. https://doi.org/10.1111/dpr.12576
Hansson, P., & Henrekson, M. (1994). A new framework for testing the effect of government spending on growth and productivity. *Public Choice*, *81*(3–4), 381–401. https://doi.org/10.1007/BF01053239
Hassan, H. (2010). Social protection and economic growth in the Sudan: Trends, perspectives, cointegration and causality. *MPRA*, *31442*(12), 1–28. https://mpra.ub.uni-muenchen.de/31442/
IMF. (2024). *Regional economic outlook. Sub-Saharan Africa: A tepid and pricey recovery*. International Monetary Fund. https://www.imf.org/en/Publications/REO/SSA/Issues/2022/10/14/regional-economic-outlook-for-sub-saharan-africa-october-2022
International Labor Office. (2021). *World social protection report 2020–22: Social protection at the crossroads – in pursuit of a better future*. ILO.
International Monetary Fund. (2022). *Regional economic outlook. Sub-Saharan Africa: Living on the edge*. International Monetary Fund, Publication Services.
Jolliffe, I. T. (2002). *Principal component analysis for special types of data*. New York: Springer, 338–372.
Judson, R. A., & Owen, A. L. (1999). Estimating dynamic panel data models: A guide for macroeconomists. *Economics Letters*, *65*(1), 9–15. https://doi.org/10.1016/S0165-1765(99)00130-5
Kaiser, H. F. (1958). The varimax criterion for analytic rotation in factor analysis. Psychometrika23: 187–200. 1974.An index of factor simplicity. *Psychometrika*, *39*(1), 31–36. https://doi.org/10.1007/BF02291575
Kasidi, F., & Mwakanemela, K. (2013). Impact of inflation on economic growth: A case study of Tanzania. *Asian Journal of Empirical Research*, *3*(4), 363–380. https://archive.aessweb.com/index.php/5004/article/view/3366/5381
Kireyev, A., & Chen, J. (2017). Inclusive growth framework. *IMF Working Papers*, *17*(127), 1. https://doi.org/10.5089/9781484302156.001
Kiviet, J. F. (1998). *Expectations of expansions for estimators in a dynamic panel data model; some results for weakly-exogeneous regressors*. Discussion paper, Tinbergen Institute.
Kodongo, O., & Ojah, K. (2016). Does infrastructure really explain economic growth in Sub-Saharan Africa? *Review of Development Finance*, *6*(2), 105–125. https://doi.org/10.1016/j.rdf.2016.12.001
Kouladoum, J.-C. (2023). Digital infrastructural development and inclusive growth in Sub-Saharan Africa. *Journal of Social and Economic Development*, *25*(2), 403–427. https://doi.org/10.1007/s40847-023-00240-5
Koutronas, E. (2020). Social protection for all: The next step for the Malaysian welfare. ERN: Social security & public pensions (Topic). *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3633760
Lindbeck, A. (1995). Hazardous welfare-state dynamics. *The American Economic Review*, *85*(2), 9–15.
Madurapperuma, W. (2016). Impact of inflation on economic growth in Sri Lanka. *Journal of World Economic Research*, *5*(1), 1–7. https://doi.org/10.11648/j.jwer20160501.11
Mardani, A., Streimikiene, D., Cavallaro, F., Loganathan, N., & Khoshnoudi, M. (2019). Carbon dioxide (CO_2) emissions and economic growth: A systematic review of two decades of research from 1995 to 2017. *The Science of the Total Environment*, *649*, 31–49. https://doi.org/10.1016/j.scitotenv.2018.08.229
Mathers, N., & Slater, R. (2014). *Social protection and growth: Research synthesis*. Department of Foreign Affairs and Trade Australian Government.

Mirrlees, J. A. (1971). An exploration in the theory of optimum income taxation. *The Review of Economic Studies*, *38*(2), 175–208. https://doi.org/10.2307/2296779
Mlachila, M., Tapsoba, R., & Tapsoba, S. J. (2017). A quality of growth index for developing countries: A proposal. *Social Indicators Research*, *134*(2), 675–710. https://doi.org/10.1007/s11205-016-1439-6
Mutiiria, O. M., Ju, Q., & Dumor, K. (2020). Infrastructure and inclusive growth in sub-Saharan Africa: An empirical analysis. *Progress in Development Studies*, *20*(3), 187–207. https://doi.org/10.1177/1464993420927507
Ngounou, B. A., Tekam Oumbe, H., Ongo Nkoa, B. E., & Noubissi Domguia, E. (2024). Inclusive growth in the face of increasing urbanization: What experience for African countries? *Review of Development Economics*, *28*(1), 34–70. https://doi.org/10.1111/rode.13026
Njoya, L., Ngouhouo, I., Ngounou, B. A., Njoupouognigni, M., & Nguena, C. L. (2024). Informality and inclusive growth: What lessons in the literature from the African experience? *Environmental Modeling & Assessment*, *29*(1), 157–178. https://doi.org/10.1007/s10666-023-09934-w
Nketia, E. B., Mensah, I. A., Ampon-Wireko, S., & Anfom, K. (2022). Inclusive growth and the sophisticated influence of carbon emissions, renewable energy, and financial development: An introspective analysis of Africa. *Energy Sources, Part B: Economics, Planning, and Policy*, *17*(1), 2099038.
Nördstrom, H. (1992). *Studies in trade policy and economic growth*. Monograph no. 30. Institute for International Economic Studies.
OECD. (2019). *Can social protection be an engine for inclusive growth? Development centre studies*. OECD Publishing. https://doi.org/10.1787/9d95b5d0-en
Ofori, I. K., & Asongu, S. A. (2021). ICT diffusion, foreign direct investment and inclusive growth in Sub-Saharan Africa. *Telematics and Informatics*, *65*, 101718. https://doi.org/10.1016/j.tele.2021.101718
Ofori, I. K., Gbolonyo, E. Y., Dossou, M. A. T., Nkrumah, R. K., & Nkansah, E. (2023). Towards inclusive growth in Africa: Remittances, and financial development interactive effects and thresholds. *Journal of Multinational Financial Management*, *68*, 100798. https://doi.org/10.1016/j.mulfin.2023.100798
Ortiz, I., Chowdhury, A., Durán-Valverde, F., Muzaffar, T., & Urban, S. (2019). *Fiscal space for social protection: A handbook for assessing financing options*. International Labor Organization.
Ostry, M. J. D., Berg, M. A., & Tsangarides, M. C. G. (2014). Redistribution, inequality, and growth. International Monetary Fund. *Staff Discussion Notes*, *14*(02), 1. https://doi.org/10.5089/9781484352076.006
Oyinlola, M. A., & Adedeji, A. (2019). Human capital, financial sector development and inclusive growth in sub-Saharan Africa. *Economic Change and Restructuring*, *52*(1), 43–66. https://doi.org/10.1007/s10644-017-9217-2
Perotti, R. (1994). Income distribution and investment. *European Economic Review*, *38*(3–4), 827–835. https://doi.org/10.1016/0014-2921(94)90119-8
Perotti, R. (1996). Growth, income distribution, and democracy: What the data say. *Journal of Economic Growth*, *1*(2), 149–187. https://doi.org/10.1007/BF00138861
Pouw, N. R., Rohregger, B., Schüring, E., Alatinga, K. A., Kinuthia, B., & Bender, K. (2020). Social protection in Ghana and Kenya through an inclusive development Lens. Complex effects and risks. *World Development Perspectives*, *17*, 100173. https://doi.org/10.1016/j.wdp.2020.100173
Raheem, I. D., Kazeem, O. I., & Adedeji, A. A. (2018). Inclusive growth, human capital development, and natural resource rent in SSA. *Economic Change and Restructuring*, *51*(1), 29–48.
Ramos, R. A., Ranieri, R., & Lammens, J. W. (2013). *Mapping inclusive growth*. IPC-IG.
Rawls, J. (1972). *A theory of justice*. Oxford University Press.
Reinders, S., Dekker, M., van Kesteren, F., & Oudenhuijsen, L. (2019). *Inclusive development in Africa. Synthesis report series of INCLUDE, the knowledge platform on inclusive development policies*, 1–60.
Roelen, K., Delap, E., Jones, C., & Chettri, H. K. (2017). Improving child wellbeing and care in Sub-Saharan Africa: The role of social protection. *Children and Youth Services Review*, *73*, 309–318. https://doi.org/10.1016/j.childyouth.2016.12.020
Saint-Paul, G., & Verdier, T. (1993). Education, democracy, and growth. *Journal of Development Economics*, *42*(2), 399–407. https://doi.org/10.1016/0304-3878(93)90027-K
Samans, R., Blanke, J., & Corrigan, G. (2015). *The inclusive growth and development report*. World Economic Forum. (September), 106. http://www3.weforum.org/docs/Media/WEF_Inclusive_Growth.pdf
Sarkodie, S. A., & Adams, S. (2020). Electricity access, human development index, governance and income inequality in Sub-Saharan Africa. *Energy Reports*, *6*, 455–466. https://doi.org/10.1016/j.egyr.2020.02.009
Sbia, R., & Hamdi, H. (2020). Remittances and inflation in OPEC countries: Evidence from bias-corrected least-squares dummy variable (CLSDV) estimator. *Economics Bulletin*, *40*(3), 2471–2483. https://hal.science/hal-03082806v1
Schüring, E., & Loewe, M. (2021). Introduction to the handbook on social protection systems. *Handbook on social protection systems* (pp. 1–35). Edward Elgar Publishing.
Shah, A. D., Bartlett, J. W., Carpenter, J., Nicholas, O., & Hemingway, H. (2014). Comparison of random forest and parametric imputation models for imputing missing data using MICE: a CALIBER study. *American Journal of Epidemiology*, *179*(6), 764–774. https://doi.org/10.1093/aje/kwt312
Silver, H. (1994). Social exclusion and social solidarity: Three paradigms. *Int'l Lab. Rev*, *133*(531).
Stekhoven, D. J., & Bühlmann, P. (2012). MissForest - nonparametric missing value imputation for mixed-type data. *Bioinformatics (Oxford, England)*, *28*(1), 112–118. https://doi.org/10.1093/bioinformatics/btr597

Stiftung, F. E. (2018). *Social protection in Nigeria*. Printed by Frankade@ 08062367774, First Published. http://library.fes.de/pdffiles/bueros/nigeria/15963.pdf

Svefors, P., Sysoev, O., Ekstrom, E.-C., Persson, L. A., Arifeen, S. E., Naved, R. T., Rahman, A., Khan, A. I., & Selling, K. (2019). Relative importance of prenatal and postnatal determinants of stunting: Data mining approaches to the MINIMat cohort, Bangladesh. *BMJ Open*, *9*(8), e025154. https://doi.org/10.1136/bmjopen-2018-025154

Tang, F., & Ishwaran, H. (2017). Random forest missing data algorithms. *Statistical Analysis and Data Mining*, *10*(6), 363–377. https://doi.org/10.1002/sam.11348

Tchamyou, V. S. (2017). The role of knowledge economy in African business. *Journal of the Knowledge Economy*, *8*(4), 1189–1228. https://doi.org/10.1007/s13132-016-0417-1

Terasawa, KL., & Gates, W. R. (1998). Relationships between government size and economic growth: Japan's government reforms and evidence from OECD. *International Public Management Journal*, *1*(2), 195–223. https://doi.org/10.1016/S1096-7494(99)80091-9

Tsapko-Piddubna, O. (2021). Inclusive growth policy and institutional assessment: The case of central and eastern European countries. *Baltic Journal of Economic Studies*, *7*(2), 233–239. https://doi.org/10.30525/2256-0742/2021-7-2-233-239

Umaru, A., & Zubairu, A. A. (2012). Effect of inflation on the growth and development of the Nigerian economy (An empirical analysis). *International Journal of Business and Social Science*, *3*(10), 183–191. https://www.academia.edu/download/51894347/19.pdf

Velkovska, I., & Trenovski, B. (2023). Economic growth or social expenditure: What is more effective in decreasing poverty and income inequality in the EU–a panel VAR approach. *Public Sector Economics*, *47*(1), 111–142. https://doi.org/10.3326/pse.47.1.5

Waqas, M., Awan, M. S., & Sánchez-Juárez, I. (2022). Social protection expenditures, poverty, inequality, and economic growth in Pakistan. *Paradigma Económico. Revista de Economía Regional y Sectorial*, *14*(1), 57–75.

Weede, E. (1986). Sectoral reallocation, distributional coalitions, and the welfare state as determinants of economic growth rates in industrialized democracies. *European Journal of Political Research*, *14*(5–6), 501–520. https://doi.org/10.1111/j.1475-6765.1986.tb00847.x

Woldegiorgis, M. (2022). Inequality, social protection policy, and inclusion: Pertinent theories and empirical evidence. *Journal of Social and Economic Development*, *24*(2), 241–265. https://doi.org/10.1007/s43253-023-00094-x

World Bank. (2009). *What is inclusive growth.* World Bank.

World Development Indicators Databank. (2023a). World Bank. https://databank.worldbank.org/source/world-development-indicators

Worldwide Governance Indicators Databank. (2023b). World Bank. https://databank.worldbank.org/source/worldwide-governance-indicators

Zhang, X., & Wan, G. (2017). Rural infrastructure and inclusive growth in China. *China Economist*, *1*(1), 82–96.

Appendix

Appendix A

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.401	1.929	0.800	0.800
Comp2	0.472	0.346	0.158	0.958
Comp3	0.127	.	0.042	1.000
Kaiser–Meyer–Olkin (KMO)				0.673
Bartlett specificity test ($\chi 2$)				3069.621***

Principal components (eigenvectors).
Source: Authors' computation. ***$p < 0.01$

Appendix B

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.854	2.183	0.714	0.714
Comp2	0.672	0.407	0.168	0.881
Comp3	0.264	0.055	0.066	0.948
Comp4	0.210	.	0.052	1.000
Kaiser–Meyer–Olkin (KMO)				0.802
Bartlett specificity test ($\chi 2$)				3543.217***

Principal components (eigenvectors).
Source: Authors' computation. ***$p < 0.01$

Appendix C: Descriptive statistics – LIC

Variable	Obs	Mean	Std. Dev	Min	Max
Inclusive growth	759	−0.306	1.379	−3.818	4.828
Social protection	759	21.232	8.455	0.514	60.714
Corruption	759	−0.798	0.563	−1.937	1.698
Exchange rate	759	4.773	0.205	4.179	6.236
Foreign direct investment	759	−0.347	0.536	−1.666	1.584
Inflation	759	77.852	883.629	−8.975	23773.132
Informality	759	4.203	0.16	3.14	4.556
Infrastructure	759	−0.208	0.188	−0.395	0.769
Education	759	28.963	17.905	4.721	118.7
CO_2 emissions	759	0.091	0.046	0.027	0.278

LIC: low-income countries
Source: Authors.

Appendix D: Descriptive statistics – MIC

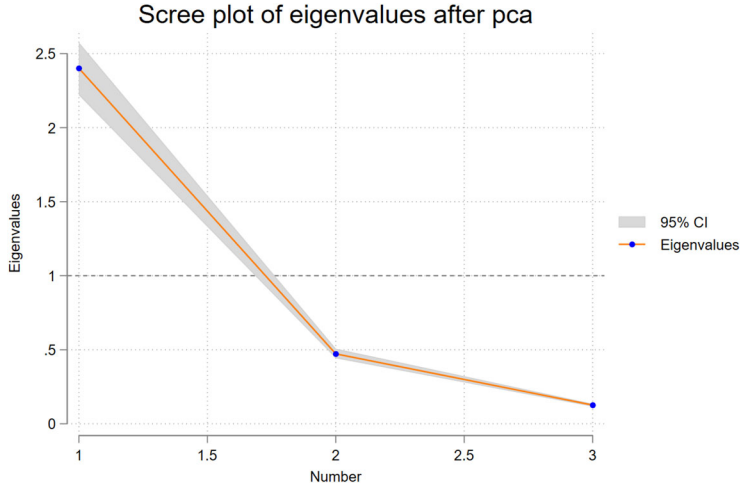
Variable	Obs	Mean	Std. Dev	Min	Max
Inclusive growth	825	0.282	1.969	−4.101	17.296
Social protection	825	27.932	14.92	1.424	84.212
Corruption	825	−0.491	0.648	−1.645	1.245
Exchange rate	825	4.67	0.198	3.85	5.61
Foreign direct investment	825	0.32	1.202	−1.719	6.111
Inflation	825	27.825	192.588	−16.86	4145.106
Informality	825	4.13	0.173	2.839	4.501
Infrastructure	825	0.192	1.346	−0.394	7.253
Education	825	45.919	21.635	5.061	111.802
CO_2 emissions	825	0.197	0.162	.022	1.551

MIC: middle income countries
Source: Authors.

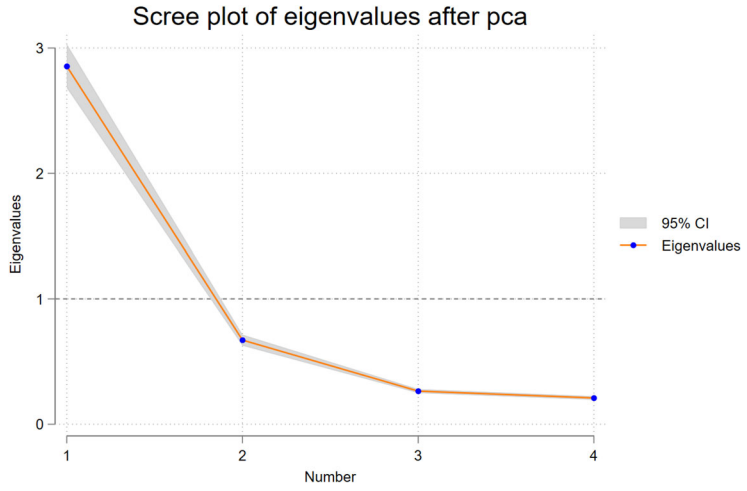
Appendix E

	Full sample		MIC		LIC	
Variables	(OLS)	(FE)	(OLS)	(FE)	(OLS)	(FE)
Social protection	0.0164***	0.0235***	−0.0019	0.0339***	0.0282***	0.0095*
	(0.0039)	(0.0043)	(0.00564)	(0.0067)	(0.0052)	(0.0055)
Corruption	0.0366	−0.3130***	0.0898	0.2140	−0.0524	−0.5260***
	(0.0754)	(0.0830)	(0.1170)	(0.1620)	(0.0784)	(0.0824)
Exchange rate (log)	0.3360*	0.5280***	2.53e-05	0.2230	0.1840	0.4930***
	(0.1900)	(0.1220)	(0.2880)	(0.2090)	(0.2140)	(0.1350)
Foreign direct investment	0.1300	0.3310***	−0.0706	0.1700**	0.2250*	0.6450***
	(0.0801)	(0.0646)	(0.1060)	(0.0837)	(0.1180)	(0.1270)
Inflation	5.89e-05	−3.78e-05	0.00097***	0.00036**	5.93e-06	−5.69e-05**
	(5.60e-05)	(2.94e-05)	(0.00028)	(0.00016)	(4.10e-05)	(2.30e-05)
Informality (log)	−2.176***	−0.579**	−5.820***	−0.9170*	−0.4300	−0.8530**
	(0.2980)	(0.2930)	(0.5450)	(0.5100)	(0.2780)	(0.3500)
Infrastructure	−0.2670***	0.5900***	−0.4540***	0.5870***	−1.6640***	−0.0237
	(0.0599)	(0.0969)	(0.0731)	(0.1190)	(0.3370)	(0.4600)
Education	−0.0141***	0.00540**	−0.0004	0.0029	−0.0257***	0.0003
	(0.0028)	(0.0027)	(0.0050)	(0.0051)	(0.0031)	(0.0027)
CO_2 emissions	4.6650***	1.2370***	5.2610***	1.0440***	5.6960***	4.1620***
	(0.3240)	(0.2700)	(0.3940)	(0.3330)	(0.9660)	(1.0530)
Heteroskedasticity	15.50***	891.59***	238.09***	1418.31***	15.50***	891.59***
Panel serial Correlation		80.129***		11.124***		103.307***
Cross sectional Dependence		−3.178***		−0.656		−3.178***
Constant	8.045***	0.155	24.48***	2.933	1.260	1.711
	(1.598)	(1.407)	(2.719)	(2.377)	(1.570)	(1.649)
Observations	1,584	1,584	825	825	759	759
R-squared	0.413	0.635	0.468	0.541	0.565	0.791
Number of Countries	48	48	25	25	23	23

Notes: This table provides regression results for the impact of social protection on inclusive growth across different income classifications (full sample, middle income countries [MIC], and low-income countries [LIC]), using OLS and FE models. The analysis includes robustness checks for heteroskedasticity, panel serial correlation and cross-sectional dependence, with these diagnostics reported to ensure the validity of the findings. Standard errors in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.
Source: Authors' own generation..



Appendix Figure F: Scree plot of eigenvalues after PCA (foreign direct investment). On the Y-axis is the eigen values of each component and on the x-axis is the number of principal components. *Source:* Authors' own generation.



Appendix Figure G: Scree plot of eigenvalues after PCA (Infrastructure). On the Y-axis is the eigen values of each component and on the x-axis is the number of principal components. *Source:* Authors' own generation.

Appendix H: Variables, description and source

Variable	Description	Source
Inclusive Growth	Index generated from PCA using Poverty, Gini Index, GDP Per Capita, Labor Force Participation Rate, Human Capital Index, Gender Equality, Government expenditure on education and health, women in parliament, infant mortality rate and life expectancy after birth.	WDI
Coverage of social protection and labor programs (% of population)	Coverage of social protection and labor programs (SPL) shows the percentage of population participating in social insurance, social safety net, and unemployment benefits and active labor market programs. Estimates include both direct and indirect beneficiaries.	ASPIRE: The Atlas of Social Protection - Indicators of Resilience and Equity, The World Bank.
Control of Corruption	Control of Corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately −2.5 to 2.5.	World Governance Indicators.
Real effective exchange rate index (2010 = 100)	Real effective exchange rate is the nominal effective exchange rate (a measure of the value of a currency against a weighted average of several foreign currencies) divided by a price deflator or index of costs.	International Monetary Fund (IMF)
Foreign Direct Investment (FDI	Index generated from PCA using Money (% of GDP), Domestic Credit to Private Sector (% of GDP), and Domestic Credit provided by Financial Sector (% of GDP).	WDI
Inflation, consumer prices (annual %)	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used.	International Monetary Fund
Firms competing against unregistered firms (% of firms)	Firms competing against unregistered firms are the percentage of firms competing against unregistered or informal firms.	World Bank, Enterprise Surveys
Infrastructure	Index from PCA using access to clean fuels and technologies for cooking, access to electricity, railways, and the percentage of the population using at least basic sanitation services.	WDI
School enrollment, secondary (% gross)	Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Secondary education completes the provision of basic education that began at the primary level, and aims at laying the foundations for lifelong learning and human development, by offering more subject- or skill-oriented instruction using more specialized teachers.	UNESCO Institute for Statistics (UIS).
CO_2 emissions (kg per 2017 PPP $ of GDP)	Carbon dioxide emissions are those stemming from the burning of fossil fuels and the manufacture of cement. They include carbon dioxide produced during consumption of solid, liquid, and gas fuels and gas flaring.	WDI

Source: Authors.

Appendix I: List of countries

Middle-income countries
Angola, Benin, Botswana, Cabo, Verde, Cameroon, Comoros, Congo, Rep., Cote d'Ivoire, Equatorial Guinea, Eswatini, Gabon, Ghana, Guinea, Kenya, Lesotho, Mauritania, Mauritius, Namibia, Nigeria, Sao Tome and Principe, Senegal, Seychelles, South Africa, Tanzania, Zambia and Zimbabwe.
Low-income countries
Burkina Faso, Burundi, Central African Republic, Chad, Congo, Dem. Rep., Eritrea, Ethiopia, Gambia, The, Guinea-Bissau, Liberia, Madagascar, Malawi, Mali, Mozambique, Niger, Rwanda, Sierra Leone, Somalia, South Sudan, Sudan, Togo and Uganda.

Source: Authors.