

An Empirical Study on Impact of Labour Productivity, Dependency Ratio on Working Poverty in Sub Saharan African Countries (SSA): An Auto Regressive Distributed Lag (ARDL) Model Approach

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Abstract

Following the global shock in late 2019 resulting from the Novel Covid-19, the overwhelming effect on the global economy cannot be over-emphasized. Hence SSA economies must strategize to reduce the surge impact on poverty. This study seeks to empirically investigate the impact of labour productivity, dependency ratio poverty on aged 0-25 and working poverty aged 25 years and above. This study employed the heterogeneous panel data comprising of (38) sampled countries for the period 2008 to 2020. Applying the Autoregressive Distributed Lag Model, the result of the study revealed that coefficient poverty aged 0 to 25 had a positive and statistical significant impact on working poverty aged 25 years above at one percent level of significance indicating that there is a long run relationship. This also shows that a long run causality relationship exists. Labour productivity depicts a positive effect on working poverty although not statistically significant indicating no long run causality effect. The parameter dependency ratio revealed a negative and statistical significant impact on working poverty in the long run at one percent level of significance indicating a long run causality effect. The ECM indicates a joint influence of all explanatory variables on the dependent variable on working poverty. It explains the long run convergence to equilibrium at the speed of 16%. On short run relationship, that there exist a positive and short run causality effect between working poverty aged 0 to 25 and working poverty aged 25 years and above. However, there is no any other short run causality relationship among remaining series.

Keywords: Working Poverty, Dependency Ratio, Labour Productivity, GDP per capital

JEL Classification: J24, P36

1. Introduction

The volatile nature of GDP per capital in SSA in 2020 had implication on poverty outcomes as a result of poor labour productivity (Montes, Silwal, Newhouse, Chen, Swindle and Tian 2020) No doubt, the estimated GDP per capital growth

(labour productivity) will be affected by the global pandemic. Thus, given the forecasted SSA's GDP per capita estimated to grow at 1.7%, Presently, with shock of the pandemic, it is more than 5-7 percentage points lower, contracting 3.1% in the baseline scenario and in 5.5% in the low scenario (Montes *et al* 2020). The implication on working poverty is enormous that the extreme poverty will rise to about 26 million and as much as 58 million persons in SSA would live below US\$1.90 as defined by 2011 PPP (Montes *et al.*, 2020). The global share of Sub Saharan Africa labour productivity had increased but it is far less compared to South and East Asian countries. For instance, between 1991 to 2000 Labour productivity in SSA stood at -0.7%. It further rose in 2000 to 2009 to about 1.9% on the other hand, in South Asia, the value stood at 3.4% in 1991 to 2000 and 4.5% in 2000 to 2009. In East Asia, it stood at 7.6% and 7.8% in 1991 to 2000 and 2000 to 2009 respectively (ILO, 2011). Within the period of 2008 to 2013, Productivity growth was 1.8 and it fell sharply to 0.5 in 2015 and 1.7 in 2017, while the effect on working poverty recorded between 2000 to 2017, shows the number of persons living between 1.90 to 3.10 dollars stood at 23.8; by 2016, it rose to 30.0 and 30.04 in 2017 (ILO, 2015; ILO 2018). This trend shows that about 137.3 million persons suffer extreme working poverty in 2017, it rose to 138.3 in 2018 and 138.7 in 2019 (ILO 2018). This study is apt and timely due to global sustainable goal realization especially on productivity and working poverty.

More so, ILO (2003) in its World employment report states that, very scanty literature is available on productivity and poverty less consensus. However, rising labour productivity had impact on reducing working poverty. Despite the declaration made for a decade by the general assembly at the Second United Nations for the Eradication of Poverty (2008-2017), in order to actualize the realization of the internationally agreed development in December 2007 to mitigate poverty with SSA inclusive, Sub Sahara African working poverty continued to increase significantly. Hence, south Asia continued to record significant success in reducing working poverty in the region thus reaching the desired target of millennium development goal in 2015. Although there are studies on labour productivity on SSA, these studies are basically on economic growth (see Zulu and Banda 2015). Studies on poverty were scanty (see Adelowokan; Maku; Babasanya and Adesoye 2019; Dursun and Ogunleye 2014) mostly single country analysis. It is in view of the forgoing background that this study investigates empirically the impact of labour productivity on working poverty in SSA countries. Hence this study is structured into five sections, this section being the introductory section, Section two discusses the theoretical framework, section three looks at data and methodology, section four deals with data analysis and interpretation and section five which is the final section looks at conclusion and made some recommendations.

2. Literature Review

There are dearth of empirical literature on the relationship between labour productivity and working poverty with mixed evidences and methodologies. Dursun and Ogunleye (2014) used the panel unit root test, Kao test, Pedroni test and panel causality to estimate the nexus between economic growth, employment and

poverty using sample of seven (7) West African countries for the period 1991 to 2010, result of the study reveals that per capital income has a positive and statistical significant impact on poverty reduction. However, employment has no any effect on poverty. In addition, a long run and short run causality relationship exist between GDP growth, employment and poverty.

In another study, Adelowokan; Maku; Babasanya and Adesoye (2019) used data on Nigeria to estimate the relationship between unemployment, poverty and growth for the period 1985-2015 applying ADF Cointegration test, Error Correction Model granger and causality test approach. The result of the study indicates that there is no causality and no long run between unemployment poverty and growth. However, there is a positive relationship between poverty unemployment interacted with growth.

Similarly, Richard, Adams and Page (2003) in their study use data on Selected Middle East and North Africa Countries to estimate the relationship between Poverty, Inequality and Growth in Selected Middle East and North Africa Countries for the period 1980 to 2000, applying ordinary least square regression technique, result of the study revealed that government employment has a positive and statistical significant impact on poverty reduction on MENA countries.

However, in a study, by Torm (2003) sampled Armenia, Kazakhstan, Kyrgyzstan, Moldova, Tajikistan and Uzbekistan to estimate the significance of GDP growth and employment determining poverty in countries under study and the result of the study revealed that poverty reduction is enhanced through economic growth and must be employment-intensive, which will result to higher labour productivity and rising incomes and at the same time reduce the level of poverty. Firman, Bariyah and Kurniasih (2020) used data on West Kalimantan Province to investigate the effect of labour productivity on working poverty for the period 2008 applying correlation analysis, the result of the study shows that labour productivity has a negative impact on working poverty.

Theoretical Framework

Labour productivity is an important condition for improving working poverty and promoting sustainable wage growth. The Neoclassical growth theory emphasized basically on supply side factors such as labour productivity, size of the work force and factor input. They argued that productivity is a function of inputs and these includes labour and capital (Solow, 1957) and also technology which increases labour productivity. Thus when labour productivity (output per capital) increases, poverty tend to diminish.

Hayes *et al.* (1994) associated level of education to poverty reduction. The authors argued that low educational attainment leads the poor to work in low skill jobs for low wages, and therefore makes them more susceptible to remaining poor. The authors believe poverty and productivity relate to each other in a circle, affecting one another.

The new theories of endogenous technical progress assumes important place in explaining labour productivity and working poverty. The theory argued that productivity growth is driven by the rate of technological innovations, which

translate to new products, new processes, and new approach to organizing production. Entrepreneur skills, research and development and decent working environment also ultimately determine productivity growth.

Krugman (1990) argued that productivity, income distribution and unemployment are determinants of economy, thus full employment, foster productivity growths are measures of measuring poverty. The theory underpinning this study is the theory by Solow 1957

3. Methodology

The study seek to investigate empirically the relationship between determinants of working poverty in Sub Saharan African countries applying sample of (38) countries for the period 2008 to 2022. The sample countries includes: Angola, Benin, Botswana, Burkina Faso, Burundi, Cape Verde, central African Republic, Congo, Congo Dem Republic, Cote d’Ivoire, equatorial guinea, Ethiopia, Gabon, Gambia, Ghana, guinea, guinea Bissau, Kenya, Liberia, Madagascar, Malawi, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, south Africa, Sudan, Tanzania, Togo, Uganda, Zambia and Zimbabwe The rationale of employing the span period of study is the use of non-probability sampling technique in form of availability of data. Data is sourced from International Labor Organization (ILO).

Technique of Analysis

Applying the heterogeneous panel, this study seeks to employ the Panel stationarity test, panel autoregressive distributed lag model and panel causality test approach. Thus the behavior of the data will determine the conditions for further analysis. The families of pooled mean groups will be selected using the probability p-value. For instance, choosing between MG and PMG, If P-value>0.05 then run PMG otherwise the MG should be estimated. In any case, selecting between DFE and MG If P-value>0.05 use DFE otherwise use MG

The generalized ARDL (p, q_1, q_2, \dots, q) model is expressed as:

$$y_{it} = \sum_{j=1}^p \delta_j y_{i,t-j} + \sum_{j=0}^q \beta'_{ij} x_{i,t-j} + \Phi + e_{it} \dots \dots \dots 1$$

In this case, y_{it} mean dependent variable (β'_{it})' is a $k \times I$ vector that are allowed to be purely I(0) or I(1) or cointegrated δ_{ij} is the coefficient of lagged dependent variable called scalars; β_{ij} are $k \times I$ coefficient of vectors; Φ is the unit specific fixed effects; $i = 1, 2, \dots, N$; $t = 1, 2, \dots, T$; p, q are optional lagged orders; e_{it} is the error term or white noise.

There parameter ARDL p, q_1, q_2, \dots, q_T error correction model is specified as:

$$\Delta y_{ij} = \theta_i (y_{i,t-1} - \lambda'_i X_{i,t}) + \sum_{j=1}^{p-1} \xi_{ij} \Delta y_{i,t-1} + \sum_{j=0}^{q-1} \beta'_{ij} \Delta X_{i,t-j} + \varphi_i + e_{it} \dots \dots \dots 2$$

Note:

$\theta_i = -(1 - \delta_i)$, group specific speed of adjustment coefficient (expected) that ($\theta_i < 0$); $\lambda'_i = \text{vector of long-run relationship}$; $ECT = [Y_{i,t-1} - \lambda'_{i,t}]$, the error correction term.; and ξ_{ij}, β'_{ij} are the short-run dynamic coefficients.

Variable Measurement and Definition

Poverty: This is measured as Proportion of population that fall below the international poverty line (%). This is in line with the measure by international labour organization (ILO, 2020). Dependency Ratio: this is measured as the number of population whose dependents were classified from age zero to 14 and age 25 and above. Labour productivity: This parameter is measured as the Annual growth rate of real GDP per employed person estimated in (GDP constant 2010 US \$) (%). This is in line with measure by (See ILO 2020)

4. Results

Macroeconomic time series are known to be non-stationary, and in real analysis, diagnostic test for series is required to have a robust estimation. From the result, all series were not stationary at level values and while a few are stationary at first difference 1(1) others series are stationary at second difference 1(2) (Pesaran and Smith, 1995 and Pesaran, Shin and Smith 1997). after employing the ADF and PP panel unit root test and employing the xtpmg pg, pmg and Hausman Sigmamore, result shows that the pmg model is most appropriate given the rule of thumb If P-value>0.05 then run PMG otherwise MG should be estimated. In this case the pmg is chosen over the mg because Prob>chi2 = 0.1763 is greater than 0.05%(see Blackburne and Frank, 2007; Pesaran, Shin and Smith 1997).

Table 1: ARDL long run estimate

Variables	Mg	pmg	dfe
to25	-2.5828** (3.15)	0.6771*** (0.004)	0.9746*** (0.02)
Labprod	-3.1295** (3.37)	0.00082* (0.001)	-0.0785*** (0.027)
Depratio	54.1234* (98.39)	-0.4824*** (0.06)	-1.4218** (0.98)

Notes:*** ** *denotes statistical significance at 1%, 5% and 10% respectively p-values (in parentheses).

Source: Author Computation

This study found that the probability value of Hausman test shows that the PMG is appropriate compared to MG given the P-value>0.05. Consequently, this study used the PMG full estimation to show the heterogeneity of countries, short and long run effects and ECM which varies across panels. As shown in Table 1, the coefficient poverty aged 0 to 25 had a positive and statistical significant impact on working poverty aged 25 plus at one percent level of significance indicating that there is a long run relationship. By causality implication, it also explains a long run causal effect relationship.

Labour productivity depict a positive effect on working poverty although not statistically significant, indicating no long run causality effect. This confirms the study by Adelowokan; Maku;

The parameter dependency ratio revealed a negative and statistical significant impact on working poverty in the long run at one percent level of significance. This

also posit that, there is a long run causality effect between dependency ratio and working poverty in SSA countries for the period covered. This finding confirms the findings of Torm (2003). The ECM $-.1659956$ and It explains the long run convergence to equilibrium at the speed of 16%.

Table 2: Short run causality for pmg estimation

Variables	coefficients
Constant	0.2933*** (0.11)
to25	0.8223*** (0.06)
Labprod	-0.0039** (0.003)
Depratio	-0.1466* (0.94)
ECM	$-.1659956$ *** .046847

Notes: *** ** *denotes statistical significance at 1%, 5% and 10% respectively p-values (in parentheses).

Source: Author Computation

The Pmg assumes that the long run coefficients are the same for all the units that makes up the sample countries in the panel. The result in table 2 shows that there exists a positive and short run causality effect between working poverty aged 0 to 25 and working poverty aged 25 years and above. However, there is no any other short run causality relationship among remaining series. It is important to note that another assumption of pooled mean group is that the short run coefficients and error variances are not the same for countries that make up the panel. For example, Angola shows a short run causal effect which also exists between working poverty aged 0 to 25 and working poverty aged 25 and above. The result for Benin indicates a positive short run causality between working poverty aged 0 to 25 and working poverty aged 25 and above and any deviation in the equilibrium would be corrected at 53% speed of adjustment.

Similarly, the result for Botswana shows dependency ratio with a significant sign indicating a short run relationship and a short run causal effect. The result for Burkina Faso indicates working poverty age 0 to 25 has a positive short run effect on working poverty while dependency ratio posit a negative short run causality effect on working poverty.

pov25plus to25 labprod depratio

In Burundi, there exist a positive short run causality effect between working poverty aged 0 to 25, dependency ratio and working poverty aged 25 years above. The coefficient labour productivity posit a negative short run causality effect on working poverty aged 25 year and above.

In Cape Verde, labour productivity and poverty within aged 0 to 25 have a short run causal effect on working poverty in SSA. Deviation in equilibrium can be

restored by 39% speed of adjustment. For Central African Republic, only working poverty aged 0 to 25 had a positive and short run causal effect on working poverty aged 25 years above.

However, the result for Congo revealed that only working poverty aged 0 to 25 had a positive short run causal effect on working poverty aged 25 years plus and disequilibrium can be corrected at 83% speed of adjustment. For Congo Dem republic, of all coefficients, only labour productivity and working poverty aged 0-25 years revealed positive short run causality effect on working poverty aged 25 years plus. Cote d'ivoire for instance, just working poverty aged 0 to 25 had a short run causal effect on working poverty aged 25 years plus or above. In Equatorial Guinea, only dependency ratio posit a negative and short run causality effect on working poverty aged 25 years plus and any deviation from that can be adjusted at speed of 92%.

The result for Ethiopia posit that only working poverty aged 0-25 had a short run causal effect on working poverty aged 25 years and above. Surprisingly, the result for Gabon shows no any causality effect of coefficients on working poverty at all. Gambian result revealed that labour productivity and working poverty aged 0-25 had a positive and short run causal effect on working poverty aged 25 plus and any deviation in equilibrium can be adjusted by 22% speed of adjustment. For Ghana, just working poverty aged 0-25 had a positive and short run causal effect on working poverty aged 25 years and above and incase of deviation, a speed of adjustment at 28% can correct that equilibrium. The result for Guinea shows that just working poverty aged 0-25 indicates a positive and short run causal effect on working poverty aged 25 years and above. For Guinea Bissau, the result revealed that labour productivity, dependency ratio exerts a negative sign and working poverty aged 0-25 had a positive sign thus, have short run causal effect on working poverty aged 25 years and above. For Kenya economy, the result revealed that both dependency ratio and working poverty aged 0-25 have a positive and short run causal effect on working poverty aged 25 years and above and deviation can be corrected at 13% adjustment speed.

Similarly, the result for Liberia indicates that dependency ratio and labour productivity impact negatively and had short run causal effect while working poverty aged 0-25 had a positive sign and short run causal effect on working poverty aged 25 years and above. In Madagascar, the result shows that dependency ratio impact negatively on working poverty aged 25 years plus while working poverty aged 0-25 indicates positive and short run causal effect. The result for Malawi indicates that only working poverty aged 0-25 had a short run causal effect on working poverty aged 25 plus. Mauritania for instance, shows a negative short run causality effect between dependency ratio and working poverty aged 25 years and above. For Mauritius, there is no any short run causality at all. However, in Mozambique, the result depict a positive short run causal effect between working poverty aged 0-25 and working poverty aged 25 plus. Namibia result shows that dependency ratio and working poverty aged 0-25 have positive and short run causality effect more than working poverty aged 25 years plus. Thus, any deviation can be corrected at 11% speed of adjustment. The result on Niger economy shows

that dependency ratio, labour productivity have negative and short run causality effect on working poverty aged 25 years plus while working poverty aged 0-25 had a positive and short run causal effect on working poverty.

The result for Nigeria indicates that labour productivity had a negative short run causal impact on working poverty while working poverty aged 0-25 had a positive and short run causal effect on working poverty 25 years plus. For Rwanda economy, labour productivity had a negative causal effect and working poverty aged 0-25 has a positive short run causal effect on working poverty aged 25 years plus. More so, the findings of Senegal also shows a negative causal effect between labour and working poverty aged 25 plus while aged 0-25 had a positive short run causality effect on working poverty aged 25 years and above. This finding is closely similar to that of Nigeria.

Sierra Leone result shows that of all coefficients, only working poverty aged 0-25 years have short run causality effect on working poverty aged 25 years above. For Somalia, it is also the same as only working poverty aged 0-25 has a positive short run causal impact on working poverty aged 25 plus. In South Africa, only working poverty aged 0-25 impact a short run causal effect on working poverty aged 25 years plus. For Sudan economy, there is no any short run causality effect of coefficients on working poverty. The result for Tanzanian economy revealed that only working population aged 0-25 had a short run causal effect on working poverty aged 25 plus. The findings on Togo indicates that only working poverty aged 0-25 had a short run causal effect on working poverty aged 25 plus. In the same vein, the findings on Uganda also indicates that only working poverty aged 0-25 had a short run causal effect on working poverty aged 25 plus. In the same vein, the findings on Zambia also indicates that only working poverty aged 0-25 had a short run causal effect on working poverty aged 25 plus. In the same vein, the findings on Zimbabwe also indicates that only working poverty aged 0-25 had a short run causal effect on working poverty aged 25 plus.

5. Conclusion and Recommendation

The recent pandemic had continued to increase working poverty and reduced labour productivity across the globe. It is in the light of this that this study seeks to investigate the impact of labour productivity, dependency ratio and poverty aged 0-25 on the working poverty in SSA for the period 2008 to 2022. Applying the Autoregressive Distributed Lag Model, the result of the study revealed that coefficient poverty aged 0 to 25 had a positive and statistical significant impact on working poverty aged 25 years above at one percent level of significance, indicating that, there is a long run relationship. This also shows that a long run causality relationship exists. Labour productivity depicts a positive effect on working poverty although not statistically significant as such indicating no long run causality effect. The parameter dependency ratio revealed a negative and statistical significant impact on working poverty in the long run at one percent level of significance indicates a long run causality effect. There exists also a long run convergence to equilibrium at the speed of 16%. Contrary to a short run relationship, there exists a positive and short run causality effect between working

poverty aged 0 to 25 and working poverty aged 25 years and above. However, there is no any other short run causality relationship among remaining series.

Implication for Policy

Although labour productivity posits a positive but non-significant impact on working poverty; implication is that there is need to strengthen reform structurally toward productivity, this would imply providing a framework that allows for decent working environment and training of man power to enhance productivity in SSA countries.

However, dependency ratio posit a negative and significant relationship on working poverty hence a more proactive measure to provide social support program for the aged person cannot be over emphasized. Thus, a policy framework to achieve the articulated design plan of ILO is important in reducing the outcome of working poverty in Sub Saharan African countries.

The size of ageing population has implication on working poverty. Thus there is need to evolve a strategy, to invest adequately through social protection policy for instance, accessing health protection and long term care as well as training the ageing population perhaps there would be less dependency on working poverty. Hence both labour market institution, private sector and government must consolidate on previous achievement, going forward enforce adequate data bank and the study of ageing population across the globe.

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