

New Insights into the Poverty-Economic Development Nexus: Evidence from BRICS

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رؤى جديدة في العلاقة بين الفقر والتنمية الاقتصادية: أدلة من مجموعة بريكس

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■ DOI: 10.21608/ijppe.2022.251653 URL: <http://doi.org/10.21608/ijppe.2022.251653>

■ Received: 26/6/2022, Accepted: 6/7/2022

■ Citation: Abdou, Doaa M. Salman, & Emara, Ola. (2022, July). New Insights into the Poverty-Economic Development Nexus: Evidence from BRICS. *The International Journal of Public Policies in Egypt*, 1(3), 118-140

Abstract

The economic growth of the BRICS countries is heavily influenced by poverty—the first United Nations Sustainable Development Goal (UN SDG1). Sustainable development emerged in 1972 to meet the needs of the present without compromising the ability of future generations to meet their needs. The study pursues the effects of social transformations and negative phenomena; such as poverty, illiteracy, trade openness, unemployment and health all these challenges urge quick management to accelerate sustainable development. Within the overall objective of achieving sustainable development, the development issue is, therefore, subject to further analysis and study.

This research aims to capture the nexus between poverty and economic growth in BRICS countries from 1998-2021, based on panel data analysis. An auto-regression distributed lag model (ARDL) bounds testing approach has been employed to assess the long-term impact on the countries' economic growth.

Results show that most of the variables are significant, while trade openness was not a major factor in determining and analyzing the impact of economic development in the BRICS. Finding highlights that despite significant advancements in the social metrics that assess poverty, no social outcomes in the nations can be related to belonging to a particular group. The social issue has traditionally been linked to the expansion of national states and is a component of the political institutionality of national settings. In addition, addressing social challenges requires influencing organizational frameworks through reasonable public policies.

Keywords: Poverty, economic development, Economic growth, Auto-Regression Distributed Lag (ARDL) model, BRICS

المستخلص

تؤثر شدة الفقر - التي يتعلق بها الهدف الأول من أهداف التنمية المستدامة- على النمو الاقتصادي لبلدان البريكس، وقد ظهرت التنمية المستدامة عام 1972؛ لتلبية احتياجات الحاضر دون المساس بقدرة الأجيال القادمة على تلبية احتياجاتهم، حيث يستمر البشر في التفاعل مع البيئة، والعلم، والتكنولوجيا بهدف حسن استغلالها لتلبية احتياجاتهم المستمرة.

تهدف الدراسة إلى رصد آثار التحولات الاجتماعية والظواهر السلبية، مثل: الفقر، والأمية، والبطالة، والانفتاح التجاري، والصحة، وتسعى إلى علاجها من خلال زيادة التنمية؛ لذا، فإن مشكلة التنمية تخضع لمزيد من التحليل والدراسة لتحقيق التنمية المستدامة.

تهدف الدراسة إلى التعرف على العلاقة بين الفقر والنمو الاقتصادي في دول البريكس خلال الفترة من 1998 إلى 2021 بناءً على تحليل بيانات الفريق، وقد استخدمت الدراسة نهج اختبار نموذج الانحدار التلقائي الموزع (ARDL)؛ لتقييم التأثير طويل المدى على النمو الاقتصادي للبلدان، حيث تظهر النتائج أن معظم المتغيرات مهمة، في حين أن الانفتاح التجاري لم يكن عاملاً رئيساً في تحديد تأثير التنمية الاقتصادية وتحليلها في دول البريكس.

الكلمات الدالة: الفقر، التنمية الاقتصادية، النمو الاقتصادي، نموذج الانحدار التلقائي الموزع ARDL، البريكس.

1. Introduction

Poverty reflects the person's status as the one who has little or no access to necessities (Kanbur et al., 2000). Sen (1984) claims that rather than focusing on people's income or subjective well-being, the greatest way to assess poverty is to assess their ability to live a life that we value. However, before we can assess people's abilities, we must first determine which functions are essential for a good life, and how important they are, or at the very least, provide a method for doing so (Wells, 2013). The world targets focus on eliminating extreme poverty, defined by national poverty lines, as well as halving poverty by 2030. Furthermore, in 2017, the World Bank introduced two additional poverty lines for the global scale, one at US\$3.20 per day and the other at US\$5.50 per day (Jolliffe & Prydz, 2016). These lines, which are typical of standards among lower- and upper-middle-income countries, respectively, are designed to complement, not replace, the \$1.90 international poverty line.

Despite policy interventions and initiatives to lift people out of poverty, yet COVID-19 pandemic threatens to undo years of progress in the fight against global poverty and income disparities, putting the future of a generation of children at risk. Poverty's impact on economic advancement in one of the largest groups of emerging countries; represented in Brazil, Russia, India, China and South Africa (BRICS), has been a source of concern for many experts. Despite the economic and demographic differences in each of them, they united in one goal, which is to put an end to their suffering from the problems of poverty and put it at the top of their priorities. Each of the five countries has followed a different strategy to confront the problem of poverty, and each has acquired an economic and social experience, worthy of study and inspiration for solutions.

The BRICS group has also been a major concern for researchers, albeit on a smaller scale. These five countries face severe poverty. Determining the dimensions of poverty problems may contribute to reducing their adverse impacts and implementing plans and programs that aim to find feasible solutions to the problem before it aggravates. Various models and experiences have emerged in the world in the fight against poverty, some of which are successful, whereas others have not achieved the desired results. The experience of the BRICS group to address poverty is one of the successful experiences that can be learned and benefited from. The reason for selecting the BRICS is because their GDP represents almost one-quarter of the world's GDP during 2021, their population represents more than 41% of the world's population, and they represent around 40% of the volume of production of global energy source (Jana, 2022).

The purpose of this research is to investigate and analyze the economic reasons for poverty in these five countries and determine how factors; such as life expectancy, government spending, literacy, and trade, affect their poverty rates. It also seeks to explore the nexus between poverty and economic development, by studying evidence in five different nations of the BRICS countries, to assess if poverty affects their economic growth, and how these countries may accomplish the first sustainable development goals (UN SDG1). Lastly, the research presents perspectives to researchers, policymakers, and government bodies on the nexus between poverty and economic progress in the BRICS countries.

2. Empirical Literature Review

Poverty has many definitions due to the different angles from which this phenomenon is viewed. United Nations Development Program define poverty as the material inability to achieve the minimum standard of living (UNDP, 1990). This definition depends on clear indicators identified by the UNDP, which is the income indicator, meaning that the individual does not obtain an income that secures the food only needed for his survival. The basic needs indicator is the deprivation of the means of material gratification to meet the basic acceptable level of human needs; such as food, clothing, education, and treatment. This indicator means the inability to get out of the cycle of poverty, due to some of the factors causing this, including the educational level, the level of health, the level of income, among others. The previous definitions can be summed up in one definition, which is a state of material deprivation in terms of the level of income that is not sufficient to meet the minimum necessary needs. The degrees of poverty are: extreme poverty is a situation in which the available income is not sufficient to provide the calories that keep the individual alive; absolute poverty, which is vinegar that cannot meet the nutritional and non-food needs of the individual; and luxury poverty, which is the poverty in which the individual lacks modern civilizational achievements and entertainment.

Esping-Andersen (1990) classifies in his "Three Regimes" different welfare models, currently in use in different developed countries. Traditional views on poverty correspond, for the most part, to the market-espousing, laissez-faire principle, which tends to attribute responsibility for individual outcomes, such as well-being, to their own economic decisions. As a result, people are held accountable for their misfortunes, which are ultimately the result of human flaws, according to this viewpoint. According to the authors, individual qualities could range from "a lack of a conscientious work ethic or virtuous morality to lower educational levels or competitive market talents", a viewpoint that has gained traction since the mid-1970s. Because the human characteristics that drive poverty are either "givens" or influenced by market variables, the state appears to have a minor role. Poverty, according to liberal philosophy, is caused by widespread underdevelopment of all kinds, not only market inefficiencies. Growth, according to Keynesians, fosters economic development and hence lessens poverty, so macroeconomic government intervention to alleviate involuntary unemployment is justifiable (Davis, 2014).

Scholars investigate the nexus between poverty and life expectancy, health, literacy, trade openness and citizen income and also employment. Recently, Lawanson and Umar (2021) have shown that health contributes favorably to economic growth in Nigeria, and also mitigates the negative effects of poverty on economic growth. As a health improvement annual benchmark, the study established a minimum life expectancy of 64.4 years. As a result, for Nigeria to achieve sustainable economic growth and considerable poverty reduction, policies aiming at meeting the newly specified health improvement threshold from the current level are required. Moreover, a study involving 12 Malaysian states and one federal territory during 2002-2014 shows the causes of socioeconomic variables on male and female life expectancy at birth through multivariate regressions (Anser et al., 2020). The relationship between the health–growth nexus, using the function of poverty reduction and the health threshold, must be met to minimize the impact of poverty on economic growth.

Scholars assess the relationship between government health spending, economic growth and poverty alleviation. Mehrare and Musai (2011a), show that the increase in government spending had a significant impact on poverty reduction via the impact on economic growth. The fundamental way by which health influences income-generating capability levels is productivity. Nutritionists and economists have thoroughly explored this link. A drop in the availability of labour owing to illness; second, a loss in the capability to work due to insufficient energy supply; and third, an increase in the time necessary to accomplish a project are all possible consequences (Shetty and James, 1994; Ghassemi, 1992). Duflo (2000) shows that obtaining a social pension is connected to enhancements in children's health, as income transfers are positively associated with enhanced health. This implies that the relationship between poverty and health is most likely recursive. As a result, we are looking for a framework that would allow us to look at the process of detecting poverty and disease at the same time. We present a bivariate probit model that tackles this issue in the following section. In the context of controllable conditions, health and poverty are inversely connected over time.

The link between Poverty and Literacy Rate, as shown in a study conducted in Pakistan, reveals that the variables in the model do not have a strong and stable long-run relationship (Batul, et al., 2019). When poverty is used as a dependent variable to measure economic growth, the cointegration results revealed the existence of a long-run link between education and economic growth. Education has a favorable impact on economic growth. The results reveal that the variables in the model do not have a strong and stable long-run relationship. Only in the long-run education does have a favorable and meaningful impact on economic growth. A high literacy rate in Pakistan could be an effective method to reduce poverty and boost economic growth. Moreover, Bhagwati & Srinivasan (2002) outline two primary lines of argumentation when discussing the effects of free trade on poverty. According to Krueger (1983), trade reforms in rising countries should be pro-poor, because these countries are more likely to have a comparative advantage in producing goods that require unskilled labour.

Economic development is crucial for long-term poverty reduction, and trade liberalization is expected to lead to the necessary productivity increases to keep growth going. Free trade fosters investment by offering scale and competition benefits, restricting rent-seeking activities favored by trade restrictions, and allowing for the flourishing of new ideas and discoveries (Berg & Krueger, 2003; Grossman & Helpman, 1991).

The poverty and GDP per capita nexus is presented by the Trickle-Down Theory, as it shows that the rich get richer, and the poor may benefit, as well. This could happen as a result of increased capital accumulation, increased economic activity, and more jobs, as well as additional options for disadvantaged people to borrow and invest (Aghion & Bolton, 1997). According to Ravallion & Chen (2007), inequality is bad for the poor, his study results from country-level data showing us that poverty reduction through growth is highly and negatively correlated with the level of inequality. Datt & Ravallion (1992), Ravallion (2012), and Bourguignon (2004) all suggest that reducing both economic growth and inequality can result in significant poverty reduction.

Poverty can also lead to a lack of education, resulting in poor countries falling behind in terms of human capital accumulation. Ravallion (2012) shows that in emerging economies, the early poverty rate has a large negative impact on growth rates at any initial mean consumption level. According to Lopez and Serven (2009), poverty inhibits investment, especially in low-financial-development situations, and this has a detrimental impact on economic progress. While researchers claim that poverty has a direct impact on unemployment (Saunders, 2002; Ukpere & Slabert, 2009; Apergis et al., 2011), others (Clifton & Marlar, 2011) contend that poorer nations do not automatically have greater jobless rates. One can accept the scientific view that unemployment and poverty are two closely related problems facing the present world economy. High poverty, as a rule, coexists with unemployment, thus the direct relationship between these two problems can be seen.

Individual analysis units are used to determine labour force status, whereas poverty research focuses on income units. As a result, a person can have a low income but not be bankrupt until other family members have shared revenue—this is enough to say that the family is living above the poverty line. Unemployment does not always imply that you are poor. The study's analysis technique was panel data regression analysis, and it indicated that unemployment has a significant negative impact on poverty in Indonesian areas, whereas real GDP had a significant positive impact. When examined collectively, unemployment, incomes, and real GDP all have a significant impact on poverty in Indonesian regions. Unemployment has increased poverty in Indonesian provinces as a result of the findings of this study.

3. Methodology

The goal of this research is to investigate the relationship between six independent variables and a single dependent variable in five different countries: Brazil, Russia, India, China, and South Africa, from 1998 to 2018, to collect enough data for a panel test. The dependent variable is poverty, while the independent variables are 1) life expectancy; 2) government health spending; 3) literacy rate; 4) trade openness; 5) GDP per capita; 6) and unemployment rate. Panel data analysis will be mostly used because it is more favorable than time-series or cross-sectional techniques, the panel data method. Finally, the data are calculated yearly. The key hypotheses evaluated in the study are as follows:

Hypothesis #1: There is a negative relationship between poverty and GDP per capita.

Hypothesis #2: There is a negative relationship between poverty and domestic general government health expenditure per capita.

Hypothesis #3: There is a negative relationship between poverty and life expectancy.

Hypothesis #4: There is a negative relationship between poverty and the literacy rate.

Hypothesis #5: There is a negative relationship between poverty and trade Openness (trade % of GDP)

Hypothesis #6: There is a positive relationship between poverty and unemployment rate.

The proposed model for estimating variables in this research is as follows:

$$POV = f(GDP/ca, GHE, LE, LR, TO, UR) \quad [1]$$

The dependent variable P represents the level of poverty. The independent variables are the gross domestic product per capita (GDP/Ca), government health expenditures (GHE), life expectancy (LE), literacy rates (LR), trade openness (TO), and the unemployment rate (UR).

Table 1*A Literature Review on the Relationship Between Poverty and the Independent Variables*

Variable	Description	Relationship	Source of Data
GDP per Capita (GDP/Ca)	Is it a measure of a country's economic output that accounts for its number of people? It divides the country's GDP by its total population.	Negative	Ravallion, 2012
Government Health Expenditure (GHE)	Expenditure on health from domestic sources as a share of total public expenditure. It indicates the priority of the government to spend on health from its domestic public resources.	Negative	Duflo, 2000
Life expectancy (LE)	Life expectancy is based on an estimate of the average age that members of a particular population group will be when they die.	Negative	Tafran et al., 2020
Literacy rate (LR)	The percentage of the population of a given age group that can read and write.	Negative	Batul et al., 2019
Trade openness (TO)	Trade Openness is the sum of imports and exports normalized by GDP.	Negative	Bhagwati & Srinivasan, 2002
Unemployment (UR)	Referring to individuals who are employable and actively seeking a job but are unable to find any.	Positive	Clifton & Marlar, 2011

Source: Prepared by the author

The properties of a data set are summarized and organized using descriptive statistics. The descriptive analysis of our variables in the BRICS countries is shown in table two.

Table 2*Descriptive Statistics of Variables*

Indicator	Mean	Maximum	Minimum	Std.Dev.
P	28.62244	70.2	2.8	19.03118
GDP/Ca	8.579509	11.0975	6.024171	1.184863
GHE	9694.331	84334.43	3.676	21446.03
LE	67.69112	76.704	53.444	6.304278
LR	87.5027	99.6	34.4	12.89577
TO	514.5111	49359	16.44	4812.588
UR	10.6765	33.29	3.1	8.772795

Source: Authors' Calculations

The general descriptive statistics of the variables are used to conduct the estimation tests. In particular, the table shows the mean, maximum, minimum, and standard deviation of our selected variables. Table 2 shows that the average score of poverty (P) is 28.6 in BRICS countries, whereas the standard deviation is 19.03. Regarding our independent variables, the GDP/Ca average score is 8.6 however the standard deviation is 1.18 which indicates that the GDP per capital (GDP/Ca) could be different with large amounts among BRICS countries. As for unemployment rate (UR), the average rate scored 10.67 with a standard deviation of 8.77 which shows the unemployment of our selected countries over the years varies at 5%.

The government health expenditure (GHE) average score of our selected BRICS countries is 9694.33, whereas its standard deviation is 21446.03. In contrast, the life expectancy (LE) mean score is 67.7 with a standard deviation of 6.3 which is considered low compared to other developed nations. Literacy rate average score is 87.5 with a standard deviation of 12.9, and finally, the trade openness (TO) of these countries average score is 514.5 with a standard deviation of 4812.6. It is worth noting that when examining the original time series of GDP/Ca before transforming it into logs, the mean was not close to the centre of the range and the mean + 2 standard deviations were very far from the limits of the range. This led to transforming the time series of GDP/Ca to natural logs to decrease this variation and heteroskedasticity, due to the large variation in the GDP/Ca. Finally, from the previous analysis, it is clear that most data sets display asymmetric distribution, with approximately 95% of the observations of each variable falling within 2 standard deviations from the mean.

4. Correlation Analysis

After conducting the correlation analysis, the results concluded that there is a high positive relationship between P and UR with a coefficient of (0.891279), and a high negative relationship between P and LE with a coefficient of (-0.8136), which caused us to drop two of the variables, namely the UR and LE, from our estimation models to avoid the existence of multicollinearity among our independent variables. Furthermore, Table (3) shows the correlation between the independent variables was not high enough to drop other variables, so it was decided to continue the estimation methods by just dropping the UR and LE variable.

Table 3

Correlation Analysis

Probability	GDP/Ca	GHE	LE	LR	P	TO	UR
GDP/Ca	1						
GHE	0.0265	1					
LE	0.52486***	-0.6039***	1				
LR	0.77161***	0.153501	0.225781**	1			
P	-0.399***	0.6917***	-0.8136***	-0.13421	1		
TO	0.046744	-0.041837	0.05329	0.09323	-0.07878	1	
UR	-0.102034	0.80894***	-0.7841***	0.1736*	0.891***	-0.0562	1

Note: *, **, *** indicate significance at 10%, 5% and 1% levels, respectively

Source: Authors' Calculation

5. Panel Data Analysis

The panel unit root test is utilized in numerous ways to find out the integration or stationarity of each variable. In this paper, 100 observations are used making the IPS test more intriguing. However, due to the multiple variations of stationarity of variables, different tests are utilized, such as LLC, IPS, ADF, PP and Breitung to find the most appropriate test for the model. Tests are implemented based on three different conditions; the first condition is not to include anything in the test equation, the second is to apply individual intercept in the equation, and the third is to apply individual intercept and trend in the equation. The null hypothesis becomes the variable at non-stationary (unit root) and the other is that the variable is stationary.

H_0 : Panel data includes unit root

H_1 : Panel data does not include unit root

Most of the findings of the unit root test are at levels that fail to reject the null hypothesis implying the variables aren't stationary. To fix the problem, the time series variables are retested again at the first difference to decrease the variation and cause the variables to become stationary. After variables were tested again utilizing the first difference most of the results did not have unit root and the panel reached stationary.

Table (4) illustrates the stationarity of the selected variables. Subsequently, implementing the Unit Root test, it was concluded that whether the test equation did not include anything or included individual intercept or intercept and trend majority of variables at the level were significant and stationary. After utilizing the first difference for each variable, as per the findings illustrated, the data did not include unit root and was highly significant exemplifying that the data in each variable is stationary at the first difference. Also, the most significant unit root tests for the variables are LLC, ADF and PP which were considered highly significant at 1% in all variables except for IPS, which only became significant at 1% when adding the intercept to the test equation, but when adding intercept and trend it has proven to be insignificant and not stationary.

Table 4
Panel Unit Root test

Variables	LLC		IPS		ADF		PP		Breitung	
	Level	1 st Difference	Level	1 st Difference	Level	1 st Difference	Level	1 st Difference	Level	1 st Difference
Poverty										
None	-3.444***	-8.26***	36.03***	69.88***	24.54***	95.82***	-	-	-	-
Intercept	-5.461***	-5.92***	37.57***	51.27***	12.081	86.85***	-	-	-	-
Intercept & trend	-3.458***	-7.12***	22.355**	48.94***	12.2959	72.98***	-0.01893	-4.464***	-	-
Literacy Rate										
None	3.96754	-6.06***	2.26708	55.02***	1.7289	101.9***	-	-	-	-
Intercept	-0.46428	-3.68***	5.53844	44.53***	10.7836	109.96***	-	-	-	-
Intercept & trend	-0.22408	-1.796**	11.2886	30.58***	17.4369*	83.17***	-1.2945*	-3.259	-	-
Trade % of GDP										
None	0.45775	-6.37***	12.5861	20.827**	19.23**	80.98***	-	-	-	-
Intercept	-1.93879**	-3.25***	19.904**	31.415***	27.2761***	306.861***	-	-	-	-
Intercept & trend	-0.87117	-2.675***	12.8112	55.90***	19.528**	62.1***	0.20284	-1.59832*	-	-
GDP per Capita										
None	3.52537	-2.48***	0.57886	28.67***	0.64593	41.76***	-	-	-	-
Intercept	1.91082**	-2.941*	-2.432***	22.115**	3.08794	35.89***	-	-	-	-
Intercept & trend	1.629	-3.32***	2.19808	16.2180*	1.9123	33.31***	0.44065	-2.822***	-	-
Government Health Expenditure Per Capita										
None	2.37913	-1.794**	1.52409	26.08***	0.82949	30.45***	-	-	-	-
Intercept	2.13	-3.328***	3.48128	-2.447***	2.3126	27.2968***	-	-	-	-
Intercept & trend	-1.23914	-3.09***	0.08142	-1.6886**	25.8906***	20.2907**	0.05722	-2.0599**	-	-
Life Expectancy										
None	-2.487***	-1.963**	24.95***	26.75***	0.28909	25.86***	-	-	-	-
Intercept	-5.231***	-4.18***	55.26***	40.584***	15.5205	62.02***	-	-	-	-
Intercept & trend	-9.261***	-7.96***	56.83***	49.34***	23.43***	30.04***	2.15552	-1.12514	-	-
Unemployment Rate										
None	-1.01286	-6.49***	14.6875	56.59***	13.0808	50.12***	14.6875	56.59***	-	-
Intercept	-2.868***	-4.69***	20.397**	27.7***	14.7154	33.06***	-	-	-	-
Intercept & trend	-1.31169*	-4.48***	-0.50415	-2.722***	24.12***	-0.28136	-4.26***	-4.26576	-	-

Note: *, **, *** indicate significant at 10%, 5% and 1% levels, respectively

Source: Authors' Calculation

6. Model

The panel data analysis includes the estimation of several models. Firstly, the common constant method. The common constant model estimates a common constant for all cross-sections, meaning that there are no differences between the estimated cross-sections. Our second estimated model is the fixed effects model (see Table 5 results). For the fixed effect model, all cross-sectional data are assumed to be included in the model include diverse constants, and each country has various effects on the model (see Table 6- results). Therefore, a dummy variable must be added to the model for each country to apprehend the heterogeneity that could be found in the model.

The variable α_t signifies the specific effects of each country, while ε_t signifies the error that was not calculated. There is an option to elongate the fixed effect model by adding dummies for the period. However, using such a model has been opted, because it expends a large number of degrees of freedom and several observations. Furthermore, the model assumes that all omitted variables are both uncorrelated with the independent variables. The difference between the fixed and random effects model is the presence of a stochastic error term instead of a dummy variable. Finally, our fourth model is the Fixed Effect Seemingly Unrelated Regression method also known as Zellner's method or multivariate regression which will also be tested. It estimates the parameters of the system accounting for contemporaneous correlation and heteroskedasticity in the errors across the equation.

The panel data analysis will be done twice to test the fitness of the models : First, by including all variables and using the original time series of variables, and second, after dropping life expectancy and unemployment rate because of a high correlation, and transforming the time series of GDP/Ca to natural logs to decrease variation and heteroskedasticity.

Equation 2: Proposed Model (Common Constant Model)

$$P_t = \beta_\theta + \beta_1(GDP/Ca_t) + \beta_2(GHE_t) + \beta_3(LE_t) + \beta_4(LR_t) + \beta_5(TO_t) + \beta_6(UR_t) + \varepsilon_t \quad [2]$$

Equation 3: Proposed Model (Random Effects Model)

$$P_t = \beta_\theta + \beta_1(GDP/Ca_t) + \beta_2(GHE_t) + \beta_3(LE_t) + \beta_4(LR_t) + \beta_5(TO_t) + \beta_6(UR_t) + \lambda t + \varepsilon_t \quad [3]$$

Equation 4: Proposed Model (Fixed Effects Model)

$$P_t = \beta_\theta + \beta_1(GDP/Ca_t) + \beta_2(GHE_t) + \beta_3(LE_t) + \beta_4(LR_t) + \beta_5(TO_t) + \beta_6(UR_t) + \alpha_t + \varepsilon_t \quad [4]$$

Common Constant, Random Effect, Fixed Effect Models

After conducting the unit root test and using the first difference three types of panels were used; least squares, the common constant, random effect and fixed effect which showed that all the variables are significant at different levels except GHE, LE, TO prove to be insignificant in the common constant model. Moreover, there is a positive relationship between poverty and the unemployment rate.

Table 5*Estimated Panel Least Squares*

Variable	Common Constant	Fixed Effect
C	13.1224	33.5121
GDP/Ca	***-4.191591	***-10.60573
GHE	-6.29	-0.00005
LE	0.32291	***-0.613320
LR	***-0.324544	** -0.331040
TO	-11.2	-0.00003
UR	***2.134964	**0.710078
R-squared	0.90328	0.9418
Adjusted R-squared	0.8963	0.93491
F-statistic	***129.4189	***136.8014

Note: *, **, *** indicate significance at 10%,5% and 1% levels, respectively

Source: Authors' Calculation

In detail, when the GDP/Ca increases by 1, the P decrease by 4.19 (because a 1% change in GDP/Ca will result in a change in P equal to coefficient/100)). Likewise, when GHE increases by 1, the P decreases by 6.29. In addition, when the LR increases by 1, the P decreases by 0.32. Also, when the TO increases by 1, the P decreases by 11.2. Furthermore, when the LE increases by 1, the P increases by 0.32. Finally, when the UR increases by 1, the P increases by 2.13. As shown in Table (5) the R squared 0.90 which means that our model explains 90% of the variation of P and the F-statistic equaled 129.4189 at a 1% significance level. The Durbin Watson is very low which means that there is an autocorrelation problem.

The fixed-effect model results show the following significant results: First, the significant effect of the increase in GDP/Ca by 1, decreases P by 10.60. Second, as LE increases by 1, then P decreases by 0.61. Third, as LR increases by 1, then P decreases by 0.33. Fourth, UR increases by 1 P increases by 0.71. According to the R squared, 94% of the variation in poverty is explained in all of the variables. Adjusted R- squared is 93.4% and The F stat probability shows that it's significant at 1%. All the coefficient variables are significant except for TO and GHE.

To investigate the reason for the absent relation between trade openness and poverty we re-run the model using the random effect and using the log of the GDP/Ca that may spur results. (By changing the distribution of the features to a more typically shaped bell curve, using the logarithm of one or more variables enhances the model's fit), and after dropping UR and LE because of high correlation Table (6) results show that trade openness proves to be insignificant in the common constant, fixed effect and fixed SUR models. However, there is a negative significant relation in the random effect as TO increases by 1, the poverty decreases by 0.000172, while when GHE increases by 1, the poverty rates increase by 0.000597. Moreover, when the log GDP/Ca increases by 1, the poverty rate decreases by 9.31. In contrast with LR, when it increases by 1, the poverty rate also increases by 0.316. As shown in Table 6, the R squared 0.67 which means that our model explains 67% of the variation of P and the F-statistic equaled 51.05 at a 1% significant level. The adjusted R-squared was 0.66.

Table 6*New Estimated Panel Least Squares*

Variable	Common Constant	Fixed Effect	Random Effect	Fixed SUR
C	***75.20185	***107.0032	***75.20185	***75.20185
TO	0.00	0.00346	** -0.000172	0.00
GHE	***0.000597	** -0.000121	***0.000597	***0.000597
LGDP/Ca	*** -9.316933	*** -6.152595	*** -9.316933	*** -9.316933
LR	**0.316093	** -0.278945	***0.316093	***0.316093
R-squared	0.67	0.94	0.67	0.67
Adjusted R-squared	0.66	0.93	0.66	0.66
F-statistic	***51.05326	***172.7575	***51.05326	***51.05326

Note: *, **, *** indicate significance at 10%, 5% and 1% levels, respectively

Source: Authors' Calculation

However, in the fixed-effect model, when the TO increases by 1, the P decreases by 0.00346. Moreover, when GDP/Ca increases by 1, the P decreases by 6.15. Also, when the GHE increases by 1, P decreases by 0.000121. Finally, when LR increases by 1, the P decreases by 0.279. As shown in Table (6) the fixed effect shows that the R squared 0.94 which means that our model explains 94% of the variation of P and the F-statistic equaled 172.7575 at a 1% significant level. The adjusted R-squared is 0.93. The results of the random effect are as follows; R-square equaled 0.67 which means that the model used explains 67% of the changes in P. The adjusted R-squared is 0.66. In contrast, the F-statistic equaled 51.05 at a 1% significant level. The random effect and fixed effect (SUR) display significance for all variables except trade openness, since only the random effect model displays that the trade openness is significant.

Table 7*Hausman Test*

Test Summary	Chi-Sq. Statistic	.Chi-Sq. d.f	.Prob
Cross-section random	383.402984	4	0.0000

Source: Authors' calculation

The Hausman test determines which model is more reliable; fixed or random. There are two methods for the Hausman test, the first one observes specific components individually. The other method observes the way by which the regressors' exogeneity eventually helps the economist pick the correct model (Sheytanova, 2015). For this test we have the following hypothesis:

H_0 : Random-effects model is consistent

H_1 : Random-effects model is inconsistent

Furthermore, the ARDL analysis is conducted in 5 countries, Brazil, Russia, India, China, and South Africa. First, the *Brazilian economy* results show that the GDP per capita increases by 1, the poverty rate decreases by 7.16. As the government health expenditure increases by 1, the poverty rate decreases by 0.02, and as the literacy rate increases by 1, the poverty rate increases by 0.05. Lastly, as the trade openness increases by 1, the poverty rate decreases by 0.34. Poverty, GDP per capita and literacy rate were significant amongst the variables while government health expenditure and trade openness were insignificant. Despite the severe political and economic crisis that struck Brazil in 2015, the poverty indicators for those who live on less than \$2 a day were not significantly affected as a result of Lula's previous policies. As a result of linking the value of the minimum wage in Brazil to the value of social insurance benefits such as pensions and unemployment benefits, and linking direct subsidies to the conditions of education and limiting childbearing, creating a state of sustainability in the reduction of poverty rates despite the crisis.

Second, the *Russian economy* shows that when the GDP per capita increases by 1, the poverty rate decreases by 0.365, and as the government health expenditure increases by 1, the poverty rate increases by 0.001. Lastly, as the literacy rate increases by 1, the poverty rate decreases by 0.266, and as trade openness increases by 1, the poverty rate increases by 9.96. GDP per capita, government health expenditure and literacy rate were significant, while poverty and trade openness were insignificant. Poverty rates have decreased in Russia as a result of adopting short-term and long-term economic reform and ensuring social stability. The government increases the investment in the manufacturing and small industries that are characterized by lower start-up costs and decreased banking interest to help the economy recover, in addition, investing in research and development and information and communication technology.

Third, the *Indian economy* results show that when the GDP per capita increases by 1, the poverty rate decreases by 45.06 and as the government health expenditure increase by 1, the poverty rate decreases by 0.172. Lastly, as the literacy rate increases by 1, the poverty rate decreases by 0.144, and as the trade openness increases by 1, the poverty rate decreases by 0.249. Poverty rates have decreased in India as a result of adopting a financial policy that achieves self-sufficiency and builds a free-market economy. The Indian government encourage the private sector to absorb poverty and increase development. This is via directing all kinds of support to small and medium enterprises, in addition to strengthening the infrastructure and the use of modern technology in production.

Fourth, the *Chinese economy* shows that when the GDP per capita increases by 1, the poverty rate decreases by 6.847, and as the government health expenditure increases by 1, the poverty rate increases by 0.152. As the literacy rate increase by 1, the poverty rate decreases by 0.044, and as the trade openness increases by 1, the poverty rate increases by 0.009. Poverty rates have decreased in China as a result of the attention to self-development in disadvantaged communities (rural - outskirts of cities). As well, as directing public spending on social development programs, which include education, health services and project support. In addition to adopting a monetary policy that supports the financing of small projects through lending

Fifth, *South Africa* shows that when the GDP per capita increases by 1, the poverty rate increases by 3.381, and as the government health expenditure increases by 1, the poverty rate decreases by 0.0003. Lastly, as the literacy rate increases by 1, the poverty rate increases by 1.132, and as the trade openness increases by 1, the poverty rate increases by 0.036. All variables were significant except for government health expenditure which was proven to be insignificant.

Table 8

ARDL short-run analysis

	Brazil	Russia	India	China	South Africa
Variables					
Poverty	0.045***	0.374	-0.247***	0.119***	0.173**
GDP per capita	-7.169***	-0.365*	-45.06*	-6.847*	3.381*
Government Health expenditure	-0.021	0.0001***	-0.172*	0.1522***	-0.0003
Literacy Rate	0.052**	-0.266***	-0.144***	-0.044*	1.1319**
Trade Openness	-0.342	9.96	-0.249***	0.0094*	0.0369*

Note: *, **, *** indicate significance at 10%,5% and 1% levels, respectively

Source: Author's Calculation

7. Results

In the short run, as shown by the preceding findings, there is a negative significant association between literacy rate and our dependent variable poverty in the BRICS countries. The findings were backed up by an actual study (Batul et al., 2019) that demonstrated the link between poverty and literacy rates. For the period under consideration, data on poverty and adult literacy rates were collected. The Augmented Dicky Fuller unit test was used to ensure that time series variables were stationary. At first difference, the variables were stationary. Johansen cointegration techniques were used to check the long-run connection. The long-term results show that improving the literacy rate by 1% can lower poverty by 0.759 %.

As shown by the results, there is a negative significant relationship between government health expenditure and our dependent variable poverty in the BRICS countries in the short run, except for Brazil and South Africa, which showed a negative but insignificant relationship. These results were supported by previous studies such as in a study by Mehrare and Musai (2011a), greater public spending had a considerable influence on poverty reduction through the impact on economic growth. Productivity is the primary mechanism by which health affects income-generating capability levels. Nutritionists and economists have examined this link extensively.

In the short run, as shown by the preceding findings, there is a negative significant association between GDP per capita and our dependent variable poverty in the BRICS countries. The result was backed up by an empirical investigation of The Trickle-Down Theory, which claims that when the rich get richer, the poor may benefit, as well (Aghion & Bolton, 1997). Another viewpoint considers inequality to be a barrier to poverty alleviation through growth (Ravallion & Chen, 2007). In addition, Ncube et al. (2014) tested the poverty model to analyze cross-sectional time-series data from MENA nations from 1985 to 2009. Their findings show that high levels of income disparity do cause poverty.

Trade openness is considered one of the most important variables when it comes to analyzing BRICS economic development, or its impact on poverty. According to the series of tests, trade openness showed insignificance in all the variables in the model. This shows that it was insignificant poverty as well. Moreover, trade openness wasn't considered a huge factor in determining and analyzing the impact of economic development on poverty in the BRICS based on the empirical study results. The fundamental reason behind the insignificant effect is reasons to that low-income countries cannot turn their labour force into a skilled population, thus resulting in poverty.

There are compelling grounds to believe that trade liberalization will help the impoverished just as much as the typical individual. If this is the case, trade liberalization, despite its favorable overall economic impacts, exacerbates income inequality by failing to reduce poverty. Beyond the influence of openness on overall growth, evidence reveals that there is no systematic relationship between openness and the income of the lowest. Dollar and Kraay (2001) provide the clearest evidence. Using a large panel (137 developing countries from 1950 to 1999), they regress the income share going to the lowest quintile on mean per capita income in their simplicity. As a result, they find that the income of the poorest quintile grows one for one with average incomes, which shows consistency with the earlier finding mentioned.

Nevertheless, Dollar and Kraay (2001) found that trade openness has a tiny and statistically insignificant effect on the income of the poor. Other research employing panel and cross-section data has come to the same conclusion: there is no indication of a link between trade openness and changes in the relative well-being of the poor. For example, Cashin et al. (2001) look at a variety of countries from 1975 to 1998. For a given rate of GDP per capita growth, they estimate the relationship between economic policies and gains in a human development index, which is substantially correlated with poverty. As a result, they found no evidence that trade openness was connected with either pro-poor or anti-poor growth. Yusuf et al. (2013) argue that because trade liberalization does not reduce poverty, countries with a high inclination to import and low commodity prices do not need to implement trade liberalization policies. This is backed up by Pradhan and Mahesh's (2014) findings on the influence of trade openness on poverty, which looked at a panel of 25 developing nations. Poverty, on the other hand, has a negative and significant link with overall trade, imports, exports, and goods trade, according to the clear conclusion reached. It concluded that an inward-looking trade policy is neither helpful for growth nor poverty reduction.

8. Conclusion

The strengths of the "BRICS" group are represented in its capabilities, economic and human capabilities, geographic areas and wealth. As it holds one-fifth of the global national product, which urges the group to set global strategic visions to build a new world order that meets its ambitions. Its weakness is represented in the levels of social poverty and inequality that is still a future challenge that urges intervention via the following policies:

1. Investing in humans via good quality of education and developing their skills to meet the dynamic changes in the labour market. Education contributes to reducing poverty, improving health, gender equality, peace and stability.
2. Adopting a social policy in terms of unemployment benefits, food stamps, income support and housing benefit.
3. Applying a minimum wage policy helps in the regulation of labour markets.
4. Supporting small businesses to promote economic growth—hoping that rising living standards will filter down to the poorest in society.

In nutshell, poverty continues and, in some cases, has even gotten worse despite major improvements in the social indicators that measure poverty. No social results in the countries can be linked to group membership. This is explained by the challenge of committing to very various national contexts with very distinct social policy system structures. The social issue is part of the political institutionality of national settings and has historically been connected to the growth of national states. Furthermore, it is impossible to address social issues without influencing organizational frameworks through sensible public policies.

Limitations

This topic did not face a lot of limitations, however, one of its main limitations was the unavailability of the data, especially in South Africa. Also, the unavailability of the data in recent years from 2019 to 2021 caused the omission of these years. Additionally, South Africa was one of the limitations, as it is not a part of the BRICS anymore after BRICS being BRIC. This is why there were not enough recent sources relating South Africa to the BRICS.

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