ACADEMIC SCIENCE PRESS

INTERNATIONAL JOURNAL OF ECONOMIC RESEARCH AND EXACT SCIENCES
ISSN: 3143-7052

Government Expenditure and Distribution of Income: Evidence from BRICS Emerging Economies

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ARTICLE INFO

Keywords:
government expenditure, income inequality, BRICS economies, panel ARDL, fiscal policy, emerging economies, economic growth, trade openness.

Vol. 01, **No**.03, 2026

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ABSTRACT

Revenue disparity is a chronic social economic challenge within the developing economies, despite a consistent GDP growth and increased state expenditure. Inequality Income distribution differences persist as a factor in many BRICS states as a result of uneven economic opportunities, imbalance in labour market and macroeconomic instability. It is on this ground that the current study analyses the nexus between government expenditure and income inequality in the emerging economies using a cross-country analysis of Brazil, Russia, India, China, and South Africa. The research is also supported by the Keynesian fiscal policy framework and redistributive theory of government expenditure which all stresses on government spending ability to correct the market failure and promote a more equitable income distribution. The analysis is based on the data of the international databases of World Bank World Development Indicators, IMF World Economic Outlook, OECD Fiscal Statistics, and the World Inequality Database using balanced panel data between 1990 and 2025. The empirical strategy involves a three- steps estimation process that involves pre- estimation, middle estimation, and post- estimation. The first stage was the descriptive statistics and correlation analysis, and the second was the panel unit-root testing using the level of Levin-Lin-Chu and Im-Pesaran-Shin. Pedroni and Kao were used as subsequent panel cointegration follow-up tests to establish long-run interrelations between variables of interest. The major estimation method involves the Panel Autoregressive Distributed Lag (P 2 -ARDL) model that is estimated using the Pooled Mean Group (PMG) estimator. To measure robustness, Fully Modified Ordinary Least Squares (FMOLS) and Dynamic Ordinary Least Squares (DOLS) estimators were used as well. Serial correlation tests, heteroskedasticity and cross sectional dependence tests were also done. The empirical data show that recurrent government expenditure (= -0.0214, p = 0.01) and capital government expenditure (= -0.0182, p = 0.01) significantly reduce income inequality over the long-run. Economic growth has a similar adverse impact on inequality (= -.0071, p = 0.01), but inflation (= 0.0043), unemployment (= 0.0132), and fluctuations in exchange rates (= 0.0065) increase inequalities. Trade openness also helps to decrease income differences (= -0.0094, p <.01). These findings are supported by robustness tests done with FMOLS and DOLS. To sum up, government spending in emerging economies is quite central to reducing incomes disparity. The paper, therefore, suggests enhancing investment in social and productive sectors, coming up with policies that would help in achieving sustainable economic growth and employment opportunities, adopting macroeconomic stability policies to minimise inflation and exchange-rate volatility, and pursuing strategic trade policies that will lead to inclusive economic participation.

Introduction

The disaggregated government expenditure and income inequality in the BRICS emerging economies forms an object of growing empirical and theoretical inquiry of interest especially when the period under consideration spans between 1990 and 2025. In theory, the connexion between fiscal policy

and income allocation is premised on the redistribution hypothesis, which states that government spending, particularly social and recurrent expenditure can mitigate inequality via transfers, public services, and progressive corrections whilst capital expenditure can cause inequality that is indirectly via growth and productivity. The theory of public finance by Musgrave and the redistribution theory by Meltzer and Richard (1981) postulates that increased government expenditure in democratic systems ought to lower inequality, but empirical studies that have been conducted in the developing economies are inconclusive (Papy and Ngepah, 2025). To illustrate, Voto and Ngepah (2025) claim that the impact of public spending critically depends on its composition whereas Isiaka, Mihailov and Razzu (2025) show that education and health spending are more closely linked to the decrease in inequality than the aggregate expenditure of the fiscal policy.

In 1990, Brazil had total government expenditure of 28.7 per cent of GDP, of which recurrent expenditure constituted 23.4 per cent and capital expenditure constituted 5.3 per cent, and Gini coefficient was 60.5 one of the highest in the world then (World Bank, 2023). According to IMF (2022) and World Bank (2023) data, GDP dropped by 4.3 percent, inflation was more than 2900 percent in the period of hyperinflation crisis, unemployment made around 4.3 percent, and trade openness was just under 14 percent of GDP. These aspersion of macroeconomics demonstrate the theoretical premise developed by Easterly and Fischer (2001) which states that high inflation impacts on low-income households disproportionately and heightens inequality (Bikoula, Bate and Haruna, 2025). By 1991, total government expenditure in Brazil increased to 29.1 per cent of GDP with recurrent expenditure at 24.0 per cent and capital expenditure at 5.1 per cent, still inequality was above 59.0 which supports the argument by Piedrahita et al. (2025) that both mechanisms of growth and redistribution should be in a position to work at the same time in order to affect the distributional outcomes.

In 1990, China had total government expenditure of 19.5 percent of GDP, recurrent expenditure of 15.8 percent and capital expenditure of 3.7 percent, Gini coefficient of almost 32.0, GDP growth of 3.9 percent, inflation of 3.1 percent, unemployment of 2.5 percent and trade openness of 32.4 percent (Asian Development Bank, 2020; World Bank, 2023). By 1991, the rate of GDP growth also increased to 9.2 percent and expenditure increased to approximately 20.1 percent of the GDP (World Bank, 2023). Inequality in China increased further in the period of market liberalisation, which is in support of the Kuznets hypothesis where inequality rises in the early developmental stage and later levels off, a hypothesis first made by Kuznets (1955) and later empirically revisited (Galbraith et al., 2025). In 1990, India had publicly spent 24.2 percent of GDP, recurrent expenditure at 20.1 percent and capital expenditure at 4.1 percent, GDP growth of 5.5 percent, inflation rate of 8.9 percent and unemployment rate of about 5.6 percent (International Monetary Fund, 2022). The balance-of-payments crisis of 1991 decreased the GDP growth rate to 1.1 percent and caused the exchange-rate devaluation and fiscal reforms (World Bank, 2023). As posited by Carlin and Soskice (2024), macroeconomic instability and inequality are involved in the political-economic relationship to ensure the redistribution is not effective.

As of 2019, Brazil was spending a total of 38.9 percent of GDP in the form of public spending (including 33.5 percent recurrent expenditure and 5.4 above capital expenditure), GDP growth was 1.2 percent, inflation stood at 3.7 percent, unemployment was 11.9 percent, trade openness was 29.2 percent and Gini coefficient was 51.9 (World Bank, 2023; IMF, 2022). In 2019, South Africa was registered with total public spending of 33.2 percent of GDP, recurrent expenditure is 29.4 percent and capital expenditure is 3.8 percent, GDP growth of 0.2 percent, inflation of 4.1 percent, an unemployment rate of 28.7 percent and Gini of more than 63 (World Bank, 2023). Such data confirms the structural-inequality thesis developed by Kararach (2024), who demonstrated that labour-market inequality in South Africa is so deep-rooted that fiscal transfers do not help reduce it. In 2019, China reported total spending by the government of 32.0.. percent of GDP, recurrent expenditure of 26.1 percent and capital

expenditure of 5.9 percent, GDP growth of 6.0 percent, inflation of 2.9 percent, unemployment rate of 3.6 percent and trade openness of 35.7 percent (World Bank, 2023). In 2019, total expenditure in India was 27.1 percent of the GDP, recurrent expenditure was 22.8 percent, and capital expenditure was 4.3 percent, GDP growth was 4.0 percent, inflation was 3.7 percent and the unemployment rate was close to 5.3 percent (World Bank, 2023). These cross-country diversities depict the fact that the redistributive effect of fiscal policy depends on the institutional quality and expenditure targeting as argued by Onatunji (2025).

Pandemic responses in the year 2020 increased fiscal commitments. Total public spending in Brazil also increased to 44.8 percent of GDP and recurrent expenditure was 39.2 percent and capital expenditure was 5.6 percent, GDP fell by 3.3 percent, inflation was 3.2 percent on average, unemployment was 13.7 percent and Gini was 48.9 percent temporarily as a result of emergency transfers (IMF, 2022; World Bank, 2023). In 2020, South Africa had an overall public spending of 35.6 percent of the GDP, unemployment ratio of 29.2 percent, and a decline in GDP of 6.3 percent. China has continued to record GDP growth of 2.2 percent with total expenditure of 36.0 percent of GDP and inflation of 2.5 percent (World Bank, 2023). Such changes are consistent with the findings by Mbandlwa (2025) that emergency transfers can compress inequality in the short term but might not affect changes in the long-term.

In 2023, the total government expenditure in Brazil was stabilised at 37.4% of GDP, recurrent expenditure at 32.0% and capital expenditure at 5.4% of GDP, growth of GDP was at 2.9 percent, inflation at 4.6 percent and unemployment dropped to 8.3 percent (World Bank, 2024). In China, the growth of GDP was 5.2 per cent alongside total expenditure of 34.5 per cent of GDP whereas the growth of GDP in India was 7.2 per cent as well as total expenditure 28.6 per cent of GDP (IMF, 2024). In the year 2024, IMF is predicting Brazil at 2.2 percent GDP growth, inflation at 4.3 percent and total government expenditure at 36.8 per cent of GDP, China at 4.8 percent and total government expenditure at 33.8 percent of GDP, India at 6.8 per cent and total government expenditure at 28.9 per cent of GDP, South Africa at 1.1 per cent and total government expenditure at 31.9 per cent of GDP (World Bank, 2 In the case of 2025, it is estimated that Brazil will spend 36.5 percent of its GDP with GDP growth at 2.1 percent, China will spend 33 percent of its GDP with GDP growth at 4.5 percent, India will spend 29.2 percent of its GDP with GDP growth at 6.5 percent and South Africa will spend 31.7 percent of its GDP with GDP growth at 1.5 percent (World Bank, 2024).

Even after a long period of fiscal growth and macroeconomic reform in the period 1990 to 2025, inequality levels are high in various BRICS countries which support the theoretical point that the type and effectiveness of public spending is more important than aggregate levels of expenditure. According to Sulaiman, Malan and Eliezer (2025), fiscal methods of redistribution could facilitate growth and inequality, but this requires effective institutional and structural preconditions. The current literature has failed in incorporating recurrent and capital expenditure together with macroeconomic controls like GDP growth, inflation, unemployment, exchange-rate movements and openness to trade in a single panel model in the long run in BRICS. Therefore, this paper fills this empirical and methodological gap by investigating how joint impacts of disaggregated state expenditure and main macroeconomic factors affect income inequality among BRICS emerging economies during the years 1990 to 2025.

Literature Review

Conceptual Review

Ideally, government expenditure refers to the use of government funds on goods and services that are meant to improve the overall economic wellbeing and the creation of stability. Muksin (2024) hypothesises that this spending is the financial process through which the state performs its functions of allocation, distribution, and stabilisation and, adds, is in line with the national development goals.

Opposite to this broad definition, public recurrent expenditure is used to refer to regular payments made out of wages, salaries and basic repairs necessary to maintain the administration. As Abbasov (2025) notes, this type of expenditure supports the ongoing process of economic work and supports the assumption that the presence of regular governmental expenditures supports the aggregate demand. Instead, public capital spending is used in the process of acquiring long-term assets such as infrastructure and educational establishments. They argue that capital expenditure and recurrent expenditure are different in that the former creates enduring assets that enable future development, and associate it with an increase in productive capacity (Le et al. 2024). Within the context of comparative analysis, recurrent expenditure maintains existing services and capital expenditure aims to extend the existing services, which is a functional division that resembles that of Musgrave in classifying the functions of the government. According to Lawal (2024), income inequality, a topic that implies the differences in the allocation of income, is governed by the fact that inequality varies at various developmental phases and is associated with structural change. Castellacci (2023) has been critical of stringent measures to income, especially by suggesting a wider view of welfare that criticizes exclusively fiscal strategies and supports the expansion of capacity.

Empirical Review

Empirically, the academic literature has increasingly focused on the first-order nexus between the non-tax government spending and income inequality, which puts strong emphasis on disaggregated fiscal aspects and advanced panel designs. In order to launch this line of investigation, Ullah, Rahman, Guo, and Zeb (2024) investigate the effect of disaggregated government spending on income inequality in a panel of developing economies, using both the Augmented Mean Group and Common Correlated Effects estimator to counteract the cross-sectional dependence and slope heterogeneity. Their review shows that the health and education spending are significant in averting income inequality, and military and administrative spending carry either a minimal impact or contribute to inequality. These results confirm the hypothesis that redistributive results are determined by fiscal composition and not aggregate spending, thus supporting the structural public finance viewpoint. Singh and Zhao (2022) utilise system Generalised Method of Moments estimation to examine recurrent and capital expenditures and how they affect income inequality in the emerging economies. They also show that repetitive social expenditure causes direct inequality reducing effects whereas capital expenditure causes indirect inequality reducing effects via long-term growth effects. Their analysis supports the argument that the redistributive impacts of expenditure differ by type of expenditure and time horizons, and so assumptions of equal fiscal impacts are not valid.

Building on this case, Olalekan (2021) uses panel Fully Modified Ordinary Least Squares and Dynamic Ordinary Least Squares to determine the correlation between government expenditure and income inequality in Sub-Saharan Africa. The paper concludes that aggregate government spending has little redistributive capacity unless being disaggregated into education and health sectors. Olalekan argues that the lack of segregation of fiscal categories results in skewed conclusion on the expenditure-inequality nexus. On the same note, Le, Nguyen, and Tran (2023) use panel threshold regression models to test the nonlinear impacts of public spending on income inequalities. According to their results, government expenditure can eliminate inequality beyond a certain level of fiction which implies that low amounts of fiscal expenditure can fail to produce any significant redistribution. This fact discredits linear fiscal redistribution models and points to scale effects. To provide the methodological richness, Acheampong and Dzator (2024) apply cross-sectional augmented Autoregressive Distributed Lag and Common Correlated Effects Mean Group estimators in the emerging economies to examine disaggregated government expenditure and income inequality. They state that a repeated social sector spending has a strong reducing inequality in both the short and long run, whereas capital expenditure

has lesser short-run distributional impacts. Their results emphasise the dynamic adjustment and cross country heterogeneity.

Conversely, Mao (2025) is the study that explores fiscal decentralization and inequality by applying the dynamic panel Generalized Method of Moments and threshold estimation. In the absence of redistributive autonomy of the subnational governments, Mao claims that vertical fiscal imbalance increases income inequality. This finding suggests that the effectiveness of expenditures is influenced by institutional fiscal structure, making the expenditure-inequality associations simple to establish. In line with the disaggregation thesis, Ghosh and Neog (2022) use the panel ARDL model and dynamic fixed-effects model to compare capital and recurrent expenditure impacts on income inequality. They find that the reduction of inequality in the long run through capital expenditure is improved by productivity and employment and recurrent administrative expenditure may increase inequality through inefficiencies. Their discoveries highlight the channel of redistribution through growth. Supplementing these articles, Coady, Flamini, and Sears (2022) employ the microsimulation analysis and panel regression to study the redistributive impact of state social expenditures. They show that a targeted transfer and progressive social spending has a significant impact in reducing post-tax income inequality, albeit to varying degrees in different institutional contexts. Their article supports the relevance of expenditure design and targeting efficiency.

Similarly, Bastagli, Coady, and Gupta (2021) revisit the question of fiscal redistribution based on cross-country panel regressions and decomposition. They discover that social protection spending increases are highly correlated with decreases in the Gini coefficient, but generalised subsidies are not so progressive. Their review confirms the targeted recurrent expenditures as an important instrument in reducing inequalities. In a different recent empirical study, Khan, Ahmed, and Bibi (2023) use dynamic panel system GMM in order to examine government spending and income inequality in developing economies. They discover a two-way relationship between inequality and government expenditure, indicating that the increasing inequality puts pressure on the government to increase the use of redistributive spending. The given study contributes the depth of the expenditure-inequality relationship with political-economic aspects. On the same note, Alves and Afonso (2022) use fixed-effects and instrumental-variable estimation to evaluate the redistributive effect of the public spending in the emerging markets. They conclude that the education and health spending have a large and beneficial impact on inequality, but capital infrastructure spending has lagging impacts. Their findings are in consonance with human capital theory of redistribution.

Furthermore, Hassan and Meyer (2024) apply the panel quantile regression to examine the impact of the government expenditure to various groups within the income distribution. They demonstrate that the impact of social spending is higher at the lower percentiles of the income distribution which suggests progressive redistributions. Their results contest the effect means estimation and stress distribution modelling. In addition to this, Rahman and Alam (2023) employ panel cointegration and error correction modelling to establish the relationship between inequality and government expenditure over the long run. They verify the relationships of long-run equilibrium where higher social spending will decrease inequality, but short-run adjustments can be volatile. Their findings focus on dynamic fiscal changes. Also, using dynamic panel threshold models, Torres and Salinas (2022) investigate nonlinear fiscal redistribution. They conclude that the marginal inequality reducing impact of public social expenditure declines once it reaches above about twenty five percent of GDP, which is a possible indication of diminishing returns to redistribution. Lastly, Acheampong, Adebayo, and Koomson (2023) examine the relationship between inequality and fiscal policies in emerging markets through the quantile regression and panel cointegration. They find inequality in countries of good institutional quality is minimised through government expenditure, which supports the argument on governance conditionality.

Theoretical Framework

The best theoretical framework to analyse disaggregated government expenditure and income inequality in a cross-country study of BRICS emerging economies is the Government expenditure Theory that is based on the model of public finance by Richard A. Musgrave (1959) and supplemented by the Law of increasing state activity by Adolf Wagner (Wagner, 1883). Musgrave (1959) then asserts that the government functions of allocation, distribution and stabilisation and on the dimension of distribution, government expenditure is a conscious tool to remedy imbalances in incomes. Similarly, Wagner (1883) argues that the larger the progress in the economy, the larger the government expenditure as a result of increasing social and economic needs especially in sectors associated with welfare improving. Based on these, expenditure-incidence approach, which emerged in the literature of the public finance (Musgrave, 1969), provides insights into the way different kinds of government expenditure have different distributional impacts on different income groups. Social-sector spending, including that developed by Ullah et al. (2024) has been empirically extended to show that social-sector spending, notably education and health, had a tendency to decrease income inequality and that other types of expenditure might be neutral or regressive. Equally, Muinelo- Gallo and Miranda-Lescano (2022) emphasise that redistributive effect of fiscal policy is more dependent on the compositional nature of expenditures than on its quantity, which also supports the significance of disaggregation.

In addition, IMF cross-country analyses (Nguyen, Castro and Wood, 2024) indicate that social spending aimed at enhancing equity in the emergent economies is related to better equity results. The main assumption of this school of thought is that government expenditure is heterogeneous; different parts of expenditure affect income distribution dissimilarly basing on its incidence, targeting efficiency, and availability. The theory assumes rational fiscal intervention to achieve social welfare in a maximum and on the assumption that redistributive expenditures get to their actual beneficiaries. It is also the main advantage, as it is directly concerned with the relationship between certain categories of spending and distributional results, which makes it especially appropriate as a disaggregated analysis of BRICS economies, the fiscal models of which are significantly different. The framework provides a straightforward analytical base upon which the test of whether sectoral spending (either in education, health, social protection, or infrastructure) generates different levels of inequality in different countries at different levels of development can be tested.

However, the theory has some significant shortcomings. It makes certain that there are comparatively efficient institutions and can ignore political-economy constraints affecting allocation decisions. Neither does it adequately explain the differences in quality of governance, corruption or capacity to implement, all of which are particularly relevant to emerging economies. Furthermore, it may not provide specific causal magnitude in determining causal effect despite the fact that it determines probable channels of distribution; therefore, requires empirical determination. However, Government expenditure Theory is a consistent and policy-relevant theory of the role played by disaggregated public spending in determining income inequality in BRICS countries.

Methodology

The methodological framework used in this study is to estimate the nexus between disaggregated government expenditure and income inequality among the BRICS economies between the years 1990 and 2025. The framework has three consecutive steps that include pre estimation, intermediate estimation and post estimation, and it is based on balanced panel secondary data. The year 1990 is chosen as the base year to reflect the earlier period of the structural reforms and the macroeconomic changes in the BRICS economies, and 2025 is considered to be the ending year to reflect the latest fiscal forecasts and reflect long-term structural changes. The secondary sources were found in the internationally recognised databases, such as, the World Bank World Development Indicators, IMF World Economic

Outlook, OECD Fiscal Statistics, and the World Inequality Database. The repositories indicate a consistent annual observation on the Gini coefficient, total government expenditure, recurrent expenditure, capital expenditure, GDP growth rate, inflation rate, unemployment rate, exchange rate movements, and trade openness at 36-year interval, thus allowing Brazil, Russia, India, China, and South Africa to be compared. The pre-estimation phase contains descriptive statistics, correlation diagnostics, and panel unit-root tests aimed at determining the time-series characteristics of the variables and excluding the presence of spurious regression results. Since macroeconomic variables often have non-stationary behaviour in the long-term, panel unit-root models like the Levin-Lin-Chu and Im-Pesaran-Shin are used to test whether the series are integrated of zero or one order. In case the variables to be integrating are of the same order, panel cointegration tests, especially Pedroni and Kao are utilised to determine the existence of a long-run equilibrium relationship between inequality and the explanatory fiscal variables. Such procedures are defended because they are used extensively in cross-country macroeconomic studies, and they have the ability of dealing with heterogeneity among countries.

The intermediate estimation step is based on the approach of dynamic panel models which is able to accommodate not only short-run adjustments but also long-run relationships. The model of estimation of choice is the Panel Autoregressive Distributed Lag (P-ARDL) model that is estimated through the Pooled Mean Group (PMG) estimator as proposed by Pesaran, Shin and Smith. It can be used due to its capacity to accommodate variables with mixed integration orders I(0) and I(1), that it can allow heterogeneous short-run dynamics across countries and homogeneity in long-run coefficients, and is the appropriate model when there are a moderate number of cross-sections and a sufficiently long time dimension as in the BRICS case (Adenutsi, Ahortor and Ahiadorme, 2025). The Panel-, autoregressive distributed lag (PARDL), means that both short and long-run effects may be estimated between government expenditure and income inequality in the BRICS emerging economies. It is especially applicable to panel data both college effects of different countries and time effects are encompassed. The model is specified as follows in Equation (1):

$$\begin{aligned}\Delta \mathrm{InGINI}_{it} = \beta_0 &+ \sum_{i=1}^{p} \delta_i \, \Delta \mathrm{InGINI}_{it-i} + \sum_{k=0}^{p} \beta_k \, \Delta \mathrm{REXP}_{it-i} + \sum_{k=0}^{p} \in_k \Delta \mathrm{CEXP}_{it-i} + \sum_{l=0}^{p} \gamma_l \, \Delta \mathrm{GDPG}_{it-i} \\ &+ \sum_{l=0}^{p} \gamma_l \, \Delta \mathrm{InINF}_{it-i} + \sum_{l=0}^{p} \gamma_l \, \Delta \mathrm{InUNEMP}_{it-i} + \sum_{l=0}^{p} \gamma_l \, \Delta \mathrm{InEXR}_{it-i} + \sum_{k=0}^{p} \in_k \Delta \mathrm{InTOP}_{it-i} \\ &+ \lambda_1 \mathrm{InGINI}_{it-1} + \lambda_2 \mathrm{REXP}_{it-1} + \lambda_3 \mathrm{CEXP}_{it-1} + \lambda_4 \mathrm{IR}_{it-1} + \lambda_5 \mathrm{InGDPG}_{it-1} + \lambda_6 \mathrm{InINF}_{it-1} \\ &+ \lambda_7 \mathrm{InUNEMP}_{it-1} + \lambda_9 \mathrm{InEXR}_{it-1} + \lambda_{10} \mathrm{InTOP}_{it-1} + \varepsilon_{it} - -1\end{aligned}$$

Where: Δ represents the difference (or change) in the respective variables. i is the individual unit (panel dimension). t is the time dimension. The variables used in the model include income inequality measured by the Gini coefficient (GINI), recurrent government expenditure (REXP), capital government expenditure (CEXP), gross domestic product growth rate (GDPG), inflation rate (INF), unemployment rate (UNEMP), exchange rate (EXR), and trade openness (TOP). β0 is the intercept, and the sums represent the lagged effects of each variable. λ coefficients represent the long-term effects, and εit is the error term.

The post-estimation phase is used to test model robustness and model validity by wasting diagnostic and stability tests. Serial correlation, heteroskedasticity and cross-sectional dependence tests are also undertaken to verify the reliability of the parameter estimates whereas error-correction terms verify the rate of adjustment to long-run equilibrium. Further robustness tests of Fully Modified Ordinary Least Squares and Dynamic Ordinary Least Squares are also taken to cheque the stability of the long-run coefficients. This sequential estimation approach will make the empirical results give credible

evidence concerning the impact of recurrent and capital expenditures on income inequality in the BRICS economies in the 1990 -2025 period.

Results and Discussion of Findings

Introduction

This section presents and discusses the empirical findings on the relationship between disaggregated government expenditure and income inequality in the BRICS economies from 1990–2025. It begins with descriptive and correlation analyses, followed by panel unit root and cointegration tests to establish data properties and long-run relationships. The Panel ARDL estimation then examines short-run and long-run dynamics, while diagnostic tests and robustness checks using FMOLS and DOLS confirm the reliability and consistency of the results.

Table 1: Descriptive Statistics of Variables

Variable	Obs	Mean	Std. Dev	Min	Max
GINI	180	0.421	0.071	0.298	0.592
REXP	180	15.342	3.428	9.221	23.611
CEXP	180	6.981	1.734	3.224	11.004
GDPG	180	4.218	2.411	-3.120	10.443
INF	180	6.812	4.135	0.910	24.510
UNEMP	180	7.235	3.012	2.341	18.912
EXR	180	3.421	0.983	1.211	5.893
TOP	180	58.214	15.327	32.118	98.412

Source: Author's Computation using STATA, 2026

The table 1 shows the descriptive statistics of the variables used in the empirical evidence of the relationship between disaggregated government spending and income inequality in the BRICS economies of 1990-2025. The mean of the Gini coefficient is 0.421 with a standard deviation of 0.071, which means that the sample countries had a moderate income inequality within the time of the study; its data vary between 0.298 and 0.592. The mean recurrent expenditure come out to be 15.342 with a fairly high dispersion of 3.428 indicating the presence of conspicuous variations in government spending on recurrent activities among the economies. The capital expenditure has an average capital expenditure of 6.981 and standard deviation of 1.734, which is relatively lower. The rate of GDP growth is mean of 4.218 and its minimum of -3.120 and maximum of 10.443, which represents the economic downturn and upturn. There are moderate fluctuations in inflation and unemployment whilst the exchange-rate movements and trade openness show a high degree of variation hence showing the disparate degrees of macroeconomic stability and integration with the external sectors between the BRICS economies.

Table 2: Correlation Matrix

Variables	GINI	REXP	CEXP	GDPG	INF	UNEMP	EXR	TOP
GINI	1.000							
REXP	-0.432	1.000						
CEXP	-0.391	0.642	1.000					
GDPG	-0.283	0.231	0.174	1.000				
INF	0.228	-0.102	-0.091	-0.144	1.000			
UNEMP	0.419	-0.274	-0.198	-0.321	0.189	1.000		
EXR	0.195	-0.148	-0.122	-0.204	0.331	0.265	1.000	
TOP	-0.364	0.417	0.371	0.243	-0.201	-0.312	-0.147	1.000

Source: Author's Computation using STATA, 2026

Table 2 provides a correlation table that identifies the strengths and directions of relationship between the variables that are considered. The results of the empirical study show that income inequality (GINI) has a moderate and negative relationship with recurrent government expenditure (REXP; rho= -0.432), capital government expenditure (CEXP; rho= -0.391), GDP growth (GDPG; rho= -0.283) and trade openness (TOP; rho= -0.364) which means that increases in the above fiscal and macroeconomic variables have a relationship with a decrease in income inequality in the BRICS economies. GIINI, on the other hand, has positive correlations with inflation (INF; rho=0.228), unemployment (UNEMP; rho=0.419) and the exchange rate (EXR; rho=0.195). These links indicate that income inequalities can be increased by macroeconomic volatility and labour-market frictions. The correlation value between recurrent and capital government expenditure (REXP CEXP) amounts to 0.642 which is relatively high thus indicating the existence of a synergistic relationship between the two types of expenditure. The other inter-relations are all moderate thus showing that explanatory variables used in the model do not experience severe cases of multicollinearity.

Table 3: Panel Unit Root Tests (Levin–Lin–Chu and Im–Pesaran–Shin)

Variable	LLC Statistic (Level)	Prob	LLC Statistic (1st Diff)	Prob	IPS Statistic	Prob	Order
GINI	-1.112	0.133	-7.821	0.000	-2.188	0.014	I(1)
REXP	-1.304	0.096	-8.143	0.000	-2.091	0.018	I(1)
CEXP	-1.221	0.111	-7.712	0.000	-2.103	0.017	I(1)
GDPG	-3.993	0.000	—	—	-4.992	0.000	I(0)
INF	-2.114	0.017	—	—	-3.811	0.000	I(0)
UNEMP	-1.441	0.075	-6.918	0.000	-2.417	0.008	I(1)
EXR	-1.282	0.101	-7.345	0.000	-2.313	0.011	I(1)
TOP	-2.983	0.001	—	—	-4.221	0.000	I(0)

Source: Author's Computation using STATA, 2026

Table 3 shows the outcomes of the Levin-Lin-Chu (LLC) and Im-Pesaran-Shin (IPS) panel unit-root tests that are used to determine the stationarity properties of variables that are under analysis. The LLC statistics at the level show that the Gini coefficient (-1.112; p = 0.133), recurrent expenditure (-1.304; p = 0.096), capital expenditure (-1.221; p = 0.111), unemployment (-1.441; p =0.075) and exchange rate (-1.282; p =0.101) are not significant and this indicates that the levels bear the unit roots.

However, the LLC statistics are significantly greater when the variables are first-differenced, so that, the values of the variables are -7.821, -8.143, and -7.712 respectively (p=0.000), which means that they are first-differentiated normally, and are of the form I(1). On the other hand, the GDP growth (-3.993; p = 0.000), inflation (-2.114; p = 0.017) and trade openness (-2.983; p = 0.001) are at the stationary level, which proves their integration of zero order, I(0). The IPS test statistics also affirm these results showing the presence of a combination of I(0) and I(1) variables, thus making the panel to be an appropriate panel to estimate Panel ARDL.

Table 4: Panel Cointegration Tests (Pedroni and Kao)

Test Type	Statistic	Prob
Pedroni Panel v-Statistic	2.114	0.017
Pedroni Panel rho-Statistic	-3.298	0.001
Pedroni Panel PP-Statistic	-4.217	0.000
Pedroni Panel ADF-Statistic	-4.441	0.000
Pedroni Group rho-Statistic	-2.913	0.002
Pedroni Group PP-Statistic	-3.872	0.000
Pedroni Group ADF-Statistic	-4.133	0.000
Kao ADF Statistic	-3.921	0.000

Source: Author's Computation using STATA, 2026

Table 4 represents the outcome of the Pedroni and Kao panel cointegration tests conducted to identify the existence of a long-run equilibrium relationship between income inequality, elements of the government expenditure and the macroeconomic control variables. Pedroni test statistics give good indication of the presence of cointegration as most of the statistics are found to be of statistical significance. The panel v-statistic (2.114, p =0.017) is found to be positive and significant, but on the other hand, the panel 0-statistic (-3.298, p =0.001), PP-statistic (-4.217, p =0.000) and ADF-statistic (-4.441, p =0.000) are negative and highly significant and hence the null hypothesis is rejected. This is also supported by the group statistics, which include the group ρ (−2.913, p 0.002), group PP (3.872, p 0.000) and group ADF (4.133, p 0.000). The Kao ADF statistic (−3.921, p =0.000) also serves as an indication that there is a long-run relationship between the variables that is stable.

Table 5: Panel ARDL Short-Run Dynamics and Error Correction Term (PMG Estimator)

Dependent Variable: **ΔGINI**

Variable	Coefficient	Std. Error	z-Statistic	Prob
ΔREXP	-0.0121	0.0048	-2.51	0.012
ΔCEXP	-0.0104	0.0041	-2.54	0.011
ΔGDPG	-0.0042	0.0019	-2.21	0.027
ΔINF	0.0021	0.0012	1.78	0.075
ΔUNEMP	0.0083	0.0024	3.46	0.001
ΔEXR	0.0031	0.0017	1.82	0.068
ΔTOP	-0.0048	0.0020	-2.40	0.016
ECM (-1)	-0.611	0.082	-7.45	0.000

Source: Author's Computation using STATA, 2026

Table 5 shows the error -correction (ECM -1), which is a measure of how short-run failures to the long-run equilibrium are corrected in the model. The ECM coefficient is -0.611 with a standard error of

0.082, the z -statistic, -7.45, and the probability value, 0.000, which, in turn, proves that it is negative and has high statistical significance. The existence of a long-run equilibrium relationship between income inequality and recurrent and capital expenditure, as well as the macroeconomic control variables, is supported by its negative value. The value of -0.611 shows that around 61.1 percent of any imbalance in income inequality of the previous period is balanced in a year. Such a relatively fast adjustment rate means that the trends of fiscal spending and the macroeconomic situation in the BRICS economies adapt quickly to define the long-run equilibrium again.

Table 6: Panel ARDL Long-Run Results (PMG Estimator)

Dependent Variable: **GINI**

Variable	Coefficient	Std. Error	z-Statistic	Prob
REXP	-0.0214	0.0061	-3.51	0.000
CEXP	-0.0182	0.0053	-3.43	0.001
GDPG	-0.0071	0.0022	-3.18	0.002
INF	0.0043	0.0019	2.26	0.024
UNEMP	0.0132	0.0031	4.21	0.000
EXR	0.0065	0.0028	2.31	0.021
TOP	-0.0094	0.0032	-2.94	0.003

Source: Author's Computation using STATA, 2026

The long-run estimates obtained by the Panel Autoregressive Distributed Lag (P -ARDL) model as estimated by the Pooled Mean Group (PMG) estimator, where the dependent variable is the Gini coefficient, are reported in Table 6. The findings enlighten the long-run effects of disaggregated public spending and the chosen macroeconomic variables on the income inequality in the BRICS economies during the period of the research. The coefficient of recurrent government expenditure (REXP) is negative and statistically significant (0.0214, z -3.51, p -0.000), which indicates that an increase in recurrent government spending makes income inequality decrease in the long run. This observation implies that spending allocated in wages, salaries, administration, social services and welfare programmes could enhance distribution of income by facilitating employment in the public sector as well as increasing access to social protection and basic services. The size of the coefficient suggests that an increase of one unit in recurrent expenditure causes the Gini coefficient to decrease on the long-run possibility by about 0.021 units. Equally, capital government expenditure (CEXP) is also found to have negative and statistically significant relationship with income inequality (= -0.0182, z = -3.43, p = 0.001). This means that spending on infrastructure, educational institutions, health care facilities and productive public wealth helps to reduce the gap in income distribution amongst the BRICS economies. Greater capital expenditure enhances economic opportunities, drives inclusive growth, and access to basic infrastructure, thus thereby boosting productivity and income earnings by lower-income populations. The negative and significant long-run impact of economic growth (measured by the GDP growth rate (GDPG)) on income inequality is -0.0071 with a z -value of, -3.18 with a p -value of 0.002. The implication of this result is that a long-term growth in the economy would likely lead to better income distribution in the long-run, perhaps by creating jobs, enhancing investment, and growing economic activity.

Conversely, the correlation between the two variables inflation (INF) and income inequality is positive and statistically significant (0.0043, 2.26, 0.024). This means that increasing price levels are more likely to exacerbate income inequality as inflation will impact low-income households more due to their loss of buying power and the rising price of necessary goods and services. Unemployment

(UNEMP) has a positive and very significant impact on the income inequality as well (0.0132, z 4.21, p 0.000) which means that the higher the unemployment rates, the more income inequality is observed. Hampered unemployment lowers income chances of a significant portion of the populace and undermines the distributional framework of the economy. The results show that there is a positive and significant relationship between exchange rate movements (EXR) and income inequality (β = 0.0065, z = 2.31 and p = 0.021), indicating that exchange rate depreciation can also enhance inequality by raising the cost of imports, inflationary effects and asymmetric effects of exchange rate on income. Lastly, trade openness (TOP) has a negative and statistically significant impact on income inequality (= -0.0094, = -2.94, = 0.003) meaning higher levels of integration with the international markets lead to a more equitable distribution of income, which is probably due to an increase in trade opportunities, a rise in investment flows, and creation of more jobs across the BRICS economies.

Table 7: Diagnostic Tests

Test	Statistic	Prob	Conclusion
Serial Correlation LM	1.214	0.297	No serial correlation
Heteroskedasticity Test	2.112	0.143	Homoskedastic
Cross-Section Dependence	0.981	0.326	No cross-section dependence

Source: Author's Computation using STATA, 2026

Table 7 shows the diagnostic tests which are conducted to cheque reliability and validity of the estimated panel ARDL model. The serial correlation test LM has a statistic of 1.214 with a probability value of 0.297 meaning that the null hypothesis of no serial correlation cannot be rejected. The fact that this finding indicates that the residuals are not serially correlated, which proves that there are no autocorrelation issues with the model. The heteroskedasticity test gives a value of 2.112 and probability of 0.143 meaning that the variance of residuals is constant. Further, the statistic presented by the cross section dependence test is 0.981 and probability value of 0.326, which implies that there is no dependency between panel units. All in all, these findings support the quality and strength of the model.

Table 8: Robustness Check – FMOLS Results

Variable	Coefficient	Std. Error	t-Statistic	Prob
REXP	-0.0191	0.0052	-3.67	0.000
CEXP	-0.0164	0.0048	-3.42	0.001
GDPG	-0.0068	0.0021	-3.24	0.002
INF	0.0041	0.0018	2.27	0.024
UNEMP	0.0125	0.0029	4.31	0.000
EXR	0.0061	0.0026	2.34	0.019
TOP	-0.0092	0.0030	-3.06	0.002

Source: Author's Computation using STATA, 2026

Table 8 presents the estimates based on a Fully Modified Ordinary Least Squares (FMOLS) specification, which provides a robustness test to support the existence of the stability and consistency of the long-run parameters estimated using the Panel ARDL model. The findings of the FMOLS also substantiate the findings of the preliminary findings to a large extent and they highlight the statistically significant impact of the disaggregated government expenditure and macroeconomic determinants on income inequality in the BRICS economies in the long-run. The correlation coefficient of recurrent government expenditure (REXP) is negative and its value is statistically significant (= -0.0191, t = -3.67, p = 0.001). This suggest that an increase in the recurrent government expenditure has a downward

pressure on income inequality over the long-run, and that presumably this is because higher levels of government spending increase the provision of public administration, social welfare and government services that boost social protection programmes and growth of employment by the public sector.

There is also a significant negative correlation between capital government expenditure (CEXP) and income inequality (-0.0164 t -3.42 p 0.001). The value of this coefficient is an indication that state investment in infrastructure and the productive sectors leads to inclusive development, thus reducing income inequalities. The growth rate of the gross domestic product (GDPG) is found to be negative and significantly less than 0, with the coefficient of the economic growth equal to -0.0068 with a t-value of -3.24 and p-value of 0.002. This finding suggests that prolonged economic growth reduces inequality because it increases opportunities and enhances work opportunities. Inflation (INF) on the other hand has a positive and significant relationship with income inequality (0.0041 2.27 0.024). Increasing prices have been seen to reduce the purchasing power of the low-income households in a disproportionate way thus widening the distributional disparity.

Unemployment (UNEMP) has a positive and very strong impact on income inequality (0.0125, t- = 4.31, p- =0.001). High unemployment levels worsen levels of income inequality by limiting income generation opportunities to a large population. On the same note, exchange rate movements (EXR) have positive and significant effect on inequality (= 0.0061, t = 2.34, p = 0.019). The changes in exchange rate can create inflationary pressures and unequal sectoral effects which increase income inequality. However, one of them is trade openness (TOP), which has a negative and significant association with income inequality (β = -0.0092, t = -3.06, p = 0.002), meaning that the greater integration into international trade the more balanced income distribution can be achieved by increasing market access and investment and employment opportunities.

Table 9: Robustness Check – DOLS Results

Variable	Coefficient	Std. Error	t-Statistic	Prob
REXP	-0.0203	0.0057	-3.56	0.000
CEXP	-0.0172	0.0050	-3.44	0.001
GDPG	-0.0070	0.0022	-3.18	0.002
INF	0.0042	0.0019	2.21	0.027
UNEMP	0.0130	0.0030	4.29	0.000
EXR	0.0064	0.0027	2.37	0.018
TOP	-0.0093	0.0031	-3.00	0.003

Source: Author's Computation using STATA, 2026

Table 9 shows Dynamic Ordinary Least Squares (DOLS) estimation, which is used as a supportive robustness test to support the long-run relationship between disaggregated government expenditure s and income inequality among the BRICS economies. These results agree with the previously estimated long run coefficients of the Panel ARDL and FMOLS, thus confirming the stability and reliability of the estimated results. The recurrent expenditure (REXP) has been estimated to have negative (significant) coefficient (0.0203, t = -3.56, p = 0.000) which implies that higher the amount spent by the government on recurrent expenditures, the longer the run in which income inequality decreases. In the same manner, the capital government expenditure (CEXP) has a negative but statistically insignificant effect (0.0172, t = -3.44, p = 0.001), which indicates that an investment on infrastructure and productive sectors increases income distribution. Income inequality has a negative and statistically significant association with economic growth (GDPG) (2) (3.18) (0.002), which suggests that a stable economic growth facilitates a more equitable income distribution. Conversely, inflation (INF) has a positive and

statistically significant coefficient (=0.0042, t =2.21, p =0.027), indicating that an increase in the level of price is more likely to increase income inequality (reducing the buying power of the low-income households). Unemployment (UNEMP) also demonstrates the positive and highly significant effect (0.0130, t 4.29, p 0.000), which means that the higher the levels of unemployment are, the greater the income inequalities are created due to the restricted earning opportunities of the vast majority of the population. Income inequality is positively associated with exchange rate movements (EXR) (0.0064, t=2.37, p=0.018) and the same argues that the impact of a depreciating exchange rate may worsen the level of inequality by putting pressure of inflation and disproportionate effects on economic activities. Trade openness (TOP) on the other hand shows negative and statistically significant coefficient (0.0093, t -3.00, p 0.003), which shows that greater involvement in international trade contributes towards the reduction of income inequality in the form of creating more employment opportunities, increased inflows of investments and enhanced economic integration.

Discussion of Findings

The empirical evidence presented in the present study explains the effect of disaggregated government expenditure in the BRICS economies on income inequality. The descriptive statistics and correlation analysis prove that both recurrent and capital outlays have a negative relationship with the Gini coefficient; thus, suggesting that higher governmental spending encourages a much more equal income distribution. These initial tendencies echo with the available empirical literature which highlights the redistributive role of the fiscal policy. To illustrate, Ullah et al. (2024) and Alves and Afonso (2022) also mention that government spending, especially expenditure on social sectors, would reduce the inequality between incomes, which is again in line with the rest of the literature that fiscal spending is a redistributive tool. This conclusion is supported by the long-run panel ARDL findings, which prove that recurrent and capital government expenditure s have significant negative impacts on the reduction of income inequality in the BRICS economies. This observation supports the argument presented by Singh and Zhao (2022) that repeated social spending has short-term inequality-reducing impacts whereas capital expenditure has long-term development channels that lead to better income distribution. Similarly, the findings can be compared with the finding of Ghosh and Neog (2022) who found that capital investment has a reducing effect on inequality in the long term as it enhances productivity and increases the number of workers employed.

The findings of Bastagli, Coady and Gupta (2021) who argue that the improvement in social protection spending is significantly negative in terms of the Gini coefficient are also supported by negative and statistically significant impacts of recurrent expenditure. Besides, the positive correlation found between the inflation rate and income inequality is in line with the available empirical studies that suggest that macroeconomic instability reduces purchasing power of low-income households in higher proportions. Despite the fact that inflation has not been the core area of expenditure-inequality studies, the current finding further supports the overall literature that identifies inflationary pressures as being the cause of purchasing power narrowing of the poorer populations. Equally, the role of unemployment in increasing income inequality supports the structural thesis that labour market frictions increase income inequalities by reducing access to income-earning opportunities. The negative impact of economic growth on the inequality supports the inclusive growth paradigm that has been observed in many empirical studies. As an example, Rahman and Alam (2023) show that fiscal policies can decrease inequality over the long term provided that economic growth is positive. Similarly, the negative correlation of trade openness is a pointer that the integration into the global markets could also promote more equitable distribution of income, which is probably by creating employment opportunities and increasing investments.

The consistency of the estimates generated using robustness cheques based on FMOLS and DOLS suggest that the findings are stable and consistent with the panel ARDL results. On the whole, the findings are mostly consistent with the available empirical research as reviewed above especially the ones that support the relevance of expenditure composition in the formation of redistributive outcomes. Although a part of the scholarly literature indicates that capital spending can affect inequality indirectly, nonetheless, the current research demonstrates that recurrent expenditure as well as capital expenditures are both important in reducing inequality in the BRICS economies thus indicating the importance of disaggregated fiscal analysis.

Conclusion and Recommendations

The study analysed the government expenditure and income inequality in the emerging economies by conducting the cross-country analysis of BRICS countries during the study period. The results are very robust empirically that disaggregated public spending is significant in determination of income distribution in emerging markets. The long-run outcomes of the Panel ARDL model suggest that recurrent and capital public spending have a significant negative effect on the income inequality and hence that government spending aimed at social services, welfare programmes, infrastructure development, and productive public investments has a positive impact on the distribution of incomes toward a more equal distribution. According to these results, fiscal policy is one of the key tools that can foster inclusive growth and enhance social welfare in the developed economies. The findings also indicate that economic growth helps in alleviating inequality thus illustrating the relevance of a long term economic growth in enhancing the distribution of incomes by creation of more jobs and productive ventures.

Nevertheless, the paper also elicits that macroeconomic instability further widens income inequality among the BRICS economies. What is discovered is that inflation, unemployment, and exchange-rate volatility are the major determinants of income inequalities such that increasing prices, labour-market failures and exchange-rate volatility are found to have a disproportionate impact on the lower-income households. The results are important to highlight that when the macroeconomic conditions are stable, it is then necessary to ensure that the gains of economic growth and state expenditures are reflected in the better distribution of income. The opposite is however true in terms of trade openness which is identified to decrease inequality, which implies that being opened to global market can boost employment prospects, inflow of investment and inclusive economic growth with proper domestic policy in place. The consistency of the results is also proved by the robustness cheques based on FMOLS and DOLS, and diagnostic tests show that the estimated model is robust and does not have any econometric issues.

Relying on these results, the paper reaches the conclusion that fiscal policy and macroeconomic stability are essential to curb the income inequality in the emerging economies. The BRICS governments must thus increase their apprehension in increasing productive government expenditure especially in, education, healthcare, infrastructure, and social-protection programmemes, since they increase economic opportunities and better distribution of income. Moreover, the policymakers must consider using measures to attain sustainable economic growth and employment to help decrease unemployment levels and improve household incomes. Inflation and exchange-rate volatility should also be kept in cheque by maintenance of macroeconomic stability by sound monetary and fiscal policies. Moreover, governments need to keep on encouraging openness of trade although domestic industries and labour market in the countries should be properly supported to ensure that the gains of international trade are widely distributed among the citizens. Altogether, this needs to be a balanced policy framework that incorporates inclusive fiscal spending, stability in management of the macroeconomy, and openness to global trade to be able to successfully manage the problem of income inequality in emerging economies.

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