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Greenhouse Gas Emissions and Economic Growth: An Empirical Analysis of BRICS Nations

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ABSTRACT

This study explores the economic impact of greenhouse gas emissions in BRICS countries. through quantitative data analysis, the findings reveal a positive association between greenhouse gas emissions and economic growth, particularly in rapidly industrializing nations such as China and India. This underscores the challenge of balancing economic expansion with environmental sustainability. This suggests that current growth models in BRICS economies are closely tied to carbon-intensive production, raising concerns about the sustainability of such trajectories. The study underscores the importance of environmental governance in shaping long-term economic and ecological outcomes. It advocates for the adoption of green technologies, cleaner industrial processes, and stronger regulatory frameworks to help decouple economic performance from environmental degradation. As BRICS countries continue to play a vital role in global growth, the need for a strategic shift toward low-carbon economies becomes increasingly urgent. It advocates for the adoption of green technologies and proactive climate policies, offering valuable insights for policymakers seeking to address both economic and environmental priorities.

Keywords: *Greenhouse Gas Emissions, Economy, Inflation, Climate Change, BRICS*

INTRODUCTION

Economic development is an improvement in the manufacturing of services and products in the country, by which the national wealth increases within a specific time. economic growth can be contributed to by capital goods, labor force, an increase in government spending, and technological advancement. economic growth can play a significant role in the stability of a country. the key point of economic growth is that more will be available to more people. if the country has stable economic growth, the poverty rate reduces,

more jobs, better living standards, and more financial security. in some west the BRICS is used as an alternative to Western-dominated institutions led by nations comprising some of the leading developing countries.

Some countries in BRICS are developing, and the factors that influence economic growth are population growth, capital formation, education and training, unemployment, political factors, government policies, natural resources, interest and exchange rates, and climate change. climate change is a factor that influences the growth of the economy on a larger scale. climate change is an alteration in temperature and weather patterns that occurs naturally. the factors that cause climate change to occur are power plants, the agriculture sector, landfills, deforestation, and burning fossil fuels. as we know that China is the only country that takes part in the emission of carbon dioxide that affects the weather's changing at a large scale. in 2023, China released carbon dioxide of at least 11.9 billion metric tons, making it the largest polluter of the world in that year. the main factors that affect economic growth are climate change in such ways damage of infrastructure, health impacts, decreased natural resources and all other factors. climate change can be the cause of consequently reduced economic growth and vicious conflict in the long run due to resource scarcity.

The relationship between change in climate and profitable growth has become a critical field of exploration, in particular in the environment of rapid-fire development husbandry. BRICS (Brazil, Russia, India, China and south Africa), represent a peculiar group up to development frugality, which is faced with a double problem of profitable stimulation, barring while barring sustainability environmental. in recent decades, these countries have endured significant profitable expansion, but this growth frequently occurs due to the growth of greenhouse gas emissions. since global problems concerning climate change are bettered, an understanding of how emigrations affect profitable growth in these countries is important for the development of a policy that balances the purpose of development using environmental tasks. this study aims to probe the connection between profitable increases and greenhouse gas (ghg) emigrations in BRICS countries. the main exploration question is whether the increase in ghg emigrations, which is frequently a by-product of industrialization and urbanization, is negatively or appreciatively identified with profitable growth in these countries. the purpose of the study is to come to a broader interpretation of how climate change mitigation strategies may affect the profitable circles of these countries. the findings may give precious information for policymakers seeking to achieve sustainable growth in a period of adding environmental challenges.

LITERATURE REVIEW

Change in climate's effect on increase of economy, the dependent variable used in the study was growth of economy and an independent variable used was climate change. this paper has also shown through the test that both have negative and significant relationships with one another (akram & gulzar, 2013). knight & schor (2014) what effect economic growth has on carbon emission, worked with economic growth as an independent variable. while carbon emission was the dependent variable. resourcing test, the analysis identified a robust relationship between economic growth & carbon emission. as stated by de angelis et all. (2019) explained the relation between gdp and greenhouse, type of research designs whose independent variable was gdp and having ghg as a dependent variable. applying test, study establish that relation of u shaped existed among economic growth in addition ghs as income rose.

As pointed out by Fankhauser & tol (2004) on the impacts that economic development has on climate change, it was cross cross-sectional study that employed only one independent variable, economic growth, and only one dependent variable, climate change. basing on the test, the study realized that there is an inverse relation between economic development and climate change. according to Aiza Shabbir et al. (2019), they examined the role of natural resources in economic growth. in this paper, the new evidence from Pakistan, the authors have used GDP as a dependent variable while pop war, CO2, and df as

independent variables. consequently, with a testing ground through the study of the nominated variables for Pakistan, coupled with the GDP evidence obtained, a near-unidirectional connection operation among variables exists within the brief horizon of the short run. according to Sabeeha Ullah et al. (2024), they analyzed the climate changes, governance, and economic growth trends in Asia: the analysis of co-integration is done in this panel using CO2 emission as a dependent variable, the economic development as the independent variable. therefore, when using test in the study, the long-run elasticities showed that the relation between CO2 emissions and economic growth is positive.

According to Babatunde et al. (2015), the relation between weather change and GDP in Africa: this cross-sectional overview employed weather change as the independent variable and GDP as the dependent variable. according to the test, the present study revealed a negative correlation between both variables. according to Sajid Ali et al. (2019), they examined how climate change affects economic growth: the study used climate change as an independent variable and economic growth as a dependent variable, and collected preliminary data from Pakistan. according to the findings of the test in the study, CO2 and temperature influence economic growth significantly negatively influence economic growth. according to Akram and Hamid (2015), they examined the change in climate terror to the economic development of Pakistan. The study used temperature as an independent variable and economy as the dependent variable, and climate change. a study, by applying tests, found that temperature is strongly negatively related to GDP.

According to j.m. Ferreira et all., (2020), checked the impact of natural patents on innovation transfer, climate reform moderation, and sustainability and economic development: the present study has adopted technology transfer & GDPs as research variables in their respective capacities; with technology transfer technique being compared with the European countries. that technological advancement influences the growth rate in Europe on environmental patents, this study established through test, where study realized that the technology transfer policies show how. Alagidede et all. (2014), examined the influence of climate change on economic growth. some findings from ssa (sub-Saharan Africa) center on the use of the variable temperature as an independent variable, with another independent variable as economic growth. by applying the test, the study can uncover the existence of an unexpected long-run co-integration between temperature and economic growth.

The study analyzed in the paper by C. Moore & b. diaz (2015) entitled examined the impact of temperature on economic development justify stringent mitigation policy it is stated that independent variable was temperature, cumulative co2, optimal carbon tax while the two dependent variables were growth rate sensitivity, climate sensitivity. as the test indicated, this study shows that support for empirically derived estimations of the relative importance of temperature effects on growth rates that correspond to the positive adaptation assumptions can be strongly supported while also providing evidence that goes beyond the likely sensitivity of the identifications to arbitrary probabilities by the specific rate of adaptation. focusing on the various climate change trainers of vagueness of in societal cost of carbon, moyer et al. (2013) examined climate change as an independent variable and economic growth, human society & productivity & scc as dependent variable. employing tests, the study established that climate change, a first-order resultant influence economic growth, productivity & scc. the relationship is negative.

In the study by wade & jennings, (2015) explored how climate change affected the world economy, cc(gt) applied as an independent variable while eg(gdpg) was the dependent variable. with test the study realizated a new light on the point that climate change inversely proportional to economic growth is and worse for developing economies. according to e. maykova et all., (2017), after a synthesis of, journal of environmental management and tourism, the study in consideration used tourism as an independent variable while environmental management was applied as the dependent variable. thus, in this case,

through testing, the analysis found that tourism has a positive influence on economic growth. s.j.tol (2011) used significant and cultured climate change over the twentieth and twenty-first centuries, using climate change as an independent variable while energy demand, water resources, biodiversity, and sea level as the dependent variables. when tested, the critical negative effects identified in the analysis are energy demand, water resources, biodiversity, and sea level rise. potential climate change until the year 2100 is positive and provides benefits to human health and agriculture. leichenko & a. silva (2014), examined climate change and poverty: exposure, effects, and alleviations plans. the study used climate change as an independent variable and poverty, vulnerability as dependent variable. using a test, the study found that the contacts between climate change and poverty are multifaceted.

According to samie et all., (2020), examined the impacts of future land use/land cover changes on climate in pakistan's punjab province: implications for environmental sustainability and economic development, the study used land use and land cover changes (lulcc) as an independent variable and climate change (temperature) as a dependent variable, the study found that there is a positive relation between them. according to adgera et all., (2004), examined the successful revision to climate change across scales, the study used the climate change as an independent variable and physical and ecological systems as a dependent variable. using tests, the study found that there is a significantly negative relation between them. according to fernandes et all., (2021), they examined the green growth in opposition to economic growth: do sustainable technology transfer and inventions hint to an inadequate choice? the study used sustainable technology & innovation (green growth) as an independent variable and economic growth as a dependent variable. using tests, the study found, sustainability and innovation have positive relations with economic growth.

According to s. j. tol (2012), in " examining the improbability about overall economic impact of climate change, the study used the (climate change) ghg emissions as an independent variable and economy as a dependent variable. using test, the study concluded a negative relation between both variables. according to alshubiri & elheddad (2019), examined nexus of foreign finance, economic growth plus carbon dioxide emissions in oecd countries, the study used co2emissions as an independent variable and foreign finance, economic growth as a dependent variable. using test, the study found that co2 as a u-shaped relation with foreign finance and a reversed u-shaped relation with the economic growth. according to devereuxand & edwards (2015), examined the climate change and food security, the study used climate change as an independent variable and food security as a dependent variable. using test, study concluded, negative relationship climate change has with food security in long term and might be positive relation in short term.

According to zenghelis (2012), examined strategies to restore trust and economic growth through green investment furthermore innovation. the study used green investment & innovation as an independent variable and economic growth as a dependent dependent variable. using test, the study uncovered that there is a positive relationship between green investment and economic growth. according to w. callahan & s. mankin (2023), examined the globally unequal impact of extreme heat on economic growth, the study used temperature as an independent variable and economic growth as a dependent variable. using test, the study found that show a significantly negative relationship for undeveloped countries. according to owusu & asumadu-sarkodie (2016), examined the evaluation of renewable energy sources, sustainability problems and climate change mitigation, the study used renewable resources as an independent variable and climate change as a dependent variable. using test, the study found that more efforts toward renewable resources help to overcome the climate change.

In c. moore & b. diaz (2015) examined the temperature effect on economic growth justify stringent mitigation policy temperature was the independent variable while economic growth was the dependent variable employing the test, the study framed that negative impact of climate change on economic

performance. according to Hensler & Schumacher, (2019) the research design used in the study was weather was used as an independent variable, while gdp was the dependent variable the study analyzed the weather impact on economic growth and it productivity measures. by employing tests, the study realized that climatic conditions hurt the three elements of production. For the mitigation policy, the study used temperature as an independent variable and economic growth as a dependent variable. Using test, the study set up that climate change has with negative influence on economic output. According to Henseler & Schumacher (2019), who examined the effect of weather on economic growth and its production factors, the study used weather as an independent variable and GDP as a dependent variable. using test, the study found that climatic conditions negatively affect the three components of production. when analyzing the impact of stabilizing global temperatures on economic growth at 1.5°c or 2°c warming, which is examined by pretis et all., (2017) temperature was used as an independent variable while the economic growth was on the dependent variable. by employing test, the result shows that here is a negative linear relationship between climate led contraction in per capita GDP growth and national income at $p<0.001$.

Parry et al. (1999) examined climate change and world food security: in the study, climate change was an independent variable, while global food production was the dependent variable, a new assessment. holding with the test, this study also discovered a negative relationship between them. The study done by S.J. Tola et al. (2000) analyzed how much damage climate change will do. In conducting recent estimates, the researcher used climate change (global warming, temperature) as an independent variable and economic growth as the dependent variable. applying the test, the study indicated that negative relation. the impact of climate change is more effective for poor countries instead for developed countries. climate change is more effective for poor countries than for developed nations. Following Hallegatte et al. (2004), using climate equivalents for considering climate change economic impacts in urban areas, an econometric and statistical analysis used climate change as an independent variable and economic impact as the dependent variable. with the help of the test, the study used the recommendation of the test. It concluded that climate change is economically efficient if it looks forward to the long run. Still, if it is going to look forward towards the short run, then it is or can be very damaging for the economy of the country.

According to m. Bo u w er (2010) examined how anthropogenic climate change increased disaster harms. the study used climate (weather) as an independent variable and disaster loss as a dependent variable. Using tests, the study concludes that due to climate change, the country will face disaster loss, positive with each other. maria bădîrcea et al. (2021) examined the involvement of the blue economy and economic growth to climate change: evidence from European Union countries. The study used gross domestic product (GDP) as an independent variable and greenhouse gas emissions (GHG) as a dependent variable. using the test, the study found that the blue economy and economic growth both influence greenhouse gas emissions. according to Fankhauser & S.J. Tol (1996), who examined the recent innovations in economic valuation, the study used climate change as an independent variable and economy as a dependent variable. using test, the study concludes that there is a negative and positive relationship stuck between them.

METHODOLOGY

The study is based on quantitative panel data that is collected from the WDI (World Data Indicator). Usually, data collected from the WDI is valid and authentic because almost all the researchers across the world use this to collect data for their research, which proves its validity and authenticity.

Variables

Dependent variable

Economic Growth: This refers to the increase in the inflation-adjusted market value of the goods and services produced by an economy over time. It is commonly measured by the annual percentage change in Gross Domestic Product (GDP), (Babatunde o et al., 2015; Sabeeh Ullah et al., 2024; Alagidede et al., 2014).

Independent variables

Greenhouse Gas Emissions

This represents the total emissions of greenhouse gases, typically measured in metric tons of carbon dioxide equivalent (CO_2). It serves as the primary explanatory variable to assess its impact on economic growth (Swarta et al., 2003).

Control Variables

Inflation: Measured as the annual percentage change in the Consumer Price Index (CPI), inflation is included to control for the macroeconomic environment that might influence economic growth.

Climate Change: Represented through indicators such as average temperature rise, frequency of extreme weather events, or climate risk indices. This variable helps control for environmental factors that can also affect economic performance.

Statistical tools

Multicollinearity

The existence of perfect polynomials is a violation of one of the basic assumptions. indications that the relationship between the values of all the explanatory variables is perfectly linear. this results in OLS method not being able to estimate the population constraint. the study used a relationship matrix and a variance inflation factor to measure multicollinearity.

Heteroskedasticity

In the (CLRM) assumptions, the error term in the relationship between both variables is constant across values.

$$\vee ar(\varepsilon t) = \sigma 2$$

Heteroscedasticity is a serious problem that occurs due to the violation of the assumption, which means that among all the independent variables, the error term is not constant.

Model Specification Test (Hausman's test)

When doing model selection using Hausman's the null hypothesis is that individual estimators are constant and the estimator β0 is negative, with the alternative hypothesis that β0 is constant but the estimator β1 is inefficient; however, efficient when the dl model is true. in short, it sees the test, if there is one on the unique error in the model and the correlation between the regressors.

$$h = (\beta FE - \beta RE)\ [\text{variance}\ (\beta FE) - \text{variance}\ (\beta RE)]{-}1\ (\beta FE - \beta RE)\tilde{}\ x2$$

Fixed effect model

Fixed effects models are also called least squares dummy variables (LSDV) estimators, in which the group mean is fixed as opposed to a random effect. Here, constant is considered group-specific.

$$yit = \sigma it + \beta 1X1it + \beta 2X2it + - - - - - - - - - - - - - - - - - + \beta kXkit + \varepsilon it$$

yit is the dependent variable for individual i observed at time t, xit is the regressor, and alpha (σit) is an individual effect that is the unobserved time variation and is the error. the term is to test the following regression model.

$$tuNNit = \alpha 0 + \beta 1IGOit + \beta 2FCEOit + \beta 3BIit + \beta 4FSIZEit + \varepsilon$$

Panel Unit Root Test

For testing the root, both the df and adf unit root tests are generalized for panel data estimation, while for the rejection of the root, Umpisran and Shin (ips) test has been used, which is typically the mean of adf. Statistics The Ips Test offers a single worth estimate for every i section and therefore offers different possibility readings. total parameters, regression sum of squares, and interval size.

$$\Delta \gamma i, t = \alpha\, i + \gamma\, i, t{-}1 + \sum \emptyset\, k\, \Delta\, \gamma\, i, t{-}k + \delta\, it + \theta\, t + \mu\, it$$

$$H0{:}\ \rho i = 0\ for\ all\ i\ \text{h1:}$$

$$\rho i < 0\ for\ at\ least\ one\ i$$

the null hypothesis indicates that the mean of all the series equals one; on the other hand, the alternative hypothesis indicates that some parts of the series have no unit root, that is they are stationary.

Panel Cointegration Test

The main problem in panel cointegration is the spurious regression that occurs in the presence of the most popular tests for covariance of instability are based on angle and Granger, collinearity, with the analysis consisting of a standard ADF test on the residuals μt

$$yi,t = \rho ei,t{-}1 + \sum \emptyset j\ n\ j{=}1\ \Delta ei,t{-}j + \mu it$$

Panel Autoregressive Distributed Lag (ARDL)

ARDL is a statistical co-integration technique that follows ordinary least squares (OLS). a covariance estimation procedure for projecting long-run and short-run coefficients simultaneously, ARDL was found to be the best econometric technique compared to others.

$$tUN = f\ (IGO, FCEO, BS, BI)$$

$$ho{:}\ \alpha = \beta 1 = \beta 2 = \beta 3 = \beta 4$$

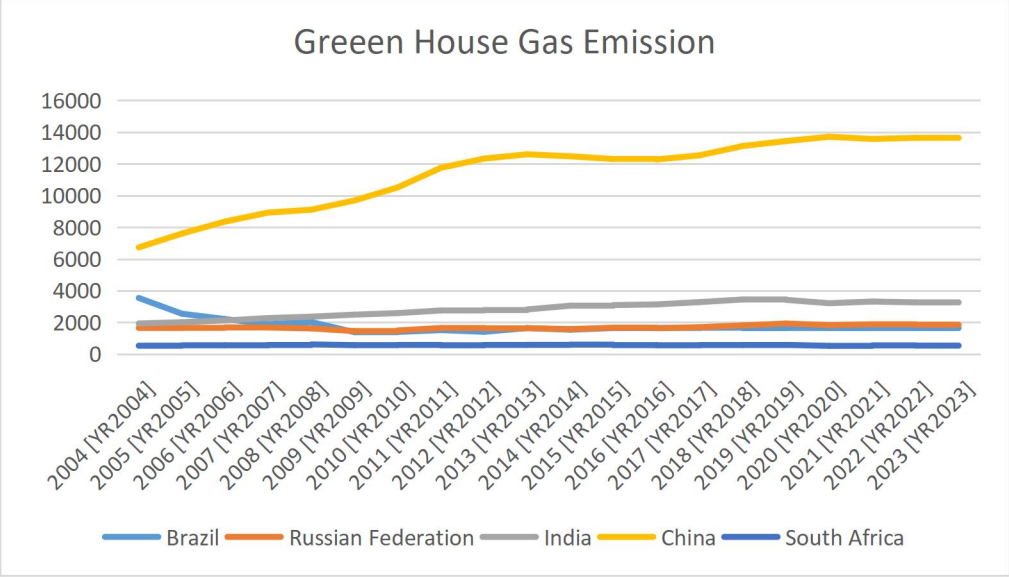
$$h1{:}\ \alpha \neq \beta 1 \neq \beta 2 \neq \beta 3 \neq \beta 4 \neq \beta$$

Table 1: Results of summary statistics of all variables used

variable	obs	mean	std. dev	min	max
gdp	100	4.300656	4.054049	-7.799994	14.23086
ghge	100	3659.086	4092.422	520.1389	13706.06
eg	100	0.325	1.04053	0	4
geest	100	-0.0299484	0.3353413	-0.7124619	0.8079116
gestanerror	100	0.2083957	0.0224088	0.1760887	0.3030187
inflation~i	100	5.538908	3.041196	-0.7281653	15.53441
cpi	100	125.7732	41.00009	54.53152	216.862

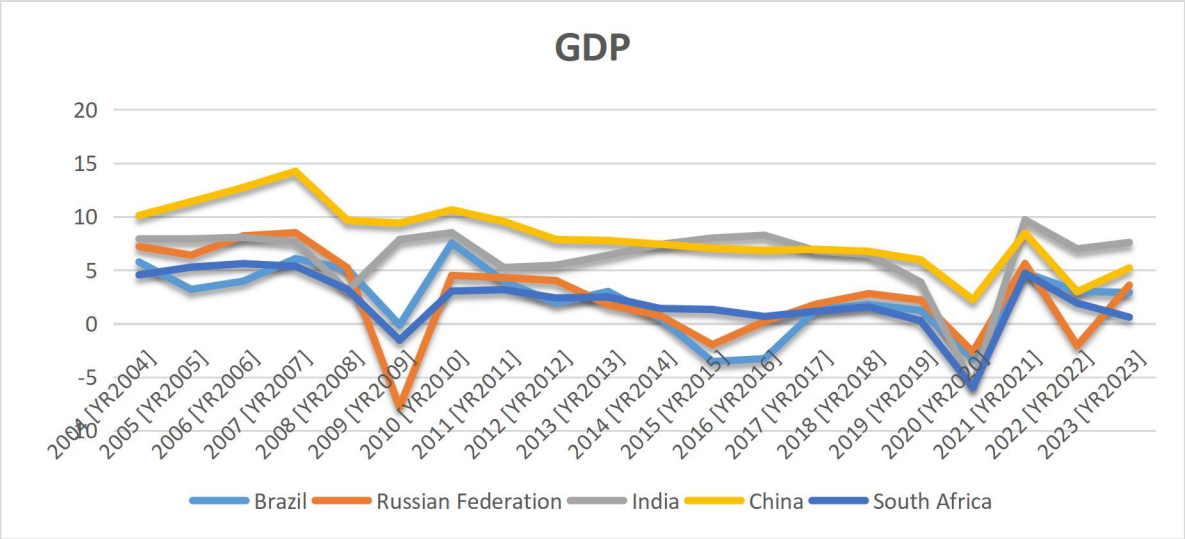
ANALYSIS AND RESULTS

Table (1) presents an average value of cpi (125.7732) having a standard deviation of (41.00009) also carrying a minimum (54.53152) and a maximum value of (216.862). inflectional has an average value of (5.538908) having a standard deviation of (3.041196) also carrying a minimum (-0.7281653) and a maximum value of (15.53441). environmental governance has an average value of (0.325) having a standard deviation of (1.04053) also carrying a minimum (0) and a maximum value of (4). geest has an average of (-.0299484), having a standard deviation of (0.3353413) also carrying a minimum (-0.7124619) and a maximum value of (0.8079116). gestanerror has an average of (0.2083957), having a standard deviation of (0.0224088), also carrying a minimum (0.1760887) and a maximum value of (0.3030187). GHGE has an average of (3659.086) having a standard deviation of (4092.422), also carrying a minimum (520.1389) and a maximum value of (13706.06). GDP has an average of (4.300656), having a standard deviation of (4.054049) also carrying a minimum (-7.799994) and a maximum value of (14.23086).



:

This graph shows the ratio of emission of greenhouse gas emissions of BRICS countries over the last 20 years. This graph shows that in 2004, China focused on strengthening the economy led to the emission of more CO2 in the atmosphere.



This graph shows the GDP of the BRICS countries for the last 20 years. This graph tells us that China focused on its economic growth from 2004 to 2008 and after that, China thought that they have damaged a lot to the atmosphere. in 2019, China was the top country that emits almost 30% of the carbon dioxide emissions. in 2008, there is a regression of economic growth in the Russia n Federation due to the war with Georgia.

Table 2: Result for exact linear relationship (correlation matrix)

	cpi	inflation	eg	geest	gestanerror	ghge	GDP
cpi	1.0000						
inflationa	-0.085	1.0000					
eg	-0.242	0.3061	1.0000				
geest	-0.082	-0.4938	-0.0097	1.0000			
gestanerror	0.6575	-0.0506	-0.2582	-0.075	1.0000		
ghge	-0.113	-0.4839	-0.0913	0.5018	0.1599	1.0000	
gdp	-0.381	-0.2054	0.1838	0.2274	-0.2145	0.4552	1.0000

Table 2 reveals the results of the existence of a definite linear relationship between all the variables used. it is clear that none of the values exceed 90%, which indicates the existence of perfect multicollinearity, so all variables are independent of the violation of basic assumptions.

Table 3: Result of OLS regression model

GDP	coef.	std. errs.	t	p>|t|	[95%conf.	interval]
ghge	.0004388	.000111	3.95	0.000	.0002184	.0006591
cpi	-.02417	.0118897	-2.03	0.045	-.0477806	-.0005593
inflation annual	-.1402691	.1460557	-0.96	0.339	-.4303069	.1497686
eg	.6741289	.3585943	1.88	0.063	-.0379682	1.386226
geest	-.8720966	1.269087	-0.69	0.494	-3.392252	1.648059
gestanerror	-16.40726	22.10399	-0.74	0.460	-60.3014	27.48688
_cons	9.686071	3.656739	2.65	0.009	2.424512	16.94763

number of obs	100
f (6, 93)	8.93
prob> f	0.0000
r-squared	0.3513
adj r-squared	0.3094
root mse	3.3689

Table 3, shows the result of the fixed effect model. GHGE shows important concerns with the economic growth. ghge is statistically appreciable (0.045) and in a positive (.0004388) relationship with the economic growth.

Table 4: Results of the fixed effect model

gdp	*coef.*	*std. errs.*	*t*	*p>|t|*	*[95% conf.*	*interval]*
ghge	0.0006764	0.0000816	8.29	0.000	0.0005138	0.000839
cpi	0.0884541	0.0198155	4.46	0.000	0.0489796	0.1279286
eg	0.5455712	0.2488299	2.19	0.031	0.0498767	1.041266
geest.	1.029762	.9192959	1.12	0.266	-0.8015698	2.861093
gestanerror	-22.9671	24.39108	-0.94	0.349	-71.55663	25.62242
_cons	-4.659648	5.459621	-0.85	0.396	-15.53577	6.216475
sigma_u	5.2917605					
sigma_e	2.3419037					
rho	.83622083					

Table 4, exhibits the results of the fixed effect model. ghge was found significant concerning with the economic growth. ghge shows statistically appreciable (0.000) and in positive (0.0006764) relationship with the economic growth (gdp).

Table 05: Result of model specification test/ hausman's specifications

chi-square statistics	***Probability***
61.33	0.0000

Table 5 below it becomes clear since the probability value is less than the significance value of 0.05 indicating that the null hypothesis of a study that means there is a random effect can be rejected. the same applies when accepting the other hypothesis that the fixed effect is superior, appropriate and has positive consequences.

DISCUSSION

Comparing and contrasted with previous research, results of the present study provide some evidence of the BRICS' co-movement of economic growth, ghge and environmental policies. the significance and positive correlation between the ghg and gdp in the fixed effects models shown above supports the hypothesis that co2 emissions have risen with economic development in the emerging markets most especially, China, result that is in concordance with Grossman & Krueger (1995). the study carried out in the recent past established that there is an increasing correlation between ghg emissions and economic development since every economic activity translates to the emission of more greenhouse gases as evident

from the case of China and India among others. they explained that initial research has also indicated that economic growth leads to emissions in the short run but it is tied to a change in the long run as countries transition to emission-friendly technologies and cleaner processes (li et al., 2021). in addition, inflation has been reviewed, and its poor influence to growth has been elaborated in regard to the opinion considering the BRICS countries, proving with the help of environmentally sensitive indexes that inflationary pressures are not extremely dangerous for growth in the countries of the group of fast-growth economies (hang & Zhang, 2023). however, in some of the BRICS countries, the shift in environmental policies is regarded as slow because the policies have not unlike delivered on their promises of green wash economic growth. similarly, the inverse relationship between the consumer price index (cpi) and inflation confirms earlier studies' findings that inflation influences consumers' expenditure and economic events. moreover, compatibility between the environment measures of ec and economic growth represented through the gdp indicates that strong environmental policies are beneficial for growth as stern (2007) suggested. nevertheless, the study argues that the environmental governance estimate (geest), is statistically insignificant, contrary to other studies that directly map environmental governance to business performance (Mazzanti and Zoboli, 2008). second, the relatively low significance of inflation as a determinant of economic growth also implies that the notion of inflation as a factor that hinders growth is invalid in the case of the BRICS economies (Fischer, 1993). this research also does not find a clear relationship between inflation and greenhouse gas emissions – something that raises doubts on authors such as Hamilton (2003) who brought to light the energy price as a determinant of inflation.

CONCLUSION

The study explores the nexus between climate change and economic growth within the BRICS nations, focusing on greenhouse gas (GHG) emissions alongside various environmental and economic factors. The findings reveal a significant positive correlation between GHG emissions and economic growth, particularly due to high industrial activity in countries like China and India. However, the results indicate that economic growth is a primary driver of emissions, suggesting that the adoption of green technologies and sustainable practices could potentially shift this relationship in the long term. This study underscores the importance of environmental governance in enabling sustainable economic growth, though its effectiveness varies across BRICS countries. Inflation and the Consumer Price Index (CPI) were found to have a weak correlation with economic growth, which contrasts with some findings in the existing literature. These insights call for stronger, integrated policies that promote both economic development and environmental sustainability within the BRICS context. This research provides a valuable foundation for policymakers to design strategies that achieve sustainable growth while addressing environmental challenges. Moreover, the study emphasizes the importance of international cooperation and technology transfer in promoting green economic practices across BRICS nations. Given the diverse economic structures and environmental priorities within this group, a one-size-fits-all approach may not be effective. Tailored policy frameworks that integrate renewable energy investments, environmental regulations, and innovation incentives are essential for each country. The transition toward a low-carbon economy not only supports environmental goals but also opens opportunities for green jobs, sustainable industries, and long-term resilience against climate shocks.

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