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The Moderating Role of Corruption on the Nexus Between Government Spending and Per Capita Income in the Emerging Economies of the BRICS

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ABSTRACT

This paper investigates the moderating role of corruption on the relationship between government spending and per capita income in the BRICS countries (Brazil, Russia, India, China, and South Africa). The panel-corrected standard error model is used to examine the interactive links between government spending, corruption, and economic growth using panel data from the World Bank spanning the years 2000 to 2022. The results show that capital and current government spending positively impact economic growth, but these benefits are significantly offset by corruption. The study emphasizes the necessity of balanced anti-corruption measures to ensure that efforts to curb corruption do not inadvertently hinder the beneficial impacts of government spending on economic growth. The results provide valuable insights for policymakers in emerging economies, highlighting the importance of fostering good governance and effective fiscal policies to promote sustainable development.

INTRODUCTION

The structure of government and its function, as well as the prevalence and consequences of corruption in the public sector, are two factors that impact economic and social policy issues in both established and developing economies. While finding the best financing levels and government function is something that everyone aspires to, many recognize that role can play a major influence in the development of the notion of political business cycles. Similarly, corruption is seen as a bad thing for a nation's economy; its causes may likewise be traced to a number of things, including a lack of openness, shoddy governance, and skewed incentives that erode public confidence in institutions. Consequently, addressing corruption becomes crucial not only for economic growth but also for social development and the overall well-being of the population (Al Qudah, 2024).

The relationship between governance, corruption, and economic success gets more complex as cultures and economies develop. The trajectory of a country's economic development can be influenced by the type of government, namely the degree of interventionism or laissez-faire. The government's decisions

over tax laws, investment programs, and regulatory frameworks have a big impact on public sector corruption. Governments that place a high priority on accountability, openness, and the rule of law foster an atmosphere that deters corruption and fosters economic stability (Magableh et al., 2024).

However, the relationship between corruption and the efficacy of government is more nuanced than simple cause-and-effect analysis. Even if corruption weakens public confidence and takes funds away from worthwhile endeavors, it's crucial to understand that systemic issues frequently give rise to corruption. Income inequality, political unpredictability, and weak institutional frameworks can all foster an atmosphere that is favorable to corruption. These underlying issues are made worse by corruption, which impedes economic development and upholds social inequities.

A multifaceted strategy that includes building institutions, encouraging transparency, and cultivating an integrity-driven culture is needed to combat corruption. Establishing strong anti-corruption measures, such as putting in place efficient legal frameworks, improving monitoring procedures, and empowering independent judicial systems, must be a top priority for governments. Furthermore, encouraging accountability and transparency through open data projects and public participation might be essential in lowering corruption levels.

Furthermore, international collaboration and coordinated effort are needed to prevent corruption. Governments and international organizations must work together to create global standards, share best practices, and bolster systems for mutual legal aid because corruption knows no national borders. Together, nations can effectively fight corruption, promote long-term economic growth, and uphold social justice.

In a sample of BRICS nations, we examine the empirical link between government spending and corruption on economic growth. It is crucial to remember that emerging economies—particularly those of the BRICS—have paid little attention to the nature of the relationship between government spending and growth and the function of corruption as a moderating factor behind that relationship. As a result, by investigating the link from both analytical and empirical angles, this work seeks to close the gap. Prior studies have mostly focused on discussions concerning the structure of public spending, the extent of government, and their effects on economic growth. However, this study intends to make a considerably larger contribution to this topic by taking into account the context of international heterogeneity among nations, which is a feature shared by rising economies. By deepening our knowledge of the connection between public spending, corruption, and economic expansion, we can offer insightful analysis that scholars and decision-makers around the world can use (Bitterhout & Simo-Kengne, 2020).

In conclusion, factors such as the existence and impact of corruption, as well as the structure of government, play a crucial role in influencing issues related to social and economic policy. Societies can strive toward creating efficient plans to support equitable and sustainable growth, fight corruption, and advance good governance by comprehending the intricate interactions among these variables. We can only bring about a society where corruption no longer stands in the way of progress and where governments act in the best interests of their constituents by working together. (Akimova et al., 2020).

1.BACKGROUND AND RATIONALE

Several studies in section 2.2 support the view that countries with low and medium income are generally inclined to spend the highest proportion of their GDP on social welfare services. The necessities and good health are the building blocks that enable people to rise above their current situations of poverty and discrimination and take their futures into their own hands. This is why government spending should focus on this critical area to ground the economic and human development process on a solid basis among all citizens. The size of the government is typically measured by government spending, and governance can be proxied by the level of corruption. The state's role, hence, has a crucial impact on economic and human development, and there has been a debate about the impact on theorizing the roles that the state needs to play (Dorlach, 2021).

The size of government was first conceptualized in an informative manner by Adam Smith to address the role of the government in terms of income and living standards. According to Sinha (1998) and Sandmo (2004), government spending protects citizens in various ways by redistributing wealth and providing welfare services such as education, health, and social security. They use tax revenues to protect the poor and the needy and provide better public goods and services. Government spending patterns across high, medium, and low-income countries also vary. For countries with high-income levels, government spending is concentrated relatively more on public goods and services needed to ensure an adequate safety net for citizens and relatively less toward redistributive ones.

1.1 Research Aim and Objectives

Moreover, the large disparities in political regimes, income levels, and economic structures among emerging economies restrict the usefulness of the empirical results of work to countries in general. Specifically, our work provides fresh evidence from the relatively explicit analysis of government size and economic growth in light of the fragility of empirical findings, as pointed out by Tavares and Wacziarg (2001). Additionally, based on previous research, it seems plausible to argue that less corrupt countries exhibit better-designed economic policy institutions, thus improving the nexus if working with cointegrated vectors. In this sense, and to the extent that empirical works only sparingly examine countries with similar characteristics to mitigate spurious results, the findings of this paper might be manipulated to an audience, as in top-level meetings of organizations and international forums such as G8 and G20.

This study aims to re-examine the effects of government spending on per capita income in the presence of corruption and uncertainty in emerging economies. Since government spending is a broad and relevant fiscal policy, historically used to promote economic growth, and with the large availability of time series data, this paper intends to investigate the effects of such policies for the so-called BRICS countries as a preview of the G20 economies. Investigating this subset of economies is justified because of the empirical exercises performed in the literature. On the one hand, many studies provide evidence of the inefficiency of public spending in the context of many developing countries. On the other hand, a considerable amount of the research on government intervention has focused on developed economies, and only recently have a few analyses been performed on emerging economies.

Understanding the determinants of per capita income, a variable that reflects an economy's overall economic performance, is a subject of significant interest in the economics literature. Distinct from developed economies, emerging economies have examined the role of government spending in promoting economic development following different approaches, which led to mixed findings.

The structure of the paper is as follows. section two is the literature review and will comprehensively analyze previous research on the relationship between government spending, corruption, and per capita income. In section three, the theoretical framework will be developed to examine the moderating role of corruption on the nexus between government spending and per capita income. This will be followed by section four, which will present the research methodology and data analysis techniques. The last section will focus on the conclusions and policy implications of the study.

2. LITERATURE REVIEW

The earliest theoretical work on government expenditure was developed by Keynes (1973), who argued for using public consumption and investment to compensate for decreasing private investment and stimulate aggregate demand under weak economic activity.Wagner (1958) and Peacock and Wiseman (1961) supported Keynes's argument. They used historical observations to suggest a long-run relationship between growth (caused by rising public spending) and the state. More elaborating contributions came from Ramsey (1927), Barro (1989), Meltzer and Richard (1983), who used a more rigorous econometric approach to the subject, similar to the Solow (1956) growth model, and showed that income elasticity for government spending linked to economic growth was much less significant as a policy tool. Other empirical

works, including Grossman and Krueger (1991), Dawson (1998), Weede and Kämpf (2002)an,Gupta et al. (2005) , and the comprehensive review call by Alesina et al. (1998), have been conflicting and equivocal in their results.

This section briefly overviews the empirical literature relevant to this study. Research on the nexus between government expenditure and economic growth and corruption's role in this relationship in emerging economies, particularly the BRICS countries, is scarce and limited. This study contributes a possible policy recommendation on how emerging economies might use appropriate government expenditure to stimulate growth.

2.1 Government Spending and Economic Growth

Cardoso and Faletto (2024) mentioned that the endemic low-income levels of the poor in Latin America led to the conclusion that socio-political exhaustion among the poor and the most disadvantaged led to their contribution to the construction and sustenance of a fiscally efficient state remaining marginal. The relationship between government spending and public preferences provides an overly narrow narrative, given the large and difficult-to-deny evidence of adverse outcomes associated with rising economic inequality in countries with varying levels of economic growth. This refutes the behavioral argument by which citizens are demanding more expensive policies to reduce income inequality, and that the expansion of social rights by the state is covered, given that, by definition, the population has rights. Despite having limited financial resources, they may impose and demand severely more expensive public services. Several theoretical models have extensively analyzed the intricate link between government spending and economic growth.

The Wagner and Peacock-Overseas models, widely acknowledged as pioneers in this field, introduced the first formal theories regarding the demand-based hypotheses of public expenditure growth (Magazzino et al., 2015). In light of the context of a developing economy, both models suggested that public sector expenditure on essential sectors, such as administration, defense, education, health, infrastructure, natural resources, and public order and safety, would inevitably increase in sync with the average income or per capita income of citizens. In essence, these highly influential models argue that for sustainable economic growth, the government must proactively promote growth by expanding the demand for public goods and services while ensuring the allocation of resources is done efficiently and effectively, with the explicit endorsement and support of citizens.

However, the Keynesian model, holding a prominent position among these theoretical frameworks, puts forth a compelling argument that government spending exerts both short-term and long-term impacts on economic growth. This model strongly suggests that carefully tailored fiscal policies, including strategic tax cuts and prudent spending hikes, can remarkably affect the overall economic landscape. Such policies, especially with an already exhausted monetary policy, can significantly raise the GDP and stimulate private investment. Furthermore, these measures can extend the duration of economic expansion, offering a tangible boost to the nation's prosperity and well-being.

The Keynesian model emerges as a prominent and influential framework in light of these theories. Highlighting both short-term and long-term impacts on economic growth, this model underscores the significant role of government spending. It contends that through meticulously tailored fiscal policies, such as strategic tax cuts and prudent spending hikes, governments can remarkably influence the overall economic landscape. By leveraging these measures, particularly when monetary policy has been exhausted, nations can witness a substantial increase in GDP and a rejuvenation of private investment. Moreover, the lasting effects of such initiatives can extend the duration of economic expansion, subsequently enhancing the well-being and prosperity of the entire nation.

Expanding on these crucial topics gives us a deeper understanding of the complexities surrounding government spending and its impact on economic growth. Recognizing the significance of inclusive

policies, governments can better address their citizens' socio-economic challenges, fostering a more equitable and thriving society. Through strategic fiscal decisions and comprehensive resource allocation, nations can pave the way for sustainable economic development and a brighter future for all. (Nguyen and Duong2021)

2.2 Corruption and its Impact on Economic Development

Jiménez and Villoria (2012) groundbreaking study utilizes comprehensive data obtained from INFORM, providing valuable insights into the detrimental effects of corruption on developing nations. Their meticulous analysis reveals that corruption invariably results in amplified production costs and a pronounced decline in overall output, particularly in countries with relatively unrestricted economic channels.

Adding to the discourse, Fang (2024) more recent research sheds light on the short-term consequences of corruption. This investigation demonstrates that corruption hurts hunger levels, production capabilities, investment initiatives, and overall consumption patterns in countries where individuals experiencing a disadvantage are more inclined to engage in bribery practices. It is worth noting that these adverse effects could be mitigated over time as the government initiates the allocation of funds acquired through informal means. The extensive body of literature regarding the intricate connection between corruption and economic development has sparked intense debates among scholars and experts. Within this discourse, one can find a wide range of papers, from those advocating for the notion that some level of corruption can stimulate growth to those presenting contrasting findings that point toward the detrimental effects of corruption on economic progress.

Moreover, the topic has been supplemented by various studies focusing on the developing world. Some of these studies have shed light on the remarkable surge in output and export observed during the 1960s and 1970s, followed by a significant decline in growth and enduring stagnation from the 1980s onwards. Due to these thought-provoking findings, a considerable body of work has emerged to delve into corruption's intricate role in this context.

However, it is worth noting that only a few papers have adequately addressed the impact of corruption on income per capita in large emerging economies. This is a significant gap in the existing literature, which calls for further investigation and exploration to understand the complexities and ramifications surrounding corruption in these particular economies. It is crucial to comprehend how corruption influences these nations' income disparities and economic growth prospects. Thus, bridging this research gap would provide crucial insights into the various dimensions of corruption and its impact on the socioeconomic fabric of large emerging economies. By conducting rigorous research on this topic, scholars can contribute to formulating effective anti-corruption strategies and policies that foster sustainable development and alleviate poverty in these contexts. Consequently, it is imperative to prioritize this study area to promote equitable and inclusive growth in large emerging economies and enhance global efforts to combat corruption (Song et al., 2021).

3. THEORETICAL FRAMEWORK

A larger discrepancy rate between government revenue and expenditure leads to increased growth. A decrease in corporate tax encourages private investment, leading to a rise in the private sector's disposable income. These developments will cause the aggregate demand curve to shift and lead to an increase in investment. In this case, a distortion could lead to a rise in short-term growth but a fall in the long-term growth rate. A shift in the composition of government spending toward purchases of productive products results in a durable growth effect with the formulation of IS-LM-type macroeconomic models. A summary of these ideas indicates that a nation's total economic growth is influenced by its government budget and that the many adjustments brought about by fiscal policy have varying short- and long-term effects on growth (Gurdal et al., 2021).

Growth in facilities can benefit a nation's overall economic development due to more spending in specific industries. A report for the Inter-American Development Bank identified two growth categories: transient and permanent. The former results from a budget deficit in which the government borrows money to fund increased spending, which raises aggregate demand and propels growth. This growth will stop once the deficit is closed through lower government spending. The budget's revenue and expenditure components should be the main emphasis for long-term growth (Beck et al., 2000).

Continuous growth is one of the main goals of development; hence, the literature on emerging economies is interested in learning more about how corruption affects growth. Numerous pieces of evidence point to the negative effects of corruption on economic growth. Ades and Di Tella (1999) provide evidence of the association between corruption and low-quality government investment, which will slow down the nation's growth rate, using a principal-agent type model with a self-interested official. There is also the idea that high corruption frequently results in the government seizing private property. This may cause capital to flee, reducing the amount of foreign currency available.

Growth will be slowed by the loss of recent foreign investment and lower anticipation for future investment. The "context" and degree of corruption can also affect growth differently. Corruption is categorized by Gupta et al. (2005) into large corruption scandals, minor under-the-table dealings, etc. It is said that small-scale corruption, which doesn't entail the exchange of public resources, can occasionally serve as a grease, facilitating the routinely laborious job that public institutions must do. On the other hand, significant corruption scandals hurt the economy. Their simulation results demonstrate how both forms of corruption slow down economic growth by lowering investment, productivity, and educational levels.

3.1 Fiscal Policy and Economic Growth

The relationship between government and economic growth is an important factor in determining a country's economic health. Political motivations are comparatively new in the discussion of growth. Whether or not the government promotes growth is still up for debate. This is significant because it has been stated that there was no widespread government action to affect growth before 1940. Government participation and size metrics have been dispersed throughout several policy categories. This brings up the topic of what policies work best for growth. This is a very wide-ranging, generic query. Nevertheless, the question of how to accomplish the growth objectives can be reduced to fiscal policy, which modifies the economy through taxes and spending by the government.

It has long been believed that achieving full employment of resources is the main goal of fiscal policy. Most people agree that this growth is not inflationary. Many analyses that support intervention are predicated on the idea that the economy may undergo protracted periods of resource underutilization before reaching the full employment growth equilibrium. This is a waste of the economy and is frequently linked to the downfall of sectors or geographical areas. Since full employment is a social requirement, direct progress toward full employment may be hampered by resource flexibility. The distribution of resources and how they get to the growth equilibrium are crucial at this point (Asteriou & Hall, 2021)

3.2 Corruption and Economic Growth

Another important explanation of corruption was proposed in an article on 20 less-developed nations by Leff (1964), the majority of which had extremely corrupt governmental systems. Leff's two main conclusions are as follows: first, the likelihood of corruption increases with the amount of regulation placed on economic activity. The second finding is that the demand for "getting around the law" has an income elasticity larger than unity. Leff notes that while it is difficult to distinguish between low risk and availability-driven demand, higher risk translates into lower penalties, which makes it simpler to pay an official to "get around the law".

Economists and political scientists have given the idea of corruption much attention. Among the scholars who analyze corruption and how it affects economic growth is Olson Jr (1971) who proposed the

existence of distinct groups. According to Olson, there are two kinds of social groups: nomadic and fixed. Because they are more motivated to grow the economy and form a government, stationary bandits are likelier to do so. Violent plundering and resource destruction by roaming bandits eventually result in the suppression of economic activity. Olson contends that there is no motivation for change because shifting from a roaming bandit to a stationary bandit is improbable and would benefit the roving bandit itself.

3.3 Fiscal Policy and Corruption

The first preference is a covert labor model in which the agents are government representatives. Their pay is the opportunity cost in this instance, and the cost of corruption (lost government revenue) is the alternative wage in the private sector. The wealth impacts pertain to the rise in their income, as workers tend to exhibit less price elastic demand for typical products (in this case, labor in the public sector) at higher income levels.

Considering the two inclinations, a rise in public spending will decrease corruption if government revenue increases bureaucrat salaries and a rise in the pay gap between honest and dishonest officials. This is a significant outcome. If the model is extended into a simple endogenous growth framework where each country's level of government determines the rate of technological advancement, an increase in public spending is implied to boost the GDP growth rate. In the other scenario, more public money would be available to support corrupt practices if the stake preference is maintained. At this point, the empirical work assumes the latter scenario (Del Monte & Pennacchio, 2020).

Given its possible bearing on future growth, it is imperative to ascertain whether and how public expenditure affects the equilibrium of corruption. However, from a theoretical perspective, taking this into account directly allows one to build a model with contradictory inclinations. The most apparent choice for a stand-in for fiscal policy is the size of the public sector. On the one hand, a rise in public spending will cover an increase in the politicians' pay if one believes that they are rent seekers. Wealth impacts, therefore, imply that they will be less dishonest. However, a bigger pot of public money means more chances for bribes, and the resources at stake can be greater, suggesting a higher degree of corruption.

4. METHODOLOGY

The study uses panel data from the World Bank statistics for the BRICS nations covering 2000–2022. The dependent variable is the growth in GDP per capita, and the independent variables are government capital and current expenditures, The corruption index examines its moderating impact on the relationship between fiscal policy variables and economic growth. The interaction term between corruption and government expenditures captures the moderating effect of corruption on the connection between fiscal policy and per-capita income, while controls are introduced in the form of labor force, country, and time indicators.

Our approach is designed to analyze the complex interactions between government current expenditures, capital expenditures, the corruption index, and their collective impact on economic growth within the BRICS economic bloc. Using a panel-corrected standard error model and a two-decade dataset from credible international organizations, our methodology enables a thorough analysis of cross-sectional and time-series data, providing comparative and comprehensive insights. This closes the knowledge gap regarding longitudinal and cross-regional studies and improves comprehension of how various regulatory frameworks can moderate the effects of fiscal policies on economic growth. The operational definitions of the study variables are shown in Table 1.

Table 1. Variables, abbreviations, definitions, and measurement

Type	Variable	Abbreviation	Definition	Measurement
Dependent variable	GDP per capita growth	*cpta_grth*	The annual percentage growth rate of GDP per capita is based on constant local currency. GDP per capita is gross domestic product divided by midyear population. GDP at	(annual %)

			purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without deductions for the depreciation of fabricated assets or depletion and degradation of natural resources.	
Government spending Variables	Current Government expenditures	*cur_exp*	Annual percentage growth of general government final consumption expenditure based on constant local currency. Aggregates are based on constant 2015 prices, expressed in U.S. dollars. General government final consumption expenditure (general government consumption) includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditures on national defense and security, but excludes government military expenditures that are part of government capital formation.	(% GDP)
	Capital Government expenditures	*cptl_exp*	Gross fixed capital formation (formerly gross domestic fixed investment) includes land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. According to the 1993 SNA, net acquisitions of valuables are also considered capital formation.	(% of GDP)
The Moderating variable	Control of corruption	*corr*	Control of Corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. Percentile rank indicates the country's rank among all countries covered by the aggregate indicator, with 0 corresponding to the lowest rank and 100 to the highest rank. Percentile ranks have been adjusted to correct for changes in the composition of the countries covered by the WGI.	Percentile Rank (0 -100) [0 extremely corrupt, 100 very clean]
Control variable	Labor force	*labor*	Labor force comprises people ages 15 and older who supply labor for the production of goods and services during a specified period. It includes people who are currently employed and people who are unemployed but seeking work as well as first-time job-seekers. Not everyone who works is included, however. Unpaid workers, family workers, and students are often omitted, and some countries do not count members of the armed forces. Labor force size tends to vary during the year as seasonal workers enter and leave.	(% pop)

Source: World Bank databases.

Kaufmann et al. (2011) created the World Governance Indicators (WGI) to rank nations according to the perceived degree of public sector corruption in industrialized and developing nations and the quality of governance reported by an organization, a citizen, and an expert. A nation's percentile rank shows how it stacks up against other countries in the overall indication. It ranges from zero (very corrupt) to one hundred (very clean).

4.1 Descriptive statistics

Data descriptive statistics, which provide information on the mean, standard deviation, and minimum and maximum values of variables, is always instructive. Table 2 presents the sample statistics that aid in characterizing and understanding the features of the data set in use. Per-capita economic growth varies substantially, ranging from -7.8 to 13.6 percent. There is a comparable variation in the labor force size. The considerable differences in the size of the BRICS populations may be the primary cause of the fluctuation in these two indices. Ranging between 9.8 to 20.8, statistics on current spending seem smooth, but data on capital spending and the corruption index point to clear disparities in government investments and institutional frameworks.

Table 2. Descriptive statistics

Variable	*Obs.*	*Mean*	*Std. dev.*	*Min*	*Max*
cpta_grth	115	3.7	4.0	-7.8	13.6
labor	115	47.1	7.3	36.5	59.1
cur_exp	115	16.3	3.1	9.8	20.8
cptl_exp	115	25.3	9.5	13.2	44.5
corr	110	42.2	15.1	11.0	70.2

Source: Authors' calculations

4.2 Government spending, per-capita income, and corruption in BRICS

Figure 1 displays the trends in the government's current and capital expenditures as a proportion of GDP for the BRICS countries. Over the years, current expenses remained relatively constant, around 16-17%. On the other hand, capital expenditures increased on average from 2000 to 2011, peaking at nearly 28% of GDP. Despite a subsequent dip, this trend suggests that the BRICS countries are paying more attention to their capital expenditures.

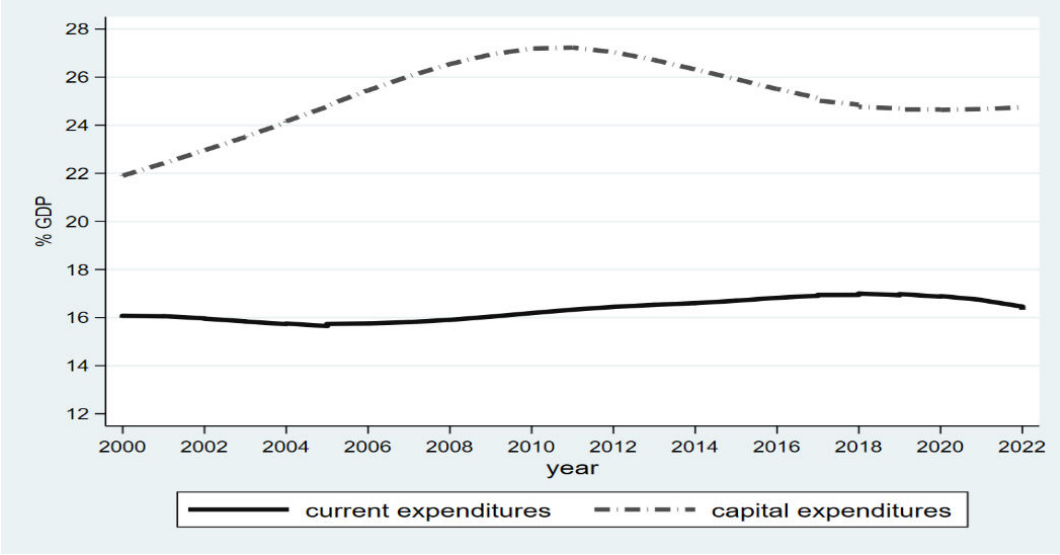

Figure 1. Government expenditures in the BRICS group (%GDP)
Source: created by authors

Figure 2 shows GDP growth and per-capita GDP growth, accounting for population disparities between countries. Evidently, for the five countries, both growth rates were trending in the same direction. Nonetheless, there were differences between countries in the trends—whether they were rising or falling—and the size of these rates. While Brazil's rates fluctuated below 4% during the period, South Africa's and Russia's rates continuously declined. India's economy grew more rapidly between 2000 and 2008, but it began to shrink. In conclusion, China saw substantial growth until 2005, when its growth rates surpassed the 10% threshold, after which they declined.

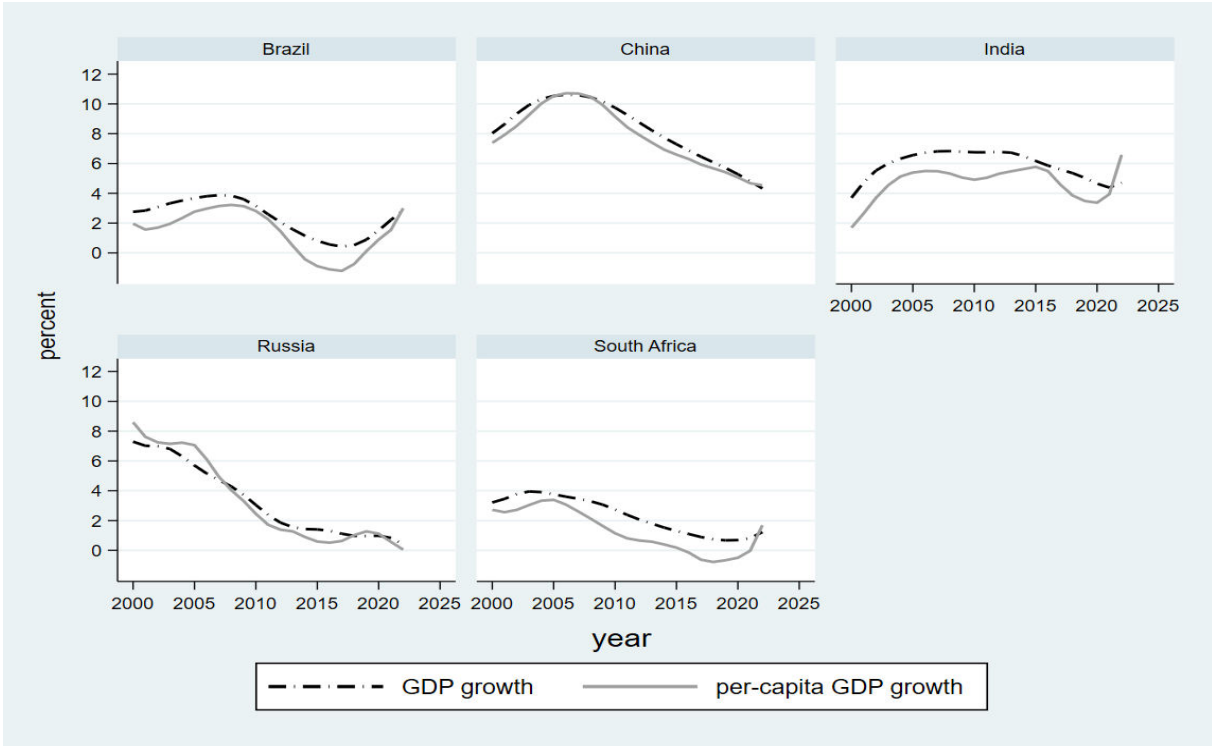

Figure 2. Real economic growth in the BRICS by country (%)
Source: created by authors

The government's current and capital expenditures, plotted in Figure 3, can be related to the diversity in economic growth patterns depicted above in Figure 2. Both forms of government spending steadily moved around a rate of 20% of GDP in Brazil, Russia, and South Africa, countries with either fluctuating (Brazil) or declining (Russia and South Africa) rates of economic growth. There have been noticeable increases in capital spending compared to current spending in China (capital expenditures surpassed 40% of GDP after 2010) and India (capital investments accounted for close to or more than 30% of GDP). Even during their periods of economic decline, China and India were compensated for their superior growth compared to their allies (see Figure 2 above).

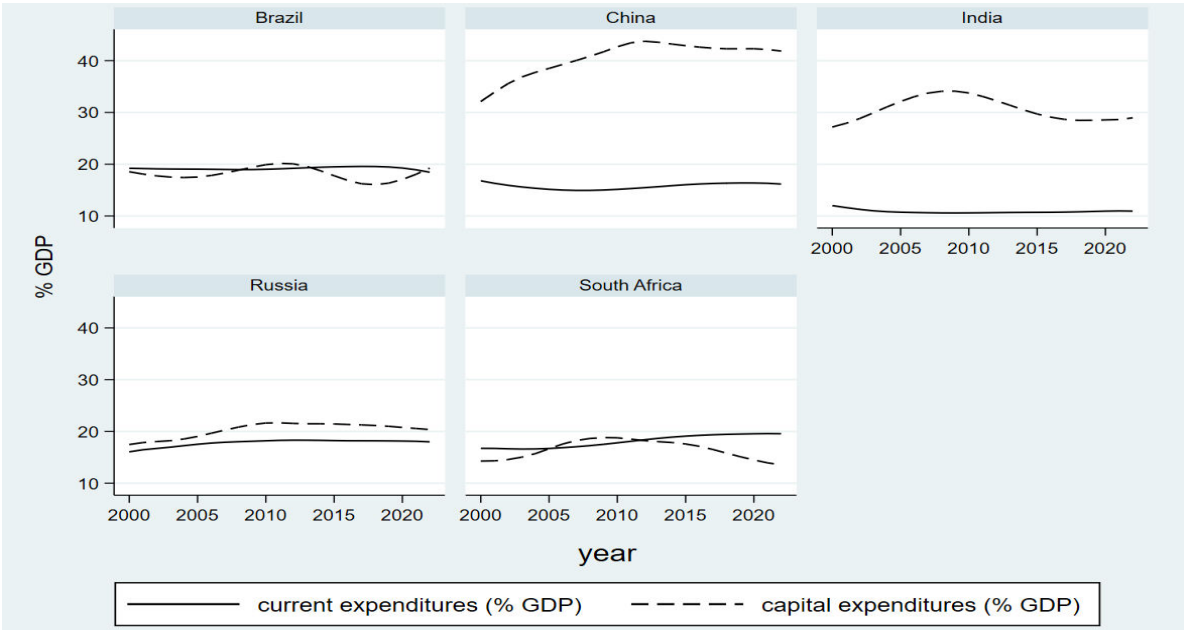

Figure 3. Current and capital expenditures in the BRICS group by country (%GDP)
Source: created by authors

The BRICS countries' economic metrics vary, and so do their anti-corruption policies, as Figure 4 illustrates. Brazil and South Africa began the new millennium with superior anti-corruption performance but declining in their metrics of control over corruption; Brazil was around the 60th percentile, while South Africa was in the 70th percentile. Control of corruption policies was nearly constant in Russia and India, whose rankings did not change significantly during the study's timeframe (roughly 20 for Russia and 40 for India), while China was the only nation to adopt anti-corruption measures, as evidenced by its improving rank since 2005. These variations in combating corruption must be related not only to economic performance but also to the interplay between economic variables, which is the main goal of this paper.

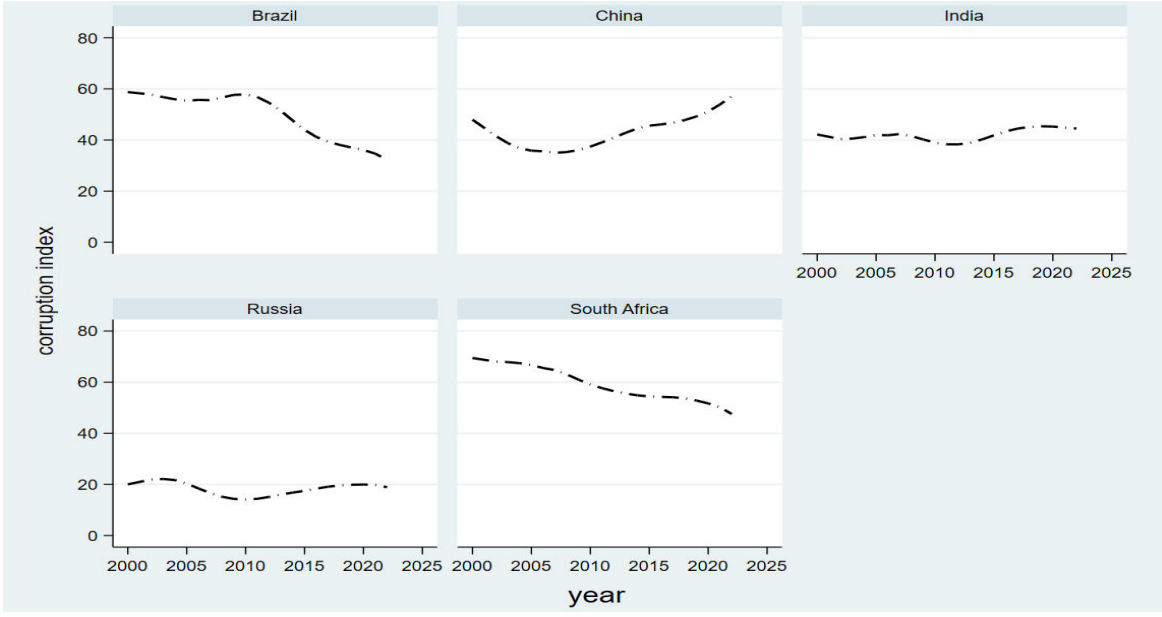

Figure 4: corruption index in BRICS by country (percentile rank)
Source: created by authors

4.3 Diagnostics

Diagnostic testing gives insights into the potential modeling of the data being used. In econometrics, a set of techniques known as "regression diagnostics" is employed to evaluate a model's validity and ascertain whether it supports statistical assumptions. The suitability of the model is assessed by examining potential linear relationships (collinearity) between the explanatory variables, the stationarity of the variables over time (unit-root), and long-term relationships (cointegration) between the variables. The features of the data set are summarized using summary statistics.

According to the multicollinearity test findings displayed in Table 3, there are no worries regarding multicollinearity among the independent variables. The findings indicate that there is a negative correlation between current and capital spending, while there is a varying link between government spending and the anti-corruption index. The anti-corruption index and current expenditure show a positive association, whereas the anti-corruption and capital spending show a negative correlation. This suggests that stringent anti-corruption policies benefit current spending but harm governmental capital spending in the BRICS countries.

Table 3. Multicollinearity test, Pearson correlation matrix

Variable	*cur_exp*	*cptl_exp*	*cor*	*labor*
cur_exp	1.000			
cptl_exp	-0.566	1.000		
corr	0.025	-0.099	1.000	
labor	0.411	0.359	-0.404	1.000

Source: Authors' calculations

Table 4 shows the results of the Pesaran test for cross-country dependence for our variables. With zero p-values, the null hypothesis of cross-country independence in terms of governmental spending and economic growth may be rejected, but when we look at the labor force and corruption policies, they might be independent. These results reflect the economic cooperation among the BRICS countries, linked to government spending on separate anti-corruption initiatives. Hence, we shall proceed under the assumption of cross-country dependence.

Table 4. Cross-sectional (cross-country) dependence, Pesaran test

H0: cross-section independence (no correlation across panels)					
Variable	*CD-test*	*p-value*	*average joint T*	*mean I*	*mean abs(I)*
cpta_grth	8.27	0.000	23.00	0.550	0.55
cur_exp	4.75	0.000	23.00	0.310	0.32
cptl_exp	6.43	0.000	23.00	0.420	0.42
corr	-0.95	0.343	22.00	-0.06	0.42
labor	1.21	0.226	23.00	0.08	0.36

Source: Authors' calculations

With p-values of 0.0026 and 0.453, both the likelihood-ratio test and Wooldridge test for autocorrelation in panel data reject the null hypothesis of homoscedastic error and no serial correlation, respectively (see Table 5). The next section discusses the model under the assumptions of no multicollinearity among the regressors, cross-country dependence, and heteroscedastic-autocorrelated errors.

Table 5. Heteroscedasticity and Autocorrelation Test

Likelihood-ratio test for heteroscedasticity	Wooldridge test for autocorrelation in panel data
H0: homoscedastic error	H0: no first-order autocorrelation
LR chi2(4) = 16.36	F (1, 4) = 8.258
Prob > chi2 = 0.0026	Prob > F = 0.0453

Source: Authors' calculations

4.5 The model

The use of multiplicative interaction modeling is becoming more widespread. The independent and dependent variables have a nonlinear connection modified by a second variable. Using moderation modeling enables one to go beyond just determining the marginal effects of an independent variable on a dependent variable and allows the creation of conditional hypotheses (Brambor et al., 2006). Using moderation modeling, we can evaluate the impact of the independent factors on the dependent variable at different moderator values, or conversely, we evaluate how an explanatory variable impacts the response variable at different moderator levels. To formulate these interactive relationships, the model can be written as:

$$cpta\_grth_{it} = \beta_0 + \beta_1 cur\_exp_{it} + \beta_2 cptl\_exp_{it} + \beta_3 corr_{it} + \beta_4 (\text{cur\_exp}_{it} * corr_{it}) + \beta_5 (\text{cptl\_}exp_{it} * corr_{it}) + \beta_6 labor_{it} + \epsilon_{it} \quad \ldots\ldots\ldots\ldots (1)$$

Where, gdp_{it} represents the growth in GDP per-capita of country (i) in year (t). fiscal policy is indexed using three indicators: current expenditures (cur_exp_{it}), and capital expenditures ($cptl\_exp_{it}$). The corruption index (the moderator) is labeled as ($corr_{it}$), while $labor_{it}$ indicates the labor force. To obtain the conditional effect of fiscal policy on growth, we derive equation (1) concerning fiscal policy indicators as follows:

$$\frac{\partial cpta\_grth_{it}}{\partial \text{cur\_}exp_{it}} = \beta_1 + \beta_4 (corr_{it}) \ldots\ldots\ldots\ldots\ldots (1.a)$$

$$\frac{\partial cpta\_grth_{it}}{\partial \text{cptl\_}exp_{it}} = \beta_2 + \beta_5 (corr_{it}) \ldots\ldots\ldots\ldots\ldots (1.b)$$

Fixed effects estimates could be biased in serial correlation and heteroscedasticity (Huang et al., 2019). The Prais-Winsten Panels' Feasible Generalized Least Squares (FGLS) and Corrected Standard Errors (PCSE) are potential substitutes. The results are discussed in the next section, given the assumptions of auto-correlated heteroscedastic errors and cross-country dependence (Beck & Katz, 1995).

5. RESULTS

Table 6 presents the results of the panel-corrected standard error model used to investigate the relationship between government spending and the growth of per capita income, conditional on the level of anti-corruption. The findings indicate that capital and current government spending have positive and statistically significant effects on economic growth, as do anti-corruption actions and the labor force.

The impact of current expenditures on economic growth is significantly greater than capital expenditures, around seven times as large. This is primarily because current expenditures comprise all government spending on procuring goods and services (including employee compensation) and the majority on national defense and security. These expenditures directly impact aggregate consumption and indirectly affect other GDP components, hence encouraging growth.

Economic growth is negatively impacted by the multiplicative terms of corruption with both current and capital government spending components. An intriguing conclusion arises when one examines how government expenditure affects per-capita income in combination with strong anti-corruption policies. Without a doubt, reducing corruption benefits countries and promotes economic growth; nonetheless, stringent anti-corruption policies offset some of the benefits of government expenditures on growth. This raises the intriguing possibility of unanticipated benefits from corruption and raises the question of the ideal degree of corruption to grease the wheels of an economy. Finally, the model statistics indicate that the model is doing well in estimating the effects of our regressors and partially explaining the variability in the economic growth in the BRICS countries; the chi-square probability is zero, and the R-square is 0.62.

Table 6. PCSE regression results

Dependent variable (Y): per-capita GDP growth				
variable	*Coefficient*	*std. err.*	*z*	*P>z*
cur_exp	6.91***	2.246	3.07	0.002
cptl_exp	0.98**	0.416	2.35	0.019
corr_cur	-0.21***	0.055	-3.85	0.000
corr_cptl	-0.07***	0.025	-2.87	0.004
corr	0.06***	0.020	2.80	0.005
labor	0.47***	0.087	5.39	0.000
cons	-7.76	2.642	-3.43	0.001
rho =	0.153			
N	110			
R-squared =	0.6211			
Wald chi2(6) =	294.480			
Prob > chi2 =	0.000			

Source: Authors' calculations

The results of this study align with and extend the existing theoretical frameworks and empirical findings discussed in the literature review. Keynesian economic theory, which underscores the positive role of government spending in stimulating economic growth, is supported by our findings that current and capital expenditures significantly impact per capita income growth in the BRICS countries. This is consistent with the arguments made by Keynes (1973) and Wagner (1958) regarding the long-term relationship between government expenditure and economic growth.

Moreover, our study corroborates the findings of Ades and Di Tella (1999) and Gupta et al. (2005), who highlight the detrimental effects of corruption on economic performance. The negative impact of corruption on the effectiveness of government spending observed in our results echoes the conclusions of these studies, which suggest that corruption erodes public trust, diverts resources, and hinders productive investments.

Additionally, the nuanced findings regarding the interplay between anti-corruption measures and government spending resonate with Leff (1964) and Olson Jr. (1971) perspectives. These scholars argue that while corruption generally hampers economic growth, certain levels of anti-corruption efforts must be carefully calibrated to avoid unintended economic drawbacks. This study contributes to this discourse by demonstrating that while reducing corruption benefits economic growth, overly stringent anti-corruption policies can offset some of the positive impacts of government expenditures.

Overall, the results of this study provide empirical support for the theoretical propositions and empirical observations in the literature, highlighting the critical role of government spending in economic growth and the complex moderating effect of corruption. This underscores the need for balanced and context-specific anti-corruption strategies to maximize the positive effects of fiscal policies in emerging economies.

CONCLUSION

The moderating effect of corruption on the connection between government spending and per capita income in the BRICS countries is thoroughly examined in this study. The results confirm the importance of government intervention in promoting economic performance by highlighting the favorable effects of capital and current government spending on economic growth. Nonetheless, the favorable effects of government spending are greatly diminished by corruption, suggesting that corruption poses a considerable obstacle to economic development.

Government expenditures is essential for economic growth, but how effective it is, depends largely on how corrupt a nation is. In particular, compared to capital expenditures like infrastructure projects, current expenditures—which include spending on goods and services—show a larger positive influence on growth.

This implies that short-term economic activity stimulation may be more strongly impacted by immediate consumption-driven expenditures.

The harmful consequences of corruption are shown by the negative interaction terms between it and both categories of government spending. Corruption damages public confidence and the effectiveness of government operations in addition to taking money away from more beneficial uses. The reduction in efficiency and trust that results from government spending can hinder its potential economic gains.

The analysis reveals an interesting and somewhat surprising conclusion: strict anti-corruption policies, while typically advantageous, may occasionally lessen the direct benefits of government spending on growth. This might be as a result of the anti-corruption programs' disruptive consequences, which can momentarily impede economic activity. Examples of these include higher regulatory burdens and bureaucratic delays. Thus, authorities must strike a balance between carrying out strong anti-corruption initiatives and making sure that these initiatives don't obstruct the advantageous impacts of fiscal policies.

This study highlights the complexities of the relationship between government spending, corruption, and economic growth and underscores the importance of tailored policy approaches. Emerging economies like those in the BRICS group must design context-specific anti-corruption strategies, considering each country's unique political, economic, and social landscapes. This approach will help ensure that anti-corruption efforts are effective without stifling economic growth.

Findings have significant policy implications. Policymakers in emerging economies should prioritize transparency, accountability, and the rule of law to create an environment that discourages corruption and promotes economic stability. Strengthening institutions, enhancing oversight mechanisms, and fostering a culture of integrity are essential steps toward reducing corruption levels and maximizing the positive impacts of government spending.

This study contributes to the broader fiscal policy and economic development literature by providing empirical evidence from the BRICS countries. It reinforces the importance of government spending in driving economic growth while highlighting the critical role of good governance in ensuring that such spending achieves its intended outcomes. By understanding the complex interplay between government spending, corruption, and economic growth, policymakers and researchers can develop more effective strategies to promote sustainable development in emerging economies.

Future research should expand the scope of this study to include a broader range of emerging economies beyond the BRICS nations to validate the generalizability of the findings. Longitudinal studies examining the impact of varying levels of corruption over extended periods could provide deeper insights into the long-term effects of anti-corruption measures on economic growth. It should explore the role of different types of government expenditures, such as investments in technology and education, in mitigating the adverse effects of corruption. Examining the interplay between corruption, government spending, and other macroeconomic variables like inflation, unemployment, and foreign direct investment could further enhance our understanding of these complex relationships.

Comparative studies between emerging and developed economies could illuminate the different dynamics at play in various economic contexts. Investigating how institutional quality and governance structures influence the effectiveness of government spending in different regions would provide valuable insights for tailoring policy recommendations to specific national circumstances.

Finally, future studies should consider the impact of cultural and social factors on the relationship between government spending, corruption, and economic growth. Understanding how societal norms, values, and public perceptions of corruption influence economic outcomes could help design more culturally sensitive and effective anti-corruption strategies. By addressing these areas, future research can build on this study's findings and contribute to more nuanced and effective policymaking in the realm of economic development.

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