The role of the New Development Bank on Economic growth and Development in the BRICS states

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Abstract

The purpose of this study is to analyse how the BRICS countries' New Development Bank (NDB) promotes economic growth and development. This study aims to evaluate the influence of the NDB on crucial measures of economic growth and development in the BRICS nations by a thorough review of the bank's operations, financing mechanisms, and project portfolios. The study utilized the panel data from 1997-2022 using variables such as economic growth, employment, and trade. The study deployed a PMG estimator and Granger causality model. The results revealed positive bidirectional statistically significant relationship between broad money and economic growth in BRICS. The study recommended that NDB should promote growth of broad money as it boosts economic growth.

Keywords: New Development Bank, Economic growth, BRICS, Pooled Mean Group estimator, Granger causality.

JEL Specification: *C01, C32, E51*

1 Introduction

The BRICS nations' union has the potential to reform the world financial system and reshape a new development agenda. More specifically, the BRICS nations' long-proposed Development Bank has drawn a lot of criticism from the Western-dominated global order, though there is insufficient proof that the group intends to restore the global order. The development of the Development Bank, according to Qobo and Soko (2015), is focused on infrastructure and sustainable development. The bank's major goals are to provide credit lines, lower upfront risk, finance projects, and build awareness and reputation for the BRICS countries. The establishment of the New Development Bank was officially announced in 2014 by the five member states of the BRICS union, including Brazil, Russia, India, China and South Africa. According to Abdenur and Folly (2015), the New Development Bank was established to assist in closing the financial gap for infrastructure development in the Global South. The New Development Bank has also been looking to establish cooperation with other multilateral financial institutions since it was created in 2015. Skalamera Groce and Köstem (2023) alluded that Multilateral Development Banks (MDBs) offer creditworthy low-income and middle-income nations non-concessional financial aid under market-based conditions. Additionally, they give low-income nations concessional aid, such as grants and loans with interest rates below market levels. The idea to cooperate is influenced by the common purposed pursued by the BRIC's New Development Bank and the fact that projects funded by multilateral banks usually require large-scale investments as well expert resources and there are several risks involved that a single lender cannot handle alone (Andronova and Shelepov, 2018).

According to Bertelsmann-Scott, et.al (2016) within five years, the NDB went from being an idea to issuing loans, which is a noteworthy accomplishment. The BRICS's discontent with the pace of reforms in existing IFIs and domestic economic factors, such as the need for infrastructure financing and the sizeable domestic savings that could be used to meet this need, were among the driving forces behind the establishment of the bank. The BRICS nations' key distinguishing characteristic is that it consists primarily of large emerging market economies, some of which have globally and regionally competitive

growth rates. More specifically, according to Danns and Danns (2015), China was the second-largest global economy and the most populous nation on earth in 2014 with a GDP of $10.36 trillion and 7.4% In terms of global GDP, India is the second-most populous nation. In 2014, its economy expanded by 7.4%. The economy of Russia ranks tenth in the world. Brazil is the largest economy in Latin America, the region's most populous nation, and the seventh-largest economy globally. Brazil is one of the top food producers in the world and lastly, South Africa is the second-biggest economy in Africa and the world's 33rd largest economy by GDP. In terms of current US dollars, the BRICS account for roughly 22% of the global GDP and roughly 42% of the world's population.

Some of the potential benefits of the New Development bank includes, infrastructure development, the NDB will play a crucial role in financing the infrastructure development in the member states countries. Other benefits include diversification of funding sources as the NDB offers alternative sources of funding for the member states. The NDB will also promote sustainable development and enhance cooperation and partnerships among the BRICS nations. Lastly the new development bank has a potential for supporting emerging countries by providing financial assistance to emerging economies within the BRICS hoc. However, these noted benefits will be dependent on the effective implementation and operations of the new development bank. With a focus on identifying the critical elements that contribute to the bank's effectiveness in fostering sustainable economic growth, infrastructure development, and regional integration within the member nations, the goal of this study is to examine and analyse the impact of the New Development Bank (NDB) on economic growth and development in the BRICS states.

According to Mishkin (2007), indirect finance, which involves the actions of financial institutions, is far more crucial to economic growth than direct finance, which involves firms getting money directly from lenders on the financial markets. For years 1970 to 1996, for instance, Germany’s non-financial enterprises received roughly 80% of their external funding from financial institutions, with the remaining 20% coming from bank loans, whereas Japan’s was 85% from bank loans and 15% from financial institutions Mishkin (2007). Regarding the significance of financial development for a nation, substantial research has been done on the causal relationship between the rise of financial institutions’ activities and economic growth (Abduh & Omar, 2012).

The study's objectives are to present a thorough evaluation of the NDB's effects on the economies of Brazil, Russia, India, China, and South Africa as well as to provide insights into the opportunities and problems that may come from its operations. This study aims to advance knowledge of the NDB's function by examining the individual projects and initiatives it has undertaken, as well as the financing structures and policies used. It also offers suggestions for improving the bank's efficiency in promoting inclusive and sustainable growth in the region.

2 Literature review

This section will consist of theoretical and empirical literature. The theoretical literature will provide theories on how banks and their services play a role in an economy. The empirical literature will be structured according to studies from developed countries, studies from developing countries, and studies from BRICS nations.

Theoretical literature

Credit Creation Theory of Banking: According to the credit creation theory of banking, banks are not just limited to lending out deposits that have been given to them, they may also generate their own money (McLeay et al., 2014). As a result of banks’ lending, the bank instead produces bank deposits. As a result, a bank’s ability to produce money is not limited by its deposit-taking operations, and the act of bank lending generates previously unattainable purchasing power. As a result of decreasing bank loans which is the asset side of the balance sheet and customer deposits which is the liability side of the bank balance sheet, the repayment of current debt destroys money. This theory is applicable to this study since the goal of the study is to analyse the role of New Development Bank on the growth and development of BRICS nations. This theory highlights how bank operation take place in the banking

sector and how the NDB can creates loans to stimulate economic growth and development of BRICS nations.

Studies from developed countries: According to Hu et.al (2022) National development banks (NDBs) have been set up by governments in both rich and developing nations to offer desperately needed long-term loans. The study constructed the first database on NDBs in the entire world to systematically investigate whether NDBs routinely extend the maturity of their loans beyond conventional banks. The study discovered that compared to commercial banks generally and privately held commercial banks in particular, a larger percentage of total loans in NDBs are long-term loans. After adjusting for covariates at the country and bank levels, this result was statistically significant. Our research added to the body of knowledge on loan maturity since it was the first to comprehensively assess whether NDBs—a little-studied but crucial financial intermediary—play a maturity-lengthening role in bridging the funding gap using extensive panel data.

Caporale et al. (2015) analyses financial development and economic growth in 10 new European Union member states. The study explored the key characteristics of the banking and financial institutions in ten recent EU members before examining the relationship between financial development and economic growth in these countries using dynamic panel model estimation for the years 1994 to 2007. The results points to these nations' still-underdeveloped stock and credit markets, as well as the fact that their contribution to economic growth is constrained due to lack of financial depth. A more effective banking industry, however, is discovered to have had a faster expansion. Furthermore, the Granger causality test shows that the relationship between financial development and economic growth is causative, but no the other way round.

The study by Frigerio and Vandone (2020) examined the variation in loans made by the European Development Banks during election years to see whether opportunistic political behaviour has an impact on the lending activity of these institutions. The empirical analysis made use of a distinct manually compiled dataset that covered the years 2002 through 2015 and included all development banks with European headquarters. The study found that while the political stance of development banks cannot generally be supported, a comparison with the rest of the European banking system revealed that there is empirical support for it in erroneous democracies, where large development banks tend to increase their lending activity during election years.

Law and Singh (2014) investigate whether too much finance harm economic growth in 87 developing and developed countries. The study utilised panel data from 1980 to 2010 using innovative dynamic panel threshold method. According to the empirical findings, there is a threshold effect in the link between finance and economic growth. The scholars discover that the degree of financial development is favourable to economic growth only up to a specific threshold, above the threshold level, additional financial development likely to be detrimental to economic growth. These results show that increasing the amount of finance does not always promote economic growth and emphasize the need of maintaining an optimal level of financial development for promoting economic growth.

Studies from developing countries: Abduh and Omar (2012) investigated Islamic banking and economic growth from the Indonesian experience. The study utilised quarterly time series data spanning from 2003 Q1 to 2010 Q2, the ARDL, ECM and Granger causality models. The results revealed that financial development Granger causes economic growth while gross fixed capital formation does not Granger cause financial development. The study recommends that the Indonesian Government should continue promote the Islamic banking as it has shown to benefit the economy in the long run.

Broccolini et.al (2021) assessed the mobilization impacts of multilateral development banks (MDBs), using loan-level data on syndicated lending to a large sample of developing countries between 1993 and 2017 while controlling for a wide range of fixed variables. The study found evidence that multilateral lending has favourable, considerable direct and indirect mobilization impacts on the volume of transactions and the total amount of bank inflows. Following MDB lending, the number of lending banks and the average maturity of syndicated loans both rises. These impacts are not only present immediately but also continue for up to three years without being counteracted by a decrease in bond financing. Thes study results were not influenced by confounding variables like the existence of major

international banks, Chinese financing, or aid flows, and there is no indication of anticipation effects. Lastly, the study found that economic implications are also significant, indicating that MBDs can be essential in securing private financing for the 2030 Development Agenda's objectives.

Study by Massa (2011) examined the effects of development finance institutions (DFIs) on the macroeconomic climate. The study investigated the link between investments made by a chosen sample of multilateral DFIs and economic growth for a sample of 101 countries over the period 1986-2009 using the Generalized Method of Moments (GMM) for panel data analyses. According to the study, international DFI investments positively and significantly contribute to economic growth in recipient nations, and their effects are more pronounced in lower-income nations than in higher-income nations. More specifically, a 10% increase in the investment pledges of international DFIs could boost growth by 1.3% in lower-income countries and by 0.9% in higher-income nations. Furthermore, according to the study, the largest contribution to economic growth y multilateral DFI investments is seen in the infrastructure, industry, and agribusiness sectors. Lastly, lower-income countries primarily benefit from these investments in the agribusiness and infrastructure sectors, whereas higher-income countries benefit primarily from these investments in the infrastructure and industry sectors.

Durusu-Ciftcu et al. (2016) investigates financial development and economic growth theoretically and empirically using 40 countries. The study utilised panel data for 40 countries spanning from 1989 to 2011, employing an Augmented Mean Group (AMG) and Common-Correlated Effects (CCE) models. Both models revealed that there is a positive long-run effects of financial development on steady-state level of GDP per capita, and the contribution of the credit markets is substantially greater. In terms of policy, the study advise that decision-makers focus especially on enacting measures that develop financial markets, such as institutional and legal measures to support creditor, investor, and contract enforcement rights. Therefore, economic growth will be increased by supporting the expansion of a nation’s financial sector.

Qian et.al (2023) examined the impact of China’s AIIB on the World Bank, focusing on the borrowing habits of a unique group of nations: the AIIB founding members. According to the study, these founders publicly disobeyed American public opinion in order to establish a World Bank competitor. The study documented a temporary decrease in the number of World Bank infrastructure projects that the developing AIIB founders have engaged in using a novel causal inference method, Pang, Liu, and Xu's Dynamic Multilevel Latent Factor Model, as well as several well-known estimation models as robustness checks. The study found the first comprehensive proof that China's Asian Infrastructure Investment Bank could undermine the political sway the United States has over developing nations thanks to its control via the World Bank. According to the study, a significant group of nations may be leaving the World Bank and turning to a Chinese organization for development leadership instead.

The study by Simpasa et.al (2015) examined the impact of development aid using a series of projects carried out by the African Development Bank (AfDB) during the past 20 years. The findings pointed to a heterogeneous impact of aid. The highest employment impact was seen in projects focused on the productive sectors, particularly those that finance microcredit institutions and small businesses. More significantly, the indicated employment benefit of AfDB projects is far bigger than the potential employment that might be inferred from the aid-growth employment nexus using macro data, particularly in the previous decade. This. According to the study, may have been because over this time, the emphasis of development assistance has shifted away from areas that are profitable. In conclusion, the study stated that if inclusive development is the main goal of development aid, then the current distribution of aid to various applications may need to be reviewed.

Awdeh (2012) investigated banking sector development and economic growth in Lebanon. The study utilised time series data spanning from 1992 to 2011, OLS and Granger causality model. Firstly, they discovered a one-way causality between economic growth and banking sector indicator including deposit growth and loan to the local private sector using Granger causality test. On the other hand, the amount of credit given by banks to the local private sector and the size, effectiveness, and concentration of the banking industry have little effect on economic growth. These findings corroborate the demand-following theory claim that Lebanon’s financial sector and country’s economic growth are related. The OLS model also supports these results.

Studies from BRICS nations: The New Development Bank (NDB) and its role in the BRICS countries are discussed empirically in this section, with an emphasis on how it might affect the member states' economic growth. The study by Andronya and Shelepoy (2018), focused on how the new development bank interacted with other development banks. Examining the request for cooperation between the BRICS New Development Bank and other multilateral financial institutions was the goal of the study. According to the report, the primary goal of the appeal for cooperation with other international financial organizations is to lower the risks connected to significant expenditures and expert resources that the NDB cannot carry on its own. The study sought to examine how the NDB, and other multilateral financial institutions collaborate. To better comprehend the long-term prospects of the NDB, the study examined the modes of interaction that already exist between the NDB and the other multilateral banks as well as their suggested strategies for upcoming collaborative projects. The study discovered that the NDB seeks to formalize collaboration among financial institutions and an efficient division of labour among them to reduce infrastructure investment deficits.

Qobo and Soko (2015) examined the creation of the New Development Bank by the BRICS countries as they explored the growth of rising powers in the global financial architecture. According to the study, the NDB has provided an alternative to the established international financial organizations and has promised to be a key player in the reformation of the world financial system. The study concludes that the present dominant financial institutions will continue to exist notwithstanding the emergence of the new system of global financial management. The study concluded that the BRICS countries' capacity to manage local socio-economic concerns will decide the most effective path for them to assume global financial leadership.

Waisbich and Borges (2020) mapped out the NDB's major institutional, governance, and financing innovations in practical detail together with their essential locations in the lengthy history of development finance and the resurgence of South-South Cooperation. The study concluded that the Bank has yet to take on the intellectual and political challenges of institutional engineering and experimentation to develop ambitious thinking and strong institutional mechanisms to handle the demands of financing sustainable infrastructure in the Global South for economic, social, and environmental development.

The study by Duggan et al. (2022) examined the role of the new development bank as a new circuit for the participants to trade products in the financial sector with a focus on the structural power of the BRICS. According to the report, the creation of the NDB does not give the BRICS countries the structural authority they require to alter the status quo.

Mazenda and Ncwadi (2016) notably focused on the primary goal of the NDB to generate additional trade and investment opportunities as they studied the function of the formed New Development Bank and the Contingent Reserve arrangement by the BRICS in transforming the international financial system. The report made the case that the New Development Bank and the Contingent Arrangement face numerous challenges, including the governance structures and decision-making processes that demand political immunity, transparency, and integrity. The report also looked at China's role as the principal financier of the BRICS's planned development projects and its desire to fortify its political ties with other developing nations. The study concluded that, among other things, the BRICS states' lack of clear leadership on equitable shareholding may limit their expansion.

The NDB initiative was examined in the study by Abdenur and Folly (2015) from an institutionalist viewpoint, which sees organizations as socially rooted among numerous interconnected layers of social interaction. The study analysed the NDB in the context of three crucial elements that are important for the institutionalization of a multilateral initiative: the development of a logical bureaucracy, the level of social embedding of the bank, and the emergence of a normative platform with the power to influence the global development rules-making process. The study confirmed that significant progress has been made toward the first and second criteria, but that the NDB's position in the project is still very much a moving target. According to the study, the bank will aid in establishing the BRICS as a significant collective actor in the field of development if it is well implemented. However, the legitimacy and authority gained from this strategy may not necessarily extend to other fields of action mentioned in the official BRICS discourse, such as international security.

Biswas (2015) study looked at how new organizations, such the new development bank, can alter the global financial structure of development finance. The growing disparity between developing countries' voting rights in the IMF and World Bank's governing bodies and their GDP share in the global economy is a major source of worry for these nations. The disparity between the importance of developing nations to the globe and their governance of the Bretton Woods institutions will keep becoming worse, especially for the Asian BRICS, unless significant changes are made to the distribution of voting rights. China has taken a big leadership role in initiating these new development finance programs, seeing that they can improve its political and economic ties with other developing nations. However, creating governance structures and decision-making processes with a high level of integrity, transparency, and independence from political interference when making loan choices would be a significant task for these new organizations.

Bertelsmann-Scott et.al (2016) examined the NDB's operational modes, charts its historical growth, and predicted how the NDB will likely change the landscape of development financing. According to the study, the slow rate of change in the existing global financial institutions to represent the current political and economic reality more accurately is one of the main problems that emerging economies, particularly the BRICS group, contend with. To overcome the huge domestic savings across developing countries, emerging economies also face severe infrastructure spending shortfalls. Thus, these elements contributed to the development of the NDB.

The study by Xu (2019) defined the concept of coordination mechanism, systematically examined the development of global economic governance structure, intensively interpreted the current characteristics of big power coordination mode in global economic governance structure, and objectively evaluated trends of global political and economic pattern from the perspective of new power coordination, starting with the transformation of the global economy governance structure. The study argued that the ability of the BRICS member countries to effectively promote the institutionalization and globalization of the BRICs Bank has significant policy consequences on the member states.

The study by Braga et.al (2022) analysed the five NDB projects that were chosen by the NDB and their interaction with regional sustainable development goals. When studied collectively, the case studies offered significant insights into the bank's strategy for achieving newness, but they do not purport to analyse the entirety of its first five years of operations. The study ended by offering a mission roadmap that the bank should consider while developing its business strategy. By collaborating with local players in the larger BRICS development community, this suggested a perspective change from its current restricted focus on sustainable infrastructure investment. In addition, when linking the bank's activities with the nation-specific difficulties of the ecological transition, a shared commitment to strong sustainability and public value is necessary.

The study by Zayyalova (2017) attempted to comprehend social communication frames that shape the present and future of BRICS states using the example of their financial architecture. According to the study, that the idea of the BRICS is a significant political issue. The financial institutions and technique this global collaborative system brings are more significant when addressing it. For the analysis of the New Development Bank's communication strategy, the study constructed a three-point taxonomy. The focus of the paper is the BRICS framework's social representations of financial difficulties. How would Chinese describe the BRICS's financial highlights? What goals do Indian monetary policy seek to achieve? How do the Russian business tycoons perceive the rules governing money? Is it possible to define a set of social criteria to assess the communicative values of money representations in BRICS cultures, and are money difficulties culturally specific? The study found that financial communication has evolved into a new tool for policymaking that allows BRICS members to express their positions of power within the organization because of the answers to these and numerous other questions.

According to Cooper's (2017) analysis, the New Development Bank (NDB) of the BRICS should receive greater attention because to its differences rather than because it is comparable to the Asian Infrastructure Investment Bank (AIIB). The NDB, in contrast to the AIIB, lacks substantial financial resources and overt ties to a larger state-led geopolitical strategy. The NDB stands out due to its innovative design, which includes four noteworthy original aspects. The NDB, is dedicated to the idea of equality among its core membership. The promotion of sustainable development with a singular

focus on specialized clean renewable energy initiatives advances product innovation. The NDB's stated goal in terms of resources is to use green bonds issued in the national currencies of the BRICS. According to the study, the NDB's capacity to manage intense internal conflicts through compromise and improvisation suggests a novel pattern for group decision-making and global governance.

The empirical literature revealed that majority of the studies that focused on NDB and economic growth in BRICS conducted qualitative research. This study, however, takes advantage of the gap in methodology and conducts quantitative research employing the panel ARDL model to see if the results will be the same with those of the qualitative research conducted in BRICS. The results from this study will help the decision makers, government, and scholars in BRICS nations to review and revise policies on the NDB financial development and economic growth.

3 Methodology and Data Analysis

3.1 Data Sources and variable description

Table 3.1: Data sources and variables

Variable	Description	Unit	Source
LGDP	GDP per capita growth (annual)	%	World Bank
LEMP	Employment to population ration, 15+, total % (national estimate)	%	World Bank
LTRA	Trade (% of GDP)	%	World Bank
LGFCF	Gross fixed capital formation (% of GDP)	%	World Bank
LLIR	Lending interest rate	%	World Bank
LBMG	Broad money growth (annual)	%	World Bank

Source: Authors compilation

The study utilises unbalanced panel as some observations for the data are missing for employment for a Brazil 2000 and 2010, Russia 2022, India 1997 to 1999, 2001 to 2004, 2006 to 2009, 2011, 2013 to 2017, and China from 1997 to 1999, and 2020 to 2022. Broad money growth observation is mission for India 2022 and gross fixed capital formation for China in 2022. This, however, is not a problem for the study as panel models are able to deal with unbalanced data.

3.2 Empirical model: The purpose of the study is to examine the role of New Development Bank on the economic growth and development of BRICS nations. The study utilises gross domestic product per capita (economic growth), employment, trade, gross fixed capital formation, lending interest rates, and broad money panel data from 1997 to 2022 to formulate multivariate econometric model. The variables are already in their natural logarithm. The multivariate econometric model is the specified as follows:

$$LGDP_t = \beta_0 + \beta_1 LEMP_t + \beta_2 LTRA_t + \beta_3 LGFCF_t + \beta_4 LLIR_t + \beta_5 LBMG_t + \varepsilon_t \quad \text{.....3.1}$$

Whereby, β_0 is the slope coefficient, $\beta_{1\ldots5}$ represent the slope coefficients of regressors, *t* is the period and ε_t is the error term.

3.3 Model Specification: The study adopts a Pooled Mean Group (PMG) proposed by Pesaran and Smith (1995) and later modified by Pesaran et al. (1999) and used in the study of Abduh and Omar (2012). This model has advantages over traditional panels models as it allows intercepts, short run coefficients, and error variances to differ freely across groups, but constraining long run coefficients to be the same. The PARDL(p,q,q,….q) model can therefore be specified as follows:

$$\gamma_{it} = \sum_{j=1}^{\rho} \delta_i \gamma_{i,t-j} + \sum_{j=0}^{q} \beta'_{ij} x_{i,t-j} + \varphi_i + \varepsilon_{it} \quad \text{.....3.2}$$

Whereby, $x_{it}(k * 1)$ is vector of independent variables, φ_i are unit specific fixed effects, δ_i represent coefficient of the logged dependent variable, ε_{it} is the error term and β'_{ij} coefficient vectors. The re-parameterised ARDL (p,q,q…q) error correction model is specified as follows:

$$\Delta\gamma_{it} = \phi_i \gamma_{i,t-1} - \lambda'_i \chi_{it} + \sum_{j=1}^{\rho-1} \xi'_{ij} \Delta\gamma_{i,t-j} + \sum_{j=0}^{q-1} \beta'_{ij} \Delta\chi_{i,t-j} \delta'_{ij} + \varphi_i \iota + \varepsilon_{it} \quad \text{.....3.3}$$

Whereby, ϕ_i is a group specific speed of adjustment, λ'_i is a vector of long run relationships, ECT is given by $\gamma_{i,t-1} - \lambda'_i \chi_{it}$ and ξ'_{ij}, β'_{ij} are short run dynamic coefficients.

3.4 Granger Causality Test: The Granger causality approach is a way to look at the relationship between two variables over time. Although they are not precisely the same, causality and the cause-and-effect concept are connected. It is statistical idea built on the notion of prediction. If the Granger of X causes Y, then prior values of X should have insight that aids in forecasting Y. In other words, Y Granger causes X is impacted by the lagged values of both X and Y. Like this, X Granger affects Y if variation in Y is affected by its lag and the lagged values of X. Bidirectional Granger causality occurs when Y Granger causes X and X Granger causes Y. Unidirectional Granger causality occurs when one Granger effects leads to another. There is no causation if both variables are independent of one another. The equations for Granger causality are as follows:

$$Y_t = \alpha + \sum_{t=1}^{\rho} \alpha_t Y_{t-1} + \alpha + \sum_{j=1}^{q} b_t X_{t-1} + \epsilon_t \quad \text{.....3.4}$$

$$X_t = \beta + \sum_{i=1}^{r} c_t X_{t-1} + \alpha + \sum_{j=1}^{s} d_t Y_{t-j} + n_t \quad \text{.....3.5}$$

Where $\epsilon \; and \; n$ are random disturbances; serially uncorrelated with zero mean and unit variance. $\alpha, \beta, \alpha_{1\ldots.p}, \beta_{1\ldots.p}$ are parameters to be estimated. The hypothesis for checking causality using Granger Causality test can therefore be given as follows:

$$H_0: X_t \; does \; not \; Granger \; Cause \; Y_t \quad \text{.....3.6}$$

$$H_1: X_t \; Granger \; Cause \; Y_t \quad \text{.....3.7}$$

Whereby, H_0 is the null hypothesis entailing that lagged values of x do not explain the variation in y, and H_1 is the alternate hypothesis entailing that lagged x-values explain the variation in y.

4 Results and Interpretation

4.1 Descriptive Statistics

Table 4.1: Descriptive Statistics

Variables	LGDP	LEMP	LGFCF	LTRA	LLIR	LBMG
Mean	3.194423	56.67097	23.33239	44.86041	20.00543	11.79816
Median	2.815524	59.22000	19.10196	47.15139	10.75000	11.33312
Maximum	13.63582	75.34000	44.51877	69.39328	86.36333	38.40781
Minimum	-7.827750	27.70000	13.09187	16.43858	4.350000	1.761086
Std. Dev.	4.224393	10.73149	9.423081	12.62997	18.98727	6.201422
Skewness	-0.157300	-0.354976	1.159000	-0.405398	1.624676	0.992186
Kurtosis	2.996442	2.340924	2.885241	2.311368	4.891229	4.975974
Jarque-Bera	0.424815	4.027358	23.11619	4.856472	60.66287	33.65614
Probability	0.808635	0.133497	0.000010	0.088192	0.00000	0.000000
Sum	329.0256	5837.110	2403.236	4620.622	2060.559	1215.210
Sum Sq. Dev	1820.240	11746.81	9057.034	16270.64	36772.69	3922.679
Observations	103	10.3	103	103	103	103

Source: Authors' computation

The descriptive statistic used in the study is shown in Table 4.1 above. The findings indicate that from 1997 to 2022, there was an average of 3.19%, in terms of the gross domestic product (GDP) per capita. Additionally, there is an official employment estimate of 56.67%, a gross fixed capital formation of 23.33%, trade of 44.86%, lending interest rate of 20.01%, and a broad money growth of 11.80% in BRICS nations. Additionally, the results show that gross fixed capital formation, lending interest rates and broad money growth are positively skewed with coefficients of 1.15, 1.62 and 0.99, whereas gross domestic product per capita, employment, and trade are negatively skewed with coefficients of -0.16, -0.35 and -0.41 respectively.

4.2 Correlation Analysis

Table 4.2: Correlation Analysis

Correlation	LGDP	LEMP	LTRA	LGFCF	LLIR	LBMG
LGDP	1.000000					
LEMP	0.484163	1.000000				
LTRA	0.336666	-0.149018	1.000000			
LGFCF	0.594838	0.631584	0.085065	1.000000		
LLIR	-0.356936	0.016649	-0.689921	-0.435002	1.000000	
LBMG	0.149975	0.113747	-0.243443	0.223195	0.282310	1.000000

Source: Authors' computation

To determine the type of correlation that exists between the variables, the research performed a correlation analysis. Lending interest rates are negatively correlated with gross domestic product per capita, whereas employment, trade, gross fixed capital formation and broad money growth are positively correlated with gross domestic product per capita. Between LEMP and LGDP, the coefficient of correlations is 0.48, between LTRA and LGDP, 0.34, LGFCF and LGDP, 0.59, LLIR and LGDP, -0.36, and between LBMG and LGDP, 0.15, LGFCF and LEMP have the largest positive correlation, with a value of 0.63. The fact that variables' correlation coefficients are so low suggest that they are suitable for the investigation.

4.3 Panel Unit Root Test

Table 4.3: Unit Root Test

Panel Unit Root Test **Null Hypothesis: Unit root**						
At level	**LGDP**	**LEMP**	**LTRA**	**LGFCF**	**LLIR**	**LBMG**
Levin, Lin & Chu t*	0.0002 ***	0.0028 ***	0.3096	0.0381 **	0.0000 ***	0.0049 ***
Im, Pesaran & Shin W-stat	0.0026 ***	0.0480 **	0.3772	0.1262	0.0000 ***	0.0128 **
ADF-Fisher Chi-square	0.0028 ***	0.0374 **	0.5556	0.2395	0.0001 ***	0.0074 **
PP-Fisher	0.0000 ***	0.0092 **	0.7175	0.4962	0.0344 **	0.0005 ***
At first difference	**LGDP**	**LEMP**	**LTRA**	**LGFCF**	**LLIR**	**LBMG**
Levin, Lin & Chu t*	0.0000 ***	0.0003 ***	0.0000 ***	0.0000 ***	0.0000 ***	0.0000 ***
Im, Pesaran & Shin W-stat	0.0000 ***	0.0001 ***	0.0000 ***	0.0000 ***	0.0000 ***	0.0000 ***
ADF-Fisher Chi-square	0.0000 ***	0.0002 ***	0.0000 ***	0.0000 ***	0.0000 ***	0.0000 ***
PP-Fisher	0.0000 ***	0.0000 ***	0.0000 ***	0.0000 ***	0.0000 ***	0.0000 ***

Source: Authors' computation (*) 10%, (**) 5%, (***) 1% significance respectively

The cross sectionally independent group and individual unit root test are used in the study to determine the variables' order of integration as shown in Table 4.3. Except for LTRA which is not stationary, the LLC unit root group unit root test findings show that LGDP, LEMP, LGFCF, LLIR and LBMG are stationary at 1% and 5% considerably at the level form. Except for LTRA and LGFCF which are not stationary, the study's individual unit root tests of IPS, ADF-Fisher, and PP-Fisher found that LGDP, LEMP, LLIR and LBMG are stationary at level form. The study continued to estimate unit root at first difference and all the variables are found to be stationary. These results entail that the variables are integrated of both I(0) and I(1) making it suitable to deploy the Pooled Mean Group estimator model.

4.4 Cointegration Test

Table 4.4: ARDL Bounds test.

ARDL Bounds Test **Null Hypothesis: No levels relationships** **Number of cointegrating variables: 5**			
Cross-Section	**Observation**	**F-Statistic**	**t-Statistic**
South Africa	25	3.443460	-3.813612
Brazil	23	5.348465	-4.508546
Russia	24	12.30085	-7.426748
India	8	0.630648	-1.531053
China	20	9.118143	-6.844437

Source: Authors' computation

To ascertain whether there is a long run relationship between the variable, the study ran ARDL Bounds cointegration test as shown in Table 4.3 above. The ARDL Bounds residual cointegration results shown in Table 4.3 above, and their t-Statistics corroborate the rejection of the null hypothesis (Ho) of no cointegration, allowing us to draw the conclusion that the variables in the model have long-run relationships. This verifies the long-run regression results that the PMG estimator will present in Section 4.5 below.

4.5 Pooled Mean Group Estimator

Table 4.5: Short run estimation and long-run

Dependent Variable: D(LGDP) **Method: Pooled Mean Group Estimator/ARDL** **Selected Model: PMG (1,0,0,0,0,0)**				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Probability**
Short-run (Mean-Group) Coefficients				
CointEq(-1)	-0.877127	0.086193	-10.17629	0.0000
C	2.711371	2.195526	1.234953	0.2198
Long-run (Pooled) Coefficients				
LEMP	-0.065020	0.106811	-0.608736	0.5442
LGFCF	-0.165029	0.077026	-2.142504	0.0347
LTRA	0.169720	0.021292	7.971122	0.0000
LLIR	-0.014352	0.049118	-0.292191	0.7708
LBMG	0.101076	0.038854	2.601421	0.0108

Source: Authors' computation

The results of the PMG short and long run estimations are given in Table 4.5 above. The short-run mean-group results reveal an ECT term of -0.877127, entailing that 87% of the errors in economic growth are corrected annually towards long run equilibrium. The long-run pooled results reveals that there is a negative statistically insignificant relationship between employment and economic growth in BRICS nations. A 1% increase in employment in the long run insignificantly result in economic growth declining by 0.07%, ceteris paribus. This entail that increases in employment levels in BRICS nations has not been able to influence economic growth. This calls for policymakers to revise employment policies in BRICS nations so they can boost economic growth.

Furthermore, there is a negative statistically significant relationship between gross fixed capital formation and economic growth in the long run in BRICS nations. A 1% rise in gross fixed capital formation in the long run significantly result in economic growth declining by 0.17%, ceteris paribus. These results entail that gross fixed capital formation has been able to positively contribute to economic growth in these BRICS nations. This calls for the policymakers, governments, and researchers in these countries to revise investment policies so that it can boost economic growth and reduce the detrimental effect.

Moreover, there is a positive statistically significant relationship between trade and economic growth in BRICS nations. A 1% rise in trade in the long run in BRICS significantly result in economic growth rising by 0,17%, ceteris paribus. These results mean that trade is very important in BRICS nations as it boosts economic growth. This calls for policymakers and BRICS government to continue promoting trade as it is boosting their nations.

Moreso, there is a negative statistically insignificant relationship between lending interest rates and economic growth in BRICS nations. A 1% rise in lending interest rates insignificantly result in economic growth declining by 0.01% in the long run, ceteris paribus. These results entail that rise in lending rates is not good for the growth of BRICS nations. This calls for the policymaker, the NDB and government to revise policies on lending rates to reduce lending rates and increase economic growth in BRICS nations. These results are inconsistent with the study of Awdeh (2012) that found that banking market interest rate is not significantly correlated with economic growth in Lebanon.

Finally, there is a positive statistically significant relationship between broad money growth and economic growth in BRICS nations. A 1% rise in broad money growth in the long run significantly result in economic growth rising by 0.10% in BRICS, ceteris paribus. These results entail that the rise in broad money growth plays a very important role on the growth of BRICS nations. This calls for the NDB, policymakers and government to promote growth of broad money to boost the growth of BRICS nations. These results are consistent with the study of Abduh and Omar (2012) that found a positive relationship between financial development and economic growth in Indonesia.

4.6 Granger Causality Test

Table 4.6: Granger causality relationships

Pairwise Granger Causality Tests **Sample: 1997 2022** **Lags: 1**			
Null Hypothesis	Observations	F-Statistic	Probability
LEMP does not Granger Cause LGDP LGDP does not Granger Cause LEMP	93	5.42745 4.97633	0.0221 0.0282
LGFCF does not Granger Cause LGDP LGDP does not Granger Cause LGFCF	123	13.8803 15.0581	0.0003 0.0002
LTRA does not Granger Cause LGDP LGDP does not Granger Cause LTRA	124	1.22062 2.34879	0.2714 0.1280
LLIR does not Granger Cause LGDP LGDP does not Granger Cause LLIR	124	2.62117 0.00764	0.1081 0.9305
LBMG does not Granger Cause LGDP LGDP does not Granger Cause LBMG	123	4.20684 4.28910	0.0424 0.0405

Source: Authors' computation

The study conducts Granger causality to investigate the pattern of correlation by using empirical datasets, and to check the robustness of results and to detect the nature of causal relationships between economic growth and explanatory variables. The results in Table 4.6 above shows that there are bidirectional causal relationships between employment and economic growth in BRICS nations at 5% level of significance. These results entail that policies that affect employment will also have causal implications on economic growth and vice versa. This mean that since employment was found to have a detrimental effect on economic growth through the PMG estimator, policies that reduce employment will have causal effects on economic growth.

Furthermore, there are bidirectional causality between gross fixed capital formation and economic growth in BRICS nations at 1% level of significance. These results entail that gross fixed capital formation and economic growth granger cause each other. Policies that affect either gross fixed capital formation or economic growth will have a causal effect on the other variable in BRICS. Reducing gross fixed capital formation and revising its policies will have a causal effect on economic growth and vice versa.

Moreso, there is bidirectional causality between broad money growth and economic growth at 5% level of significance in BRICS, ceteris paribus. These results entail that broad money growth and economic growth have causal effects on each other, meaning that economic growth granger causes broad money growth, and that broad money growth granger causes economic growth. Policymakers, the NDB and monetary authorities must continue promoting broad money growth in BRICS as it boosts economic growth. These results are consistent with the results of Abduh and Omar (2012) that found financial development Granger causing economic growth.

Finally, there is no causal link between trade, lending interest rate and economic growth in BRICS nations. This calls for the NDB to revise its lending rates so that they can boost economic growth. Since lending rates were having a negative impact on economic growth, they can be reduced, and this will not have a causal effect on economic growth of these BRICS nations. These results are consistent with the results of Awdeh (2012) that found banking market interest rate neutral on economic growth in Lebanon.

4.7 ARDL Diagnostics

Table 4.7: PMG Hausman Specification Test over MG

PMG Hausman Specification Test **Null hypothesis: Estimator is statistically similar to the PMG estimator**				
Estimator		Statistic	DOF	p-Value
Mean Group*		NA	6	NA
*Differences of covariances is not positive definite				
Differences: Mean Group				
Coefficient Differences Overview: Mean Group				
Variable	**MG**	**PMG**	**Var (Diff.)**	**p-Value**
LEMP	0.234867	0.220133	0.067023	0.9546
LGFCF	0.562683	0.054085	0.508659	0.4758
LLIR	-0.461761	-0.012378	0.309457	0.4192
LTRA	-0.022790	0.154649	0.074109	0.5145
LBMG	-0.450279	0.066040	0.155653	0.1906
C	-13.439548	-17.698787	328.038585	0.8141

Source: Authors' computation

The study conducted a Hausman specification to check the effectiveness of the PMG model over the MG model as shown in Table 4.7 above. The results of the Hausman and the coefficient differences overview shows that the PMG model is best over the MG model for this study. The coefficients of the PMG are more efficient than those of the MG, entailing that the chosen model is the best for the study. The study continues to offer conclusion and recommendations for the study as shown in Section 5 below.

5 Conclusion and Recommendations

The main objective of the study is to analyse the role of NDB on economic growth and development of BRICS nations. This was achieved by making use of panel data collected from World Bank spanning from 1997 to 2022 for BRICS nations. The study performed the panel unit root test to avoid spurious regressions, ARDL bounds test to check for long run relationships, Granger causality tests and PMG diagnostic tests. The results of the PMG revealed that there is a positive statistically significant relationship between broad money growth and economic growth in BRICS nations. These results were validated by the presence of bidirectional Granger causality between broad money growth and economic growth.

Therefore, the study makes the following policy recommendations based on empirical evidence: Firstly, the positive bidirectional relationship between broad money growth and economic growth entail that broad money growth is important for economic growth of BRICS nations. This calls for policies that aims on reducing interest rates by the New Development Bank to increase money supply and stimulate

the economy. Since these countries are developing countries, if there is more money available, the economy will accelerate because businesses have easy access to financing. This must be implemented with a closer look at inflationary pressures.

Secondly, there is a positive statistically significant but non-causal relationship between trade and economic growth in BRICS. This entail that the policy makers must revise and promote trade as it significantly boosts economic growth in BRICS even though it does not have a causal effect. This can mean the promotion of exports as this brings more money in these countries and less imports as it takes money out of their borders.

Thirdly, there is a negative statistically significant bidirectional causality between gross fixed capital formation and economic growth in BRICS nations. This calls for the NDB to revise its investment policies so that it can boost economic growth and reduce detrimental effect. This can be done through revising investment projects that the NDB funds so that their investment can positively contribute to economic growth.

Moreso, there is negative statistically insignificant noncausal relationship between lending interest rates and economic growth in BRICS nations. This entail that NDB should revise lending rates, so it encourages people to borrow money. Low interest rates mean more spending money in consumers' pockets. That also mean they may be willing to make larger purchases and will borrow more, which spurs demand for household goods and firms. This is an added benefit to financial institutions because banks can lend more, but it must be done in a way that it does not discourage investors from investing their money should interest rates be kept low for longer period as returns fall.

Moreover, there is a negative statistically insignificant bidirectional causality between employment and economic growth in BRICS nations. This calls for the restructuring of the labour market in BRICS nations. This can be done through the New Development Bank extending support to those engaging in research and development and those in tertiary education system so that they can improve their skills needed for revitalising economic growth. Unskilled labourers should also be given opportunities in sectors where they can be able to work and get skills.

In conclusion, the study's main objective was to analyse the role of New Development Bank on economic growth and development of BRICS nations by incorporating employment, gross fixed capital formation, trade, lending interest rate and broad money growth as control variables. This objective was achieved by deploying a PMG estimator on BRICS nations' panel data spanning from 1997 to 2022 and Granger causality model. The NDB was found to be playing an important role on the growth of BRICS nations since broad money growth is positive bidirectional statistically significant related to economic growth. Studies in the future should consider using more observations and different models when examining the role of NDB on economic growth and development of BRICS nations.

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