The Scientific Temper (2024) Vol. 15 (4): 3377-3386

E-ISSN: 2231-6396, ISSN: 0976-8653

Doi: 10.58414/SCIENTIFICTEMPER.2024.15.4.48

https://scientifictemper.com/

RESEARCH ARTICLE

BRICS and South African economic growth: Implications for Ethiopia, the new BRICS member

Bayelign A. Zelalem*, Ayalew A. Abebe

Abstract

This paper examines the BRICS' impact on South Africa's economic growth and its implications for Ethiopia, the new BRICS member. By analyzing the economic growth before and after BRICS from 2010 to 2021 using the Wilcoxon signed rank and the normality test, the research hypotheses are answered. The results showed that BRICS has a considerable impact on the current growth domestic product (CGDP) and that the CGDP increased after South Africa joined BRICS. The research also revealed that real growth domestic product (RGDP), which is higher after South Africa joins the BRICS, greatly increases after membership. Additionally, South Africa's current growth rate of agriculture (CGRA) and annual growth rate of agriculture (AGRA) are significantly impacted by being a member of BRICS, and more (CGRA) and AGRA are reported after South Africa joins BRICS, respectively. Finally, the study discovered that membership in BRICS has a significant impact on current industry growth rates (CGRI) and annual industry growth rates (AGRI), with higher current industry growth rates (CGRI) and annual industry growth rates (AGRI) reported after South Africa joins BRICS, respectively. The analysis came to the conclusion that South Africa's economic growth improved and greatly increased as a result of joining the BRICS. Consequently, the South African government should engage in greater BRICS membership activities and Ethiopia could take an experience from South Africa and use the BRICS membership as an excellent opportunity to enhance total net export, business investment, mass production, and value addition in agriculture and industry, including manufacturing, construction, and mining sectors.

Keywords: Economic growth, BRICS, South Africa, Ethiopia.

Introduction

The abbreviation -'"BRICS-'" stands for a collection of developing nations, including Brazil, Russia, India, China and South Africa. The strong economic growth of these nations is forecasted to continue, and their combined output is anticipated to surpass that of the G-7 nations (Goldman Sachs, 2001). Observing and understanding productivity trends, behaviors, and production factors are some of the most crucial responsibilities when concentrating on economic development and expansion, as stated in major works by Bohm-Bawerk (1907), Jorgenson and Griliches (1967), and Kaldor (1966), this is vital to every economy and is even more crucial in emerging nations.

The abbreviation BRIC (Brazil, Russia, India and China) was used by investment firm Goldman Sachs' O'Neill (2001) in a research study to refer to the four significant emerging economies of Brazil, Russia, India, and China, a supposedly potent group of nations. A few years after the formation of BRIC, South Africa was invited to join it for strategic and political reasons rather than primarily economic reasons, and the term was changed to BRICS to reflect South Africa's presence. Economic, commerce, financial, energy, health, science and technology, culture, agriculture, education, and many other areas have all benefited from the BRICS collaboration. Its platform for cooperation is an ideal approach for developing nations to come together and participate in the global economy. It also plays a significant role in enhancing global multilateral cooperation. Its benefits include breaking the monopoly of Western-rich nations, expanding and deepening collaboration among developing countries, and significantly increasing the voice of emerging markets and developing countries in global governance. The BRICS nations are a new source of hope for South-South cooperation and a new venue for developing nations to engage in international economic governance.

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How to cite this article: Zelalem, B. A., Abebe, A. A. (2024). BRICS and South African economic growth: Implications for Ethiopia, the new BRICS member. The Scientific Temper, **15**(4):3377-3386.

Doi: 10.58414/SCIENTIFICTEMPER.2024.15.4.48

Source of support: Nil

Conflict of interest: None.

Received: 09/10/2024 **Accepted:** 16/11/2024 **Published** : 20/12/2024

According to the IMF (International Monetary Fund), (2014), BRICS made up almost 40% of the global population and one-third of the global GDP (Growth Domestic Product) in 2014, giving them roughly the same weight as the G7. BRICS nations are frequently viewed as drivers of global economic recovery because they have economies with the fastest rates of growth. The BRICS saw an average economic growth of 7.1% between 2001 and 2017, which was 3.3 percentage points higher than the global average. BRICS nations actively embraced the advantages of economic globalization, fully utilized their special advantages, comprehensively supported the economic and social advancement of all nations, and rose to the top of emerging markets and developing nations, taking on increasing significance in the global economic structure.

The association between membership in the BRICS and economic growth among these countries has received very limited research. In their assessment of the economies of Brazil, Russia, India, China, and South Africa during the global financial crisis, Hess, A., Campos, and Moloi (2019) discovered that the total factor of productivity average growth was adversely impacted. Attention should be paid to the unique circumstances of Brazil and South Africa, where the average growth was negative before and after the financial crisis in Brazil and drastically lower in South Africa. The fallout of the global crisis appears to have divided BRICS into RIC and BS. Both before and after the financial crisis, there were differences in the total factor of productivity average growth rates. According to research by the IMF (2011) titled New Growth Drivers for Low-Income Countries, BRICs have emerged as a new growth driver from low-income- countries.

A panel data analysis conducted by Beatrice, Simo-Kengne, and Siphiwo Bitterhout (2023) revealed that corruption has a negative impact on economic growth in the BRICS nations suggesting that some nations have lower levels of corruption than others. To improve their economies, the governments of BRICS countries are urged to implement anticorruption measures. None of the aforementioned studies contrasts the economic growth of BRICS and non-BRICS members. Therefore, it is worthwhile to investigate the effect of being a member of BRICS on before and after BRICS economic growth implications for Ethiopia, the new BRICS member. Thus, this study compares South African economic growth before and after the BRICS implications for the new member of Ethiopia with the specific aim of:

1. To investigate how being a BRICS member improves the current growth of domestic products in South Africa.
2. To assess how being a BRICS member improves the real growth of domestic products in South Africa.
3. To determine how being a BRICS member improves the current growth rate of agriculture in South Africa.
4. Examine how being a member of BRICS improves the annual growth rate of agriculture in South Africa.
5. To identify how BRICS members improve the current growth rate of the South African industry.
6. To identify how BRICS members improve the annual growth rate of South African industry.

Literature Review

The BRICS nations Brazil, Russia, India, China, and South Africa are global economic competitors to the G7 (Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States) countries' continuous hegemony over international commerce, and are projected to contribute 32.1% of the world's GDP by 2023. Incentives for official involvement in BRICS have increased in 2023, as BRICS currently has over US$4 trillion in reserves and accounts for over 42% of the global population. China has supported the idea of enhancing collaboration under the BRICS Plus model for the past two years despite the fact that BRICS Plus was established in 2017 and invited non-BRICS officials. Russia has also raised the possibility of increasing the number of BRICS members from five to 17.

Around 40 additional nations, including major players such as Argentina, Egypt, Indonesia, Iran, Nigeria, Saudi Arabia, Turkey, and the UAE, are thought to have indicated an interest in participating. The structure of BRICS and the mechanism for accepting new countries may change as more nations join, in addition to the organization revising its collective decision and having the appropriate requirements and processes for the process of accrediting new members. This will allow for the registration of Saudi Arabia, Egypt, the United Arab Emirates, Argentina, Iran, and Ethiopia as new members in 2023.

After being identified as a promising investment location in 2001, BRICS nations saw strong economic growth. However, the political and economic structures of these nations changed drastically during the 1990s. The state's active policy interventions for resource mobilization, trade policies, public procurement, stimulation of public demand, and provision of financial support have been a common threat throughout the diverse economic development experiences of these countries, contributing to their position as high performers (Santiago, 2020).

Amador (2012) emphasized that China, India, and Brazil are members of the BRICS and that their industrial exports have considerable energy content. The author pointed out that other elements, including political and social integration, affect economic progress. The findings of this study are plausible, given that political unrest frequently impedes economic growth, particularly in Africa. According to Amador (2012), the BRICS countries export significant amounts of energy. This study aims to ascertain the impact of BRICS on the economic growth of other economies from 1960 to 2013. This study used the recently developed integration technique suggested by Saikkonen and Lutkepohl (2000). The Toda and Yamamoto

(1995) method is also used in this investigation to establish a causal relationship between the economic growth of the BRICS nations.

In terms of population (40%), GDP (25% nominal and US$ 16.039 trillion), land covering (30%), international commerce (18%), and worldwide forex (US$ 4 trillion), BRICS play a key role in the global economy. The BRICS collectively engaged in sectorial cooperation in numerous fields, including science and technology, trade promotion and facilitation, energy, health, education, innovation, and the fight against transnational crime, between 2001 and the end of the 2010 Badar Alam Iqbal (2022). The 11th summit was held in Brazil in 2014, and organizations of strategic and fundamental importance were established, such as the Contingent Reserve Arrangement (CRA) and the New Development Bank (NDB). These have broad repercussions and ramifications for both the BRICS economies and the rest of the world.

Both programmers' new development bank (NDB) and global economic order (GEO) have a substantial impact on the process of accelerated economic growth, which leads to socioeconomic advancement in the member nations of Badar Alam Iqbal (2022). The NDB has authorized 70 projects for sustainable development and infrastructure worth US$25.07 billion, including loans provided to member nations under the NDB Emergency Assistance Facility. India has 18 projects totaling $6.7 billion, which is noteworthy. The 12th summit took place in Russia on December 20, 2020, adding additional elements, such as global stability, shared security, and innovative growth. These are necessary conditions for developing an improved, efficient, and effective global economic order (GEO) that is urgently required.

The BRICS nations' financial markets have developed similarly quickly. For instance, in the 20 years leading up to 2010, the market capitalization of Brazil rose from a very low 4% of GDP to 74%, that of India rose from 12% to 93%, and that of Russia and China rose from virtually 0% to 70% and 81%, respectively. Market capitalization in South Africa has increased by more than two fold, from 123 percent to 278 percent. Banks from these five nations were listed among the top 100 banks in the world, with the top four banks having their headquarters in China, according to the S&P Global Market Intelligence's global bank rankings. Therefore, it should come as no surprise that these economies took over as the primary drivers of global demand. With a strong desire to create a more just and balanced international order that reflects the dynamics of today's global economy and fairly serves the interests of all, BRICS countries were also driven to a common objective of reforming the international financial and monetary system. To do this, the participation of the G20 and the five BRICS nations is crucial for determining global economic strategy and fostering financial stability Daniel Mminele, (2016).

Using China as a case study, Ouyang (2016) carried out a thorough examination of the advantages of comprehensive human capital in large late-developing countries. These results are sufficient to suggest policy adjustments. Mallick (2015) also investigated the direct impact of globalization and the reallocation effect (or structural change) on the rise in worker productivity in BRICS nations. The findings indicate that structural changes in China and India, particularly foreign direct investment (FDI) and international commerce, have a major impact on the acceleration of labor productivity growth in the BRICS nations.

The period from 1995 to 2010 (including the start of the global financial crisis in 2008) was considered in Mobarek and Fiorante's (2014) study to determine whether the equity markets of BRIC countries could be regarded as having weak-form efficiency. They discovered evidence that supports the notion that BRIC markets may have been on the verge of becoming fairly weakly efficient. These results may be indicative of BRIC countries' economic future. Based on the review of previous studies, the following are the hypotheses for this study:

H1. There is a significant difference in the current growth of domestic products after South Africa is a member of BRICS.

H2: There is a significant difference in the real growth of domestic products after South Africa is a member of the BRICS.

H3: There is a significant difference in the current growth rate of agriculture after South Africa was a member of BRICS than before BRICS.

H4: There is a significant difference in the annual growth rate of agriculture after South Africa was a member of BRICS than before BRICS.

H5: There is a significant difference in the current growth rate of industry after South Africa is a member of BRICS than before BRICS.

H6: There is a significant difference in the annual growth rate of the industry after South Africa was a member of BRICS than before BRICS.

Research method

Research design

To accomplish this objective, this study employed an ex-post facto, or causal-comparative, research design. When controlling and influencing all or some of the independent variables is not always achievable or when laboratory control is difficult, expensive, or unethical, ex-post facto (causal-comparative) is the best research strategy to use (Brigham & Houston, 2011).

Population, sampling technique, data sources and variables description

This study investigates the effect of being a BRICS member on the economic growth of South Africa and its implications

for Ethiopia at new BRICS member. Before the BRICS, four members were included: Brazil, Russia, India, and China (BRIC). In 2010, the groups included South Africa as a member, and the association was termed BRICS. This study collects data only from South Africa because its late membership in BRICS helps to compare economic growth before and after BRICS. Moreover, collecting data only from South Africa is necessary because South Africa's economy, environment, and geography are comparable with those of Ethiopia and the information was gathered from databases maintained by the International Monetary Fund (IMF) from 2010 to 2021.

Variables description

- *Current (nominal) gross domestic product (CGDP)*

Represents the market value of all finished goods and services produced within the designated time period. The market value of all goods and services generated is not included in the current GDP because doing so would require double counting. Each finished good has an intermediary good, whose worth is factored into the cost of the finished good. The GDP is calculated for each nation's currency. These estimations must be changed into a common currency or comparison across national boundaries. Current exchange rates are frequently used for conversion; however, they can provide an inaccurate comparison of the true volumes of final products and services in GDP. Purchasing power parity (PPPs) is a superior strategy. Mankiw (2010) described PPPs as currency converters that account for variations in product pricing levels between nations and enable an international comparison of GDP volumes and economy sizes.

- *Real growth domestic product (RGDP)*

Measured by comparing the prices of current outputs to those in place in the past. Typically, changes in the volume (sometimes referred to as real) of GDP are used to measure changes in the size of economies. Real measures the removal of GDP changes caused by inflation. This provides a measurement of the changes in an economy's volume of production. Furthermore, real gross domestic product (GDP) is a measure of an economy's output of all goods and services over the course of a year, adjusted for inflation. Base-year prices are used to express the real GDP. It is also known as constant-dollar GDP, constant-price GDP, or GDP adjusted for inflation. Simply expressed, real GDP corrects for price fluctuations and estimates a nation's total economic production. Real GDP is a macroeconomic metric that accounts for price changes to calculate the worth of products and services generated by an economy over a certain period. It assesses a nation's overall economic production, accounting for price fluctuations caused by inflation or deflation Mankiw, (2010).

Current growth rate of agriculture (CGRA)

In addition to the cultivation of crops and the raising of cattle, agriculture adds value through forestry, hunting, and fishing. After summing all outputs and deducting any intermediary inputs, the value added is a sector's net output. It is estimated without considering the deterioration and depletion of natural resources or the wear and tear of manufactured assets. The International Standard Industrial Classification (ISIC) identifies where value should be added. It is the value added to the country's current or nominal GDP through agriculture, forestry, hunting, and fishing.

- *Annual growth rate of agriculture (AGRA)*

Forestry, hunting, and fishing are all included in the ISIC division of agriculture, along with the cultivation of crops and raising of cattle. After summing all outputs and deducting any intermediary inputs, the value added is a sector's net output. It is estimated without considering the deterioration and depletion of natural resources or the wear and tear of manufactured assets. The International Standard Industrial Classification (ISIC) identifies where value should be added. It is the value added to the nation's real GDP through forestry, farming, fishing, and hunting.

- *Current growth rate of industry (CGRI)*

Manufacturing and construction are included in this industry. It includes value added in manufacturing, construction, power, water, gas, and manufacturing (sometimes presented as a separate subcategory). After summing all outputs and deducting any intermediary inputs, the value added is a sector's net output. It is estimated without considering the deterioration and depletion of natural resources or the wear and tear of manufactured assets. The International Standard Industrial Classification (ISIC) identifies where value should be added. The World Bank (2023) calculated this value as the value that the industry adds to the present GDP.

- *Annual growth rate of industry (AGRI)*

Manufacturing and construction are included in the industry. It includes value-added in manufacturing, construction, power, water, gas, and manufacturing (sometimes presented as a separate subcategory). After summing all outputs and deducting any intermediary inputs, the value added is a sector's net output. It is estimated without considering the deterioration and depletion of natural resources or the wear and tear of manufactured assets. The International Standard Industrial Classification (ISIC) identifies where value should be added. According to the World Bank (2023), it is calculated as the value that industry adds to the real GDP. The study variables are summarized in Table 1.

Method of data analysis

Data on economic growth were first retrieved from the International Monetary Fund (IMF) database, and a normality test was then carried out to determine whether the data were normally distributed. The Wilcoxon signed-rank test and descriptive statistics were used to analyze South Africa's economic growth. The Wilcoxon signed-rank test

Table 1: Variables and their measurement

Variables	*Symbol*	*Measurement*
Current GDP	CGDP	%of current GDP of South Africa
Real GDP	RGDP	%of real GDP of South Africa
Current growth for agriculture	CGRA	Current growth rate of agriculture to current growth domestic product of South Africa
Current growth for industry	CGRI	Current growth rate of the industry to current growth domestic product of South Africa
Annual growth rate for agriculture	AGRA	Annual growth rate of agriculture to real growth domestic product of South Africa
Annual growth rate for industry	AGRI	Annual growth rate of industry to real growth domestic product of South Africa

Table 2. Descriptive Statistics

	N	*Minimum*	*Maximum*	*Mean*	*Std. Deviation*
CGDP before BRICS	8	0.05	0.15	.12	.035
CGDP after BRICS	8	0.07	0.16	.128	.029
RGDP before BRICS	8	-2	6	3.65	2.323
RGDP after BRICS	8	7	11	8.00	1.383
CGRA before BRICS	8	2	3	2.46	.302
CGRA after BRICS	8	8	9	8.64	.619
CGRI before BRICS	8	25	29	26.31	1.132
CGRI after BRICS	8	40	47	43.25	2.859
AGRA before BRICS	8	-6	19	3.24	7.433
AGRA after BRICS	8	3	5	4.01	.364
AGRI before BRICS	8	-6	5	2.21	3.756
AGRI after BRICS	8	6	13	8.10	2.476

is a statistical hypothesis test that does not require the assumption that the differences between paired samples are normally distributed Ayalew Ali Abebe, (2022). It can be used to compare the locations of two populations using a set of matched samples, or to test the location of a set of samples.

Results and discussions

Descriptive statistics

As shown in Table 2, the average value of the current gross domestic product (CGDP) of South Africa before becoming a BRICS member was 12%, with minimum and maximum values of 5% and 15%, respectively. The current gross domestic product (CGDP) of South Africa before becoming a member of BRICS deviates from its mean by 3.5%. However, the average value of the current gross domestic product (CGDP) of South Africa after being a member of BRICS was 12.8%, with minimum and maximum values of 7% and 15%, respectively. After becoming a member of BRICS, the current gross domestic product (CGDP) deviates from its mean by 2.9%. The mean value of real gross domestic product (RGDP) in South Africa was 3.65 before it became a member of the BRICS, with a minimum and maximum value of -2% and 6%, respectively. The real gross domestic product (RGDP) of South Africa before BRICS deviates from its mean by 2.323. The mean value of real gross domestic product (RGDP) in South Africa was 8% after being a member of BRICS, with a minimum and maximum value of 7% and 11%, respectively. The real gross domestic product (RGDP) of South Africa after BRICS deviates from its mean by 1.383.

The average value of the current growth rate of agriculture (CGRA) in South Africa was 2.46% before it became a BRICS member, with minimum and maximum values of 2% and 3%, respectively. The current growth rate of agriculture (CGRA) deviated from its mean by 3.02% before South Africa became a member of BRICS. The mean value of the current growth rate of agriculture (CGRA) in South Africa was 8.64% after being a member of the BRICS, with minimum and maximum values of 8% and 9%, respectively. The current growth rate of agriculture (CGRA) in South Africa deviated from its mean by 6.19% after South Africa became a member of the BRICS.

The mean value of the current growth rate of industry (CGRI) in South Africa was 26.31% before it became a member of BRICS, with minimum and maximum values of 25 and 29%, respectively. The current growth rate of industry (CGRI) in South Africa deviated from its mean by 1.132%

before the BRICS. The mean value of the current growth rate of industry (CGRI) in South Africa was 43.25% after being a member of BRICS, with minimum and maximum values of 40 and 47%, respectively. The current growth rate of industry (CGRI) in South Africa deviated from its mean by 2.859% after BRICS. The average annual growth rate of agriculture (AGRA) in South Africa was 3.24% before BRICS, with minimum and maximum values of -6 and 19%, respectively. The annual growth rate of agriculture (AGRA) deviated from its mean by 7.433% before the BRICS.

The average annual growth rate of agriculture (AGRA) in South Africa was 4.01% after South Africa became a BRICS member, with minimum and maximum values of 3 and 5%, respectively. The annual growth rate of agriculture (AGRA) in South Africa deviated from its mean by 3.64% after BRICS. The mean value of the annual growth rate of industry (AGRI) in South Africa was 2.21% before BRICS, with minimum and maximum value of -6 and 5%, respectively. The annual growth rate of industry (AGRI) in South Africa deviated from its mean of 3.756% before BRICS. The mean value of the annual growth rate of industries (AGRI) in South Africa was 8.10% after BRICS, with minimum and maximum values of 6 and 13%, respectively. The annual growth rate of industry (AGRI) in South Africa deviated from its mean by 2.476% after BRICS.

Test of normality

The data points stray from the diagonal line because the significance under the Shapiro–Wilk test is greater than 0.05, as shown in Table 3, and the test for normality assumes that the significance must be more than 0.05 for any data to be normally distributed (the diagonal line shows a clear nonlinear figure with the data points straying from the diagonal line). Therefore, the Wilcoxon Signed Rank Test should be used to perform the analysis because it is the optimum method of analysis for non-normally distributed data. The *p-value* for the Kolmogorov-Smirnov test is greater than 0.05, indicating that there is significant evidence to reject the null hypothesis and accept the alternative hypothesis that the variable follows a normal distribution.

Wilcoxon signed rank test

As shown in Table 4, the current growth domestic product (CGDP), real growth domestic product (RGDP), current growth rate of agriculture (CGRA), current growth rate of industry (CGRI), annual growth rate of agriculture (AGRA), and annual growth rate of industry (AGRI) are all significant

Table 3: Tests of Normality

	Kolmogorov-Smirnov[a]			*Shapiro-Wilk*		
	Statistic	*df*	*Sig.*	*Statistic*	*df*	*Sig.*
CGDP before BRICS	.236	8	.200*	.822	8	.050
CGDP after BRICS	.134	8	.200*	.965	8	.855
RGDP before BRICS	.248	8	.157	.802	8	. 302
RGDP after BRICS	.279	8	.067	.830	8	.060
CGRA before BRICS	.207	8	.200*	.927	8	.486
CGRA after BRICS	.164	8	.200*	.928	8	.497
CGRI before BRICS	.177	8	.200*	.945	8	.662
CGRI after BRICS	.179	8	.200*	.888	8	.227
AGRA before BRICS	.263	8	.110	.860	8	.119
AGRA after BRICS	.155	8	.200*	.956	8	.774
AGRI before BRICS	.238	8	.200*	.793	8	.084
AGRI after BRICS	.202	8	.200*	.866	8	.139

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Table 4: Wilcoxon signed-rank test

	CGDP before BRICS – CGDP after BRICS	*RGDP before BRICS – RGDP after BRICS*	*CGRA before BRICS -CGDP after BRICS*	*CGRI before BRICS - CGRI after BRICS*	*AGRA before BRICS -AGRA after BRICS*	*AGRI before BRICS – AGRI after BRICS*
Z	3.321[b]	1.021[c]	-4221[c]	-3.032[c]	1.071[c]	2.212[c]
Asymp sig. (2- tailed)	.024	.023	.000	.002	.000	.003

[a]Wilcoxon Signed Ranks Test
[b]Based on positive ranks.
[c]Based on negative ranks.

at the 5 and 1% levels, with *p-value*s of 0.024, 0.023, 0.0000, 002, 0.000, and 0.003, respectively. Moreover, the results confirmed that the differences in current growth domestic product (CGDP), real growth domestic product (RGDP), current growth rate of agriculture (CGRA), current growth rate of industry (CGRI), annual growth rate of agriculture (AGRA), and annual growth rate of industry (AGRI) of South Africa are significant after being a member of BRICS.

Hypothesis testing and discussions of result

In the first hypothesis, it was believed that there was a significant difference in the current domestic product (CGDP) of South Africa after BRICS compared with the current domestic product (CGDP) before BRICS. The Wilcoxon signed rank- test analysis shows that the current growth domestic product (GGDP) is significant at the 5% level, with a *p-value* of 0.024. Consequently, the null hypothesis was rejected and the alternative hypothesis was accepted.

The results of this study showed that South Africa's current growth domestic product (CGDP) improved after it became a member of BRICS compared to before BRICS, with a positive and significant result. This is because South Africa's total net exports increased and were higher after becoming a member of BRICS than before BRICS. Moreover, the significant positive result of current growth in domestic products (CGDP) is because South African business investment was higher after BRICS than before BRICS. The findings of this study are supported by O'Neill's (2007) forecast that BRICs will overtake the G7 economies in 2032, and become four of the six most dominant economies in the world. The combined nominal GDP is expected to be twice that of G7 by 2050. Moreover, the findings of this study are supported by the report of the World Bank 2023, which states that in per capita terms, the BRICS as a group had a nominal per capita GDP of $7,666 in 2021, against a global per capita GDP of $12,263 in the same year.

The second hypothesis assumes that there is a significant difference in the real growth of domestic products in South Africa after BRICS than before BRICS. The Wilcoxon Signed Rank Test analysis shows that there is a significant change in real gross domestic product (RGDP) after BRICS than before BRICS at a 5% significant level with a *p-value* of 0.023. Therefore, the null hypothesis was rejected and the alternative hypothesis was accepted. The significant difference in real growth domestic product (RGDP) after BRICS than before BRICS is because South Africa's total net exports and government spending on large productive projects are higher after BRICS than before BRICS. Moreover, South Africa accesses more loans from the New Development Bank (NDB) and invests money in huge projects that contribute to the real GDP. The findings of this study are supported by Chen's (2019) finding that the combined GDP of the four BRIC states increased from approximately 3 trillion US dollars in 2001 to 10 trillion US dollars in 2010. Although they were not immune to the 2007–2009 global economic crises, the four BRIC states were among those who first moved out of the shadows of crises and resumed high GDP growth. Compared to advanced economies that were trapped in recession and are still on the way to slow recovery, the BRICs have shown their potential to become the main force driving the global economy in the future.

Moreover, Bosupeng (2017) investigated the effects of BRICS on world economic growth and found that Brazil's economic growth is induced by other BRICS members, namely South Africa, China, and India. This suggests that economic and financial integration is required in the BRICS. If these economies increase economic and financial cooperation, other developing economies will benefit from this collaboration. Even though the BRICS countries are competing in terms of export sales, economic and financial cooperation is still a necessity for high economic growth.

The third hypothesis is that there is a significant difference in the value-added of agriculture as a percentage of the current GDP after South Africa becomes a member of the BRICS. The Wilcoxon signed rank test analysis showed that there was a significant change in the value addition of agriculture to the percentage of current gross domestic product (CGRA) after South Africa became a member of BRICS at the 1% significance level with a *p-value* of 0.000. The significant variation in the current growth rate of agriculture (CGRA) after BRICS is because the South African agricultural sector improved, and values were added to the net output of the agriculture sector after South Africa became a member of BRICS. Therefore, the null hypothesis was rejected and the alternative hypothesis was accepted. The findings of this study are supported by Wim Naudé, Adam Szirmai, and Alejandro Lavopa (2013), who found that the current growth rate of agriculture has significantly improved among the members of BRICS (Brazil, Russia, India, China, and South Africa) because of their membership.

Similarly, the study found a significant difference in the current growth rate of industry (CGRI) after South Africa became a member of BRICS compared to before BRICS at a 1% significance level and a *p-value* of 0.002. The significant difference in the current growth rate of industry (CGRI) after BRICS compared to before BRICS is because values were added in mining, manufacturing, electricity, water, and gas. This result is consistent with Wim Naudé, Adam Szirmai, and Alejandro Lavopa (2013), who found that the current growth rate of the industry significantly improved among BRICS (Brazil, Russia, India, China, and South Africa) members. Therefore, this study accepts an alternative hypothesis and rejects the null hypothesis.

The fifth hypothesis states that there is a significant difference in the annual growth rate of agriculture (AGRA) after South Africa became a member of BRICS compared to

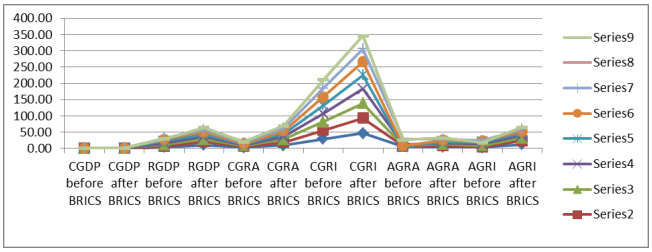

Figure 1: Trend analysis of South African economic growth before and after BRIC

before BRICS at a 1% significance level and a *p-value* of 0.000. The Wilcoxon signed rank test analysis shows that there was a significant change in the annual gross growth rate of agriculture (AGRA) after South Africa became a member of the BRICS because values were added to the annual growth rate for agriculture, forestry, and fishing. The findings of this study are supported by Ron Sandrey's (2013) examination of the individual agriculture sector. The study found that since the breakup of the old Soviet empire in 1991, Russian agriculture has been in turmoil, with agricultural production still lower than that in 1990. Even though Russia currently ranks among the top 12 producers globally in its entire major commodities as a member of BRICS Moreover, the contribution of agriculture to GDP was higher in India, Brazil, South Africa, and China as members of BRICS, according to Ron Sandrey (2013). Therefore, the null hypothesis was rejected and the alternative hypothesis was accepted.

Finally, the study found that the annual growth rate of industry (AGRI) after South Africa became a member of BRICS was higher than before BRICS at the 1% significance level and a *p-value* of 0.003. The Wilcoxon signed rank test showed that the South African annual growth rate of industry (AGRI) significantly improved after becoming a member of the BRICS. Therefore, the null hypothesis was rejected and the alternative hypothesis was accepted. The study results are supported by Wim Naudé, Adam Szirmai, and Alejandro Lavopa (2013), who found that rapid industry contributed to more economic growth in China and India after becoming members of the BRICS.

Trend analysis of economic growth in South Africa

Figure 1 shows how the current growth in domestic product (CGDP) improved and increased after South Africa became a member of BRICS compared to before BRICS from 2010 to 2021. Moreover, South African real growth domestic product (RDP), the current growth rate of agriculture (CGRA), the current growth rate of industry (CGRI), the annual growth rate of agriculture (AGRA), and the annual growth rate of industry (AGRI) improved after South Africa became a member of BRICS compared to before BRICS.

Conclusion

BRIC is an acronym for Brazil, Russia, India, China, and South Africa and is associated with emerging national economies that have covered economics, trade, finance, energy, health, science and technology, culture, agriculture, education, and many other fields. This cooperation mechanism is the best way for developing countries to come together and participate. The BRICS nations are a new source of hope for South-South cooperation and a new venue for developing nations to engage in international economic governance. From August 22–24, 2023, the BRICS (Brazil, Russia, India, China, and South Africa) group will gather in Johannesburg, South Africa, for its annual leader's summit, and six (6) new nations will be admitted: Argentina, Egypt, Ethiopia, Iran, Saudi Arabia, and the United Arab Emirates. Studies on the effects of BRICS membership on the economies of member nations and the global economy as a whole have been conducted, but no studies comparing economic growth before and after BRICS have been conducted. Therefore, the purpose of this study is to explore how BRICS impacts South Africa's economic growth and how it may affect Ethiopia, a new BRICS member.

The study found that the current growth domestic product (CGDP) significantly increased after South Africa became a member of BRICS than before BRICS, which is supported by O'Neill's (2007) forecast that the BRICs as a group will overtake the G7 economies in 2032, and they will become four of the six most dominant economies in the world. The combined nominal GDP is expected be twice that of G7 by 2050. Moreover, the study's findings are consistent with a World Bank report (2023) that states that BRICS, as a group, had a nominal per capita GDP of $7,666 in 2021, against a global per capita GDP of $12,263 in the same year, and member countries' nominal growth domestic product (CGDP) increased and benefited from membership. The study also found that real growth domestic product (RGDP) significantly increased after South Africa became a member of BRICS compared to before BRICS, which is supported by Chen's (2019) finding that the combined GDP of the four BRIC states increased from approximately 3 trillion US dollars in 2001 to 10 trillion US dollars in 2010. Moreover, the findings of this study are consistent with Mpho Bosupeng's (2017) investigation of the effects of BRICS on world economic growth and find that other BRICS members induce Brazil's economic growth.

The findings revealed that the current growth rate of agriculture (CGRA) significantly improved after South Africa became a member of BRICS, which is supported by the empirical study of Wim Naudé Adam, Szirmai Alejandro, and Lavopa (2013), who found that the current growth rate of agriculture significantly improved among the members of BRICS (Brazil, Russia, India, China, and South Africa) because of their membership. In addition, the study found that the annual growth rate of agriculture (AGRA) significantly improved after South Africa became a member of BRICS compared to before BRICS. This is consistent with the empirical study of Ron Sandrey (2013), who examined

the individual agriculture sector and found that since the breakup of the old Soviet empire in 1991, Russian agriculture has been in turmoil, with agricultural production still lower than in 1990, even though Russia currently ranks among the top 12 producers globally in all its major commodities as a member of BRICS.

The study also found that the current growth rate of industry (CGRI) improved after South Africa became a member of BRICS, which is supported by the results of Wim Naudé, Adam Szirmai, and Alejandro Lavopa (2013), who found that the current growth rate of industry significantly improved among BRICS members. Finally, the study found that the annual growth rate of industry (AGRI) increased after South Africa became a member of BRICS compared to before BRICS, which is supported by the result of Wim Naudé, Adam Szirmai, and Alejandro Lavopa (2013), who found rapid industry contributed more to economic growth in China and India after becoming members of BRICS. Therefore, the study concluded that South African economic growth improved after BRICS.

This study contributes to the financial literature because it is the first of its kind to examine the contributions of being a member of BRICS to the economic growth of South Africa, and it's useful for differentiating South African economic growth before and after BRICS. Moreover, the study's findings provide insights to the government of Ethiopia on how South Africa benefited from membership to improve economic growth. Specifically, the study provides insight to the Ethiopian government into opportunities from membership, such as loans from the New Development Bank (NDB), to improve economic growth. This study has some limitations. First, the fact that the study focuses only on the effect of being a member of BRICS on economic growth means that the study failed to see the effect of being a member of BRICS on foreign direct investment. Therefore, further research should be conducted on the effect of foreign direct investment. Second, the study used data from South Africa rather than from other BRICS members (Brazil, Russia, India, and China). Consequently, investigations will be conducted, including data from Brazil, Russia, India, and China.

Policy implications

To improve economic growth as measured by current (nominal) growth domestic product (CGDP), real growth domestic product (RGDP), current growth rate of agriculture (CGRA), annual growth rate of agriculture (AGRA), current growth rate of industry (CGRI), and annual growth rate of industry (AGRI), the South African government should pay particular attention to and participate more in BRICS membership, and Ethiopia can take a cue from South Africa, a new member of the BRICS, on how the government uses the loan from the New Development Bank (NDB) to fund more productive initiatives that support economic growth. Moreover, Ethiopia should also take lessons from South Africa on how to use BRICS membership as an excellent opportunity to expand total net exports, business investment, mass production, and value addition in agriculture and industry, including manufacturing, construction, and mining.

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