International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

A Comparative Analysis of G7 and BRICS Corporate Tax Structures and their Impact on Economic Growth: A Quantitative Study from 1990 to 2022

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Abstract: ***Taxation serves as the cornerstone of modern societies, providing the financial framework for governments to fulfill their obligations and support economic development. This research paper delves into the intricate landscape of corporate taxation, comparing the tax structures of G7 countries and BRICS nations to discern their impact on economic growth. Utilizing secondary data spanning from 1990 to 2022, the study examines key parameters such as the corporate tax to GDP ratio, GDP growth rates, and the relationship between corporate tax policies and economic performance. The research aims to address the lack of comprehensive comparative analysis in existing literature, offering insights into the rationale behind tax policies and their implications for economic development. Methodologically, the study employs quantitative analysis techniques such as correlation and regression to derive meaningful conclusions from the available data. Despite limitations such as data availability and comparability, this research contributes to the understanding of corporate tax structures and provides valuable insights for policymakers and economists alike.***

Keywords: Taxation, Corporate Tax, G7, BRICS, developed economies, emerging economies, GDP, Comparative analysis

1. Introduction

Taxation is vital for sustaining modern societies, providing governments with the funds needed for public services and infrastructure. Corporate taxation, a significant part of this system, affects businesses and economies globally. In this study, we compare the tax structures of India, G7, and BRICS countries to analyse their corporate tax policies' impact on economic growth, focusing on the Corporate Tax to GDP ratio. Understanding these policies and their effects is crucial for assessing fiscal health and economic dynamics.

2. Problem Statement

Current research often lacks comprehensive comparative analysis of corporate tax structures between emerging economies (BRICS) and developed economies (G7). Existing studies often focus on individual countries or regions, hindering meaningful comparisons. This research aims to fill this gap by providing insights into corporate tax structures across different economic landscapes. By addressing these aspects, the article seeks to inform policymakers and economists in formulating effective tax policies**.**

3. Limitations of the Study

- Limited data availability poses challenges in obtaining comprehensive information on corporate tax structures, particularly in countries with complex and frequently changing tax laws like Brazil and Russia.
- Data comparability is hindered by variations in tax accounting methods and definitions of taxable income across different countries, potentially impeding accurate comparisons of corporate tax systems.

4. Research Methodology

This research aims to comprehensively analyse corporate tax structures in emerging and developed economies, examining differences in tax rates, tax to GDP ratio, and GDP growth to understand their impact on economic development.

5. Research Objectives

- To Study the Corporate Tax Structure of G7 countries.
- To Study the Corporate Tax Structure of India and other developing countries in BRICS.
- To Compare the Corporate Taxation between the countries by evaluating key parameters including corporate tax to GDP ratio, contribution to GDP, etc.
- To understand the relationship between corporate tax rate and GDP growth rate.

Type of Data: Secondary data

Period of Study: 1990-2022

Sample size: Countries selected were G7(Canada, France, Germany, Italy, Japan, UK, and US) and BRICS (Britain, Russia, India, China, and South Africa)

Sources of Data: Various published sources**,** official websites of Indian and other countries websites (IRS, Ministry of Finance India, OECD-stat etc.,)

Nature of Data: Quantitative Data

Statistical Tools:
- Correlation
- Regression

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6. Data Analysis

Corporate Tax Rates

The comparison of corporate taxation of both the groups of countries has been done using parameters such as corporate tax Rate, Corporate tax to GDP ratio, GDP growth rate etc. using graphs and other methods.

Mean Corporate Tax Rate (in %):

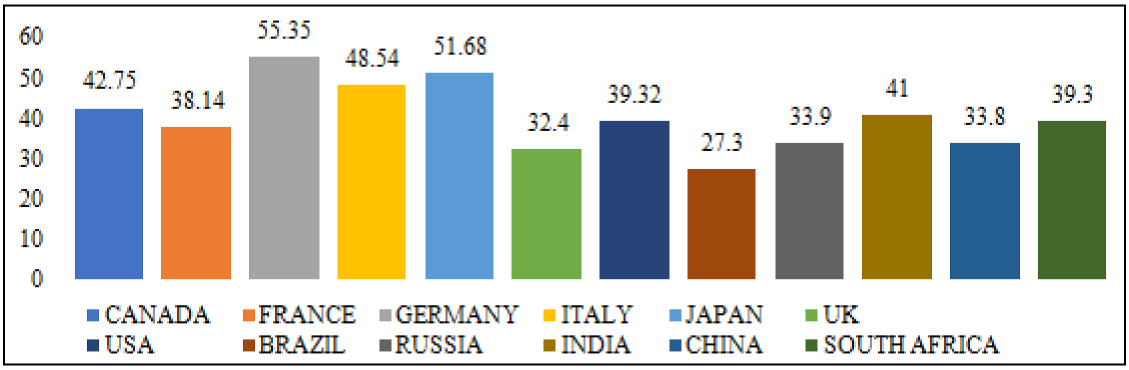

Figure 1: Mean Corporate Tax Rate of Countries from 1990 to 1999
Source: Researcher Calculation

Interpretation:

The mean corporate tax rate from 1990 to 1999 ranged between 27.3% and 55.35% among the 12 countries. Germany had the highest average at 55.35%, followed by Japan at 51.68%, and Italy at 48.54%. India ranked fifth with an average of 41%, while Brazil had the lowest average at 27.3%. Lower corporate tax rates generally indicate higher attractiveness to businesses, allowing for greater reinvestment of profits into the economy.

Mean Corporate Tax Rate (in %):

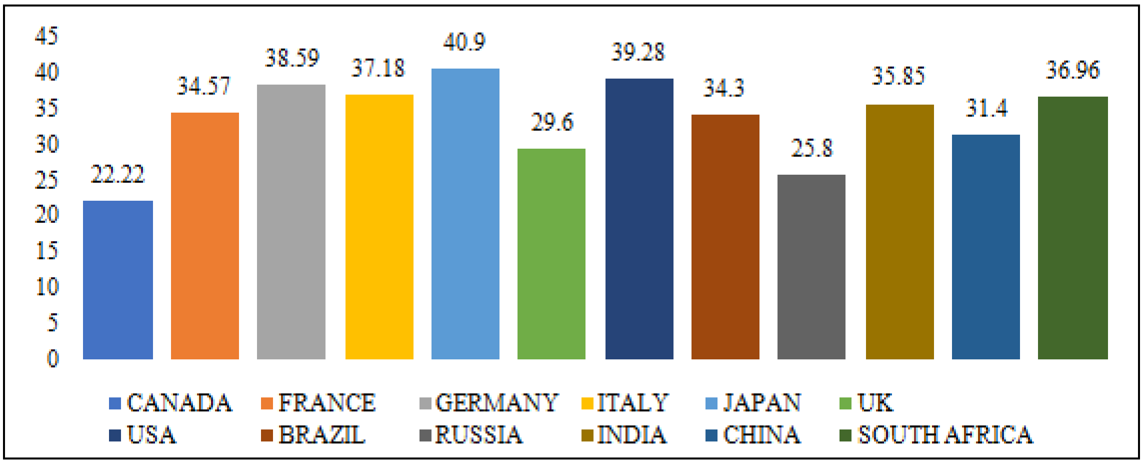

Figure 2: Mean Corporate Tax Rate of Countries from 2000 to 2009
Source: Researcher Calculation

Interpretation:

From 2000 to 2009, the mean corporate tax rate among the 12 countries varied between 22.22% and 40.9%. The average mean corporate tax rate for these countries during this period stood at 33.8%. Japan had the highest mean corporate tax rate at 40.9%, followed by the United States at 39.28%, and Germany at 36.82%. India ranked sixth with an average of 30.9%, while Canada had the lowest average at 27.3%.

Mean Corporate Tax Rate (in %):

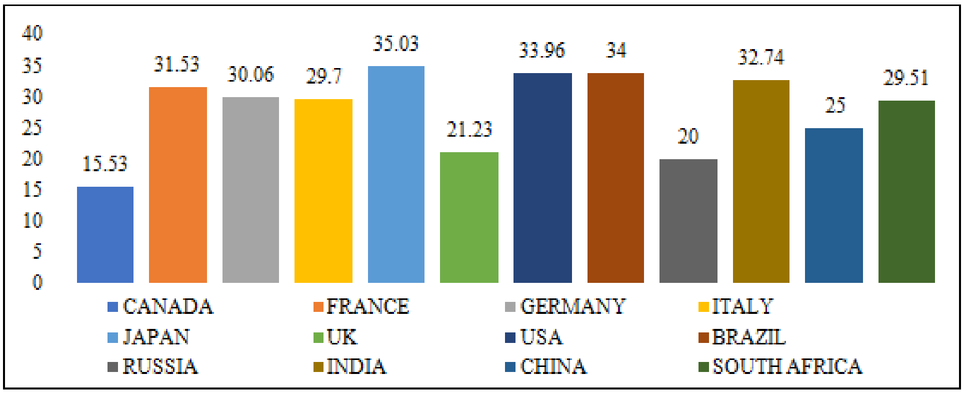

Figure 3: Mean Corporate Tax Rate of Countries from 2010 to 2022
Source: Researcher Calculation

Interpretation:
From 2010 to 2022, the mean corporate tax rate among the 12 countries ranged between 15.53% and 35.03%. The average mean corporate tax rate for these countries during this period was 29.19%. Japan had the highest mean corporate tax rate at 35.03%, followed by Brazil at 34%, and the United States at 33.96%. India ranked fourth with an average of 31.27%, while Canada had the lowest average at 15.53%.

Corporate Tax to GDP Ratio

Corporate Tax to GDP Ratio of G7 Countries (in %):
The corporate tax to GDP ratio measures the proportion of corporate tax revenue collected by a government in relation to the country's gross domestic product (GDP).

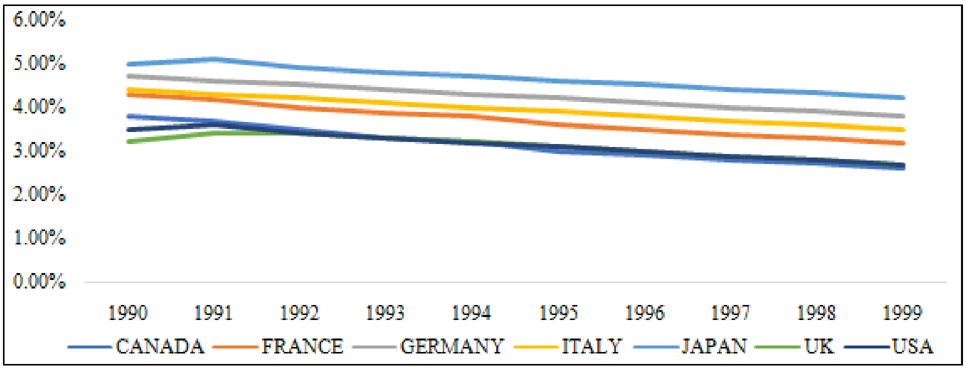

Figure 4: Corporate Tax to GDP ratio of G7 Countries from 1990 to 1999
Source: Researcher Calculation

Interpretation:
The graphic depicts the corporate tax to GDP ratio of G7 countries from 1990 to 1999, showing a general downward trend. In 1990, the average ratio was 4.3%, decreasing to 3.24% in 1999. Canada started at 3.80% in 1990, declining to 2.60% in 1999, while Japan saw a gradual decline from 5.0% to 4.20% during the same period. Other countries exhibited similar patterns of decline, with Italy experiencing a decrease from 4.40% to 3.50%, and the United States from 3.50% to 2.70%, among others.

Corporate Tax to GDP Ratio of G7 Countries (in %):

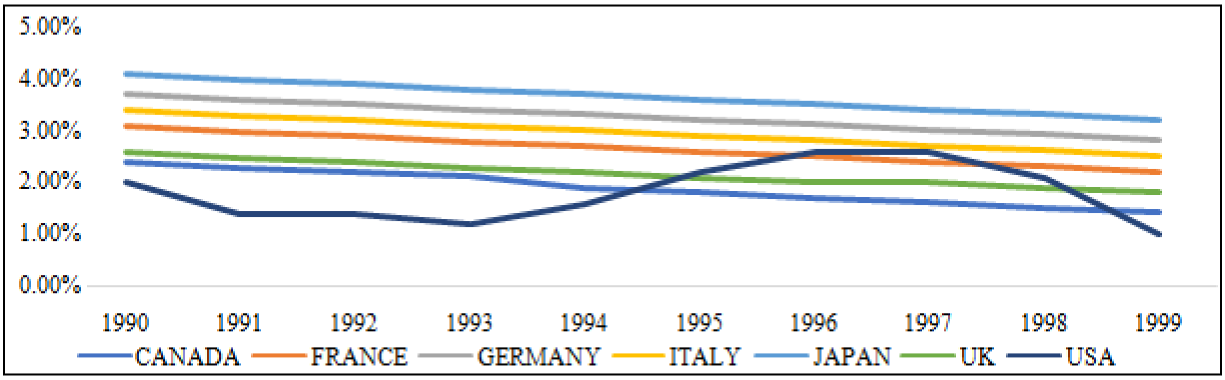

Figure 5: Corporate Tax to GDP ratio of G7 Countries from 2000 to 2009
Source: Researcher Calculation

Interpretation:
The average corporate tax to GDP ratio across G7 countries declined from 3.04% in 2000 to 2.11% in 2009, indicating a general downward trend during this period. Among individual G7 nations, Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States all showed declines in their corporate tax to GDP ratios. Canada's ratio decreased from 2.40% in 2000 to 1.40% in 2009, while France saw a drop from 3.10% to 2.20% during the same period. Germany exhibited a significant decline from 3.70% to 2.80%, while Italy experienced a decrease from 3.40% to 2.50%. Japan's ratio gradually declined from 4.10% to 3.20%. The United Kingdom's ratio decreased from 2.60% to 1.80%, while the United States' ratio fluctuated between 1.0% and 2.60% from 1990 to 2009.

Corporate Tax to GDP Ratio of G7 Countries (in %):

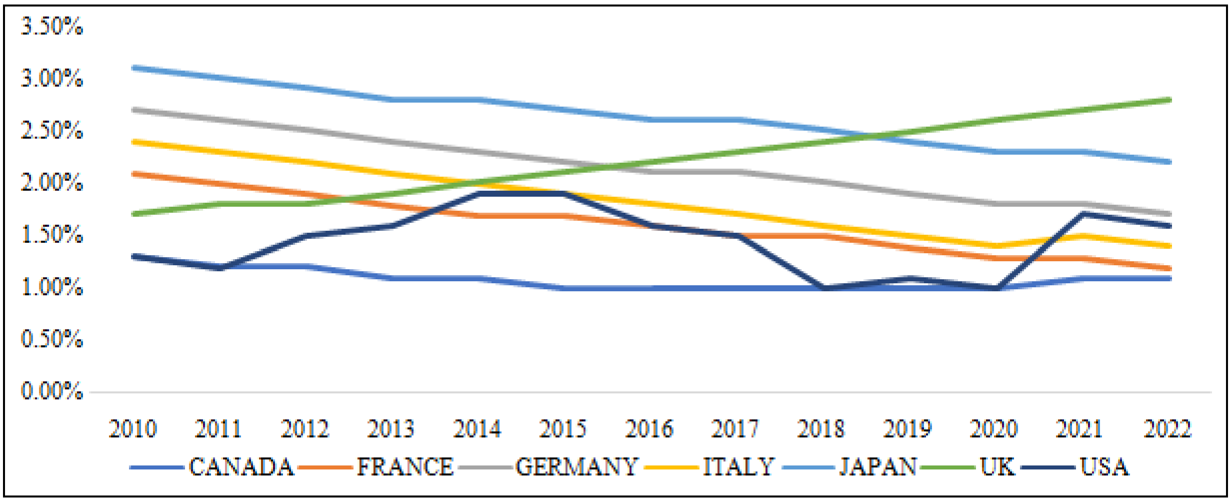

Figure 6: Corporate Tax to GDP Ratio of G7 Countries from 2010 to 2022
Source: Researcher Calculation

Interpretation: From 2010 to 2022, several trends in corporate tax to GDP ratios were observed across various countries. Canada saw a gradual decline from 1.30% to 1.10%, while France's ratio decreased from 2.10% to 1.20% during the same period. Germany exhibited a significant decline, starting at 2.70% and reaching 1.70% by 2022. Italy experienced a similar substantial decrease, moving from 2.40% to 1.40%. Japan's decline was more gradual, from 3.10% to 2.20%. In contrast, the United Kingdom's ratio increased from 1.70% in 2010 to 2.80% in 2022. The United States' ratio fluctuated between 1.0% and 1.90% from 1990 to 2022, showing a less consistent trend compared to other countries.

Corporate Tax to GDP Ratio of BRICS Countries (in %):

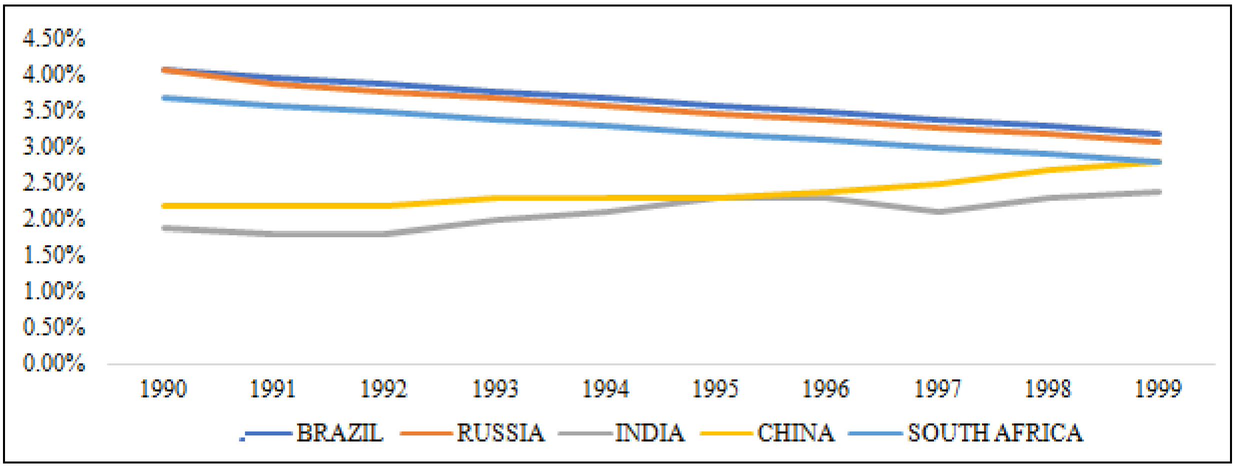

Figure 7: Corporate Tax to GDP ratio of BRICS Countries from 1990 to 1999
Source: Researcher Calculation

Interpretation: In 1990, Brazil and Russia had a corporate tax to GDP ratio of 4.10%, which decreased to 3.20% and 3.10% respectively by 1999. India consistently had the lowest corporate tax to GDP ratio among BRICS countries from 1990 to 1999, while China had the second lowest during the same period. South Africa's ratio declined significantly from 3.70% in 1990 to 2.80% in 1999.

Corporate Tax to GDP Ratio of BRICS Countries (in %):

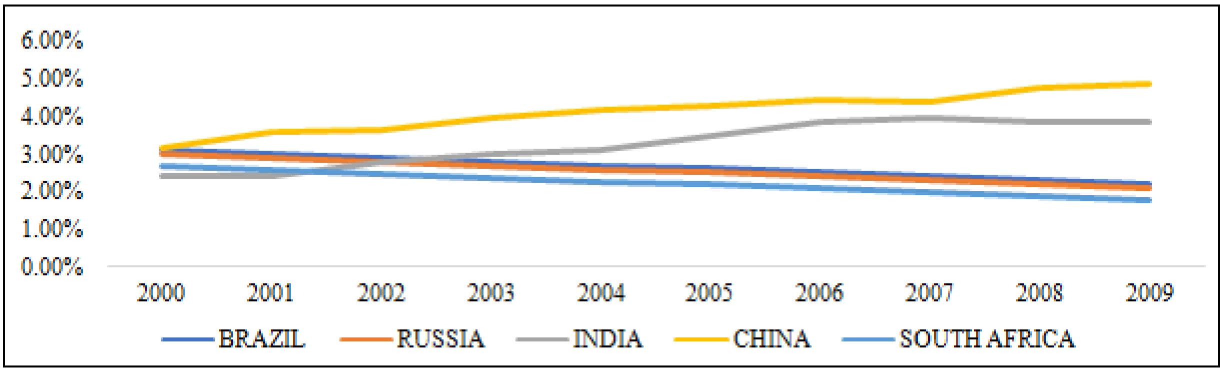

Figure 8: Corporate Tax to GDP Ratio of BRICS Countries from 2000 to 2009
Source: Researcher Calculation

Interpretation: In 2000, Brazil and Russia had corporate tax to GDP ratios of 3.10% and 3.00% respectively, which decreased to 2.20% and 2.10% by 2009. India's ratio was 2.40% in 2000 and fluctuated between 2.40% and 4.00% thereafter. China had the highest ratio among BRICS countries throughout the period. South Africa's ratio started at 2.70% and substantially decreased to 1.80% by 2009.

Corporate Tax to GDP Ratio of BRICS Countries (in %):

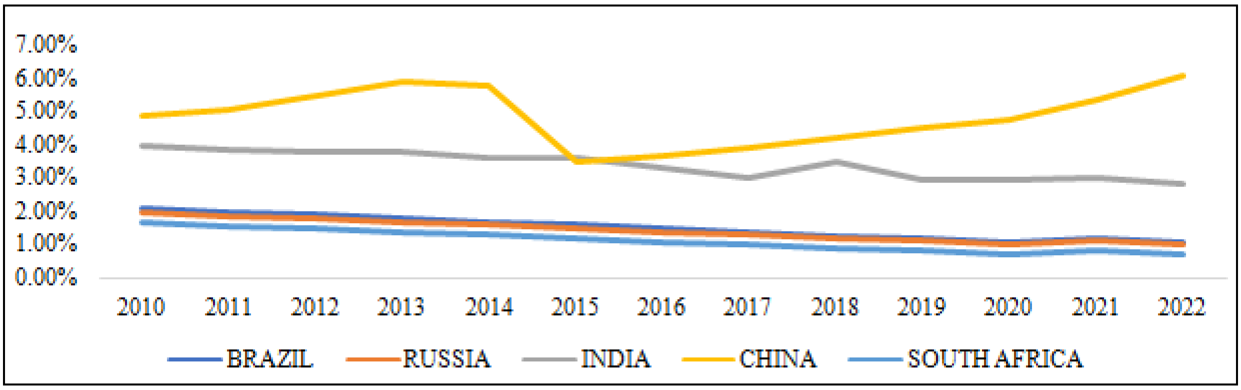

Figure 9: Corporate Tax to GDP Ratio of BRICS Countries from 2010 to 2022
Source: Researcher Calculation

Interpretation:
From 2010 to 2022, there were notable changes in the corporate tax to GDP ratios among BRICS countries. Brazil saw a decrease from 2.10% to 1.10%, while Russia's ratio decreased from 2.00% to 1.00%, and South Africa's ratio declined from 1.70% to 0.70%. China had the highest ratio in 2010, fluctuating between 3.50% and 6.10% throughout the period, ending at the highest in 2022. India's ratio was 4.00% in 2010, fluctuating between 2.50% and 3.90% over the period.

CORPORATE TAX RATE VS GDP GROWTH RATE(CORRELATION):

Correlation between Corporate tax rate and GDP growth rate for all the G7 and BRICS countries was done to understand the statistical relationship between corporate tax rate and GDP Growth rate.

G7 Countries

Correlation on Canada

	FRANCE TR	*FRANCE GR*
FRANCE TR	1	
FRANCE GR	0.181537277	1

Correlation on France

	CANADA TR	*CANADA GR*
CANADA TR	1	
CANADA GR	0.292155498	1

Correlation on Germany

	GERMANY TR	*GERMANY GR*
GERMANY	1	
GERMANY	0.142019727	1

Correlation on Italy

	ITALY TR	*ITALY GR*
ITALY TR	1	
ITALY GR	0.271878628	1

Correlation on Japan

	JAPAN TR	*JAPAN GR*
JAPAN TR	1	
JAPAN GR	0.226455666	1

Correlation on UK

	UK TR	*UK GR*
UK TR	1	
UK GR	0.07411832	1

Correlation on USA

	USA TR	*USA GR*
USA TR	1	
USA GR	0.096383246	1

Source: Researcher calculation

Interpretation:
The correlation coefficients between corporate tax to GDP ratio and GDP growth rate for Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States are all very low, ranging from 0.074 to 0.292, indicating weak positive correlations.

BRICS Countries

Correlation on Brazil

	BRAZIL	*BRAZIL*
BRAZIL	1	
BRAZIL	-0.3217403	1

Correlation on Russia

	RUSSIA	*RUSSIA*
RUSSIA	1	
RUSSIA	-0.1640976	1

Correlation on India

	INDIA	*INDIA*
INDIA	1	
INDIA	0.1543934	1

Correlation on China

	CHINA	*CHINA*
CHINA	1	
CHINA	0.1672741	1

Correlation on South Africa

	SOUTH AFRICA	*SOUTH AFRICA*
SOUTH AFRICA	1	
SOUTH AFRICA	0.1211021	1

Interpretation:
The correlation coefficients between corporate tax to GDP ratio and GDP growth rate for Brazil and Russia indicate very low (weak) negative correlations of -0.321 and -0.164, respectively. Conversely, India, China, and South Africa exhibit very low (weak) positive correlations of 0.154, 0.167, and 0.121, respectively.

Corporate Tax Rate VS GDP Growth Rate (Regression):
Regression between Corporate tax rate (Independent variable) and GDP growth rate (Dependent variable) for all the G7 and BRICS countries was done.

In regression analysis, the R-square (R^2) value, also known as the coefficient of determination, measures the goodness of fit of the regression model. It represents the proportion of the variation in the dependent variable (Y) that can be explained by the independent variable(s) (X) included in the model.

The R-square (R^2) values of all the countries are displayed below.

R–Square values of all countries

Countries	R- Square values
Canada	0.085354835
France	0.032955783
Germany	0.020169603
Italy	0.073917988
Japan	0.051282169
Uk	0.005493525
Usa	0.00928973
Brazil	**0.103516871**
Russia	0.026928047
India	0.023837326
China	0.027980655
South africa	0.01466572

Interpretation:

The R-squared values for the regression models analyzing corporate tax to GDP ratios indicate that the models explain relatively low percentages of the variation in the data for each country. Canada, France, Germany, Italy, and Japan all exhibit R-squared values ranging from 2% to 8.5%, suggesting poor fits for their respective models. The United Kingdom and the United States show even lower R-squared values, indicating extremely poor fits. Brazil's model performs slightly better with a 10.4% R-squared value. However, Russia, India, China, and South Africa all demonstrate very low R-squared values, suggesting that their models are not good fits for the data at all

In all cases, the low R-square values indicate that the models may not be very effective at explaining the observed variations in the dependent variable (GDP Growth rate) and other factors or variables not included in the model are likely influencing the outcomes to a greater extent.

7. Findings and Conclusion

1) Germany had the highest mean corporate tax rate in the 1990s, while Japan claimed this position in both the 2000s and 2010s.
2) India consistently ranked among the top five countries in mean corporate tax rates across the three studied periods.
3) Overall, there was a gradual decrease in the average mean corporate tax rates from 1990 to 2022.
4) India had the lowest corporate tax to GDP ratio during the period 1990 to 1999.
5) India and China's corporate tax to GDP ratio gradually rose during the period 2000 to 2009.
6) Additionally, the correlation between corporate tax rates and GDP growth rates across G7 countries was very low, while Russia and Brazil showed a negative correlation. The consistently low R-square values across all countries suggest that corporate tax rates alone do not substantially drive GDP growth.

In conclusion, the analysis of corporate tax rates and their correlation with GDP growth rates across different countries highlights several notable trends. Germany, Japan, and India showed significant variations in their mean corporate tax rates over the studied periods, reflecting dynamic tax policy dynamics. Despite global trends towards declining corporate tax rates, the UK and Japan demonstrated diverse tax landscapes, with contrasting ratios. Canada and Japan's leadership roles in corporate tax-to-GDP ratios in the 1990s shed light on regional dynamics, while India and China's rising ratios in the 2000s reflect evolving economic structures. Correlation analysis suggests a limited influence of corporate tax rates on GDP growth, with other economic factors playing crucial roles. Overall, this research underscores the complexity of the relationship between corporate tax policies and economic growth, emphasizing the importance of considering broader economic factors.

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Paper ID: SR24208122147 DOI: https://dx.doi.org/10.21275/SR24208122147