

Exploring Macroeconomic indicators Influence on Capital Market Performance - A Cross-BRICS Analysis.

Satyendra Kushwaha

Department of Management, LEAD College of Management, Calicut university, Palakkad, Kerala, India.

Correspondence email: -satyendra.k@lead.ac.in

ABSTRACT

This study investigates the relationships between key economic indicators and stock market indices in the BRICS countries (Brazil, Russia, India, China, and South Africa) over more than ten years, utilizing regression analysis and correlation studies. Data from 1997 to 2022 were collected from sources such as www.macrotrends.net, www.finance.yahoo.com, www.worldbank.org, www.wsj.com, www.tradingeconomics.com and www.cnbc.com and analysed using SPSS Version 25. The study focuses on the BSM, MOEX, BSE, SSE, and JSE indices, employing annual time series data and closing prices for each fiscal year. It's important to note that while this analysis specifically addresses GDP, inflation, and interest rates, other factors are not considered. The findings indicate that GDP, inflation, and interest rates significantly influence the stock market indices, explaining a substantial percentage of their variations: 68.2% for BSM, 78.9% for MOEX, 94.9% for BSE, 77.4% for SSE, and 79.3% for JSE. GDP consistently exhibits a positive correlation with stock indices across all countries, suggesting synchronized economic growth and market performance. However, the relationships between inflation, interest rates, and stock indices vary among the BRICS nations. Regression analysis underscores GDP as a significant predictor for stock indices, while the impacts of inflation and interest rates vary across countries. These insights provide valuable information for investors, policymakers, and scholars, enriching our understanding of the economic dynamics within the BRICS nations.

Key Words: *BRICS, Correlation Analysis, Inflation, Real Gross Domestic Product, Real Interest Rate, Regression Analysis, Variance Inflation Factor*

1. Introduction

The stock markets of the BRICS nations Brazil, Russia, India, China, and South Africa constitute a vital component of their respective economies and play a crucial role in shaping global investment trends. These markets have emerged as significant players on the international stage, reflecting the economic dynamism and growth potential inherent in these diverse nations. Over the past few decades, the BRICS stock markets have experienced remarkable evolution, characterized by periods of rapid expansion, regulatory reforms, and integration into the global financial system. (BANTON, 2023)

BOVESPA, Brazil's main stock exchange, fuels the economy by allowing companies to raise capital and attracting foreign investment. It tracks major companies through the Ibovespa index, but like any stock market, experiences ups and downs (down 6.01% so far in 2024). (Bovespa Index, 2024) MOEX, the Moscow Exchange, is a significant player in Russia's economy. It allows companies to raise capital by issuing shares, fostering business growth and job creation. MOEX tracks this activity through major indexes, reflecting the health of Russian companies. However, like all stock markets, MOEX experiences volatility, with ups and downs impacting investor confidence and potentially the broader economy. (MOEX, 2024b) The BSE, India's oldest stock exchange, is a powerhouse for the economy, Founded in 1875, it allows companies to raise capital and attracts investment through stocks, derivatives, and more. While a key player (tracked by the Sensex index), the BSE, like any market, experiences ups and downs. (CHEN, 2024) The Shanghai Stock Exchange, founded in 1990, is China's financial superpower and is the third largest stock market in the world in terminology of market capitalisation. It offers a robust platform for financial instruments, enabling companies to raise capital and drive economic growth. Key indexes like the SSE Composite track market performance, reflecting investor confidence and the health of listed firms. Despite occasional volatility and evolving regulations, the SSE plays a crucial role in China's economic development and integration into global financial markets. (SSE, 2019) The JSE, Africa's king of stock exchanges, fuels South Africa's economy. Founded in 1887, it lets companies raise capital and offers a trading platform for stocks, bonds, and more. The JSE tracks market health (like the FTSE/JSE All-Share Index) but

experiences ups and downs, common in any market.(JSE, 2023)

2. Statement of Problem

The research wants to understand how big economic factors affect the stock markets in Brazil, Russia, India, China, and South Africa (BRICS). We're interested in things like how fast these countries' economies are growing, how prices for goods and services change over time, and how government decisions on taxes and spending impact the stock markets(Chen, 2023). We also want to know if these factors affect each country's stock market in different ways. Furthermore, the examine aims to elucidate the implications of macroeconomic fluctuations on investor sentiment, market volatility, and risk management strategies within the BRICS capital markets. Additionally, the role of regulatory frameworks and institutional factors within each BRICS nation in shaping the transmission of macroeconomic shocks to capital market performance will be examined(BRICS, 2021). BRICS countriespresent compelling subjects for study due to their collective economic significance, demographic diversity, and shared challenges. As emerging markets, they offer abundant opportunities for growth and investment, attracting attention from researchers, investors, and policymakers(Medel, 2019). Despite their differences, they face common obstacles like income inequality and infrastructure deficits. Understanding how these nations address these challenges and leverage their economic potential is crucial for fostering sustainable development and global economic stability. Therefore, studying the BRICS countries provides significant insights into navigating the complexities of emerging markets and managing the associated opportunities and risks. By figuring this out, we can help investors decide where to put their money and help governments make better economic decisions. This research will give us insights into how the stock markets in these countries work and how they're influenced by what's happening in the economy(National, 2014).

3. Objectives

The research intentions to analyse the impact of real GDP growth on BRICS stock markets, explore the connection between inflation rates and investor sentiment, assess how interest rate fluctuations affect equity valuations in BRICS markets, compare responses of BRICS stock markets to changes in economic indicators, evaluate the effectiveness of macroeconomic policies in controlling market volatility within BRICS nations, provide practical recommendations for investors and policymakers, and contribute to a deeper understanding of macroeconomic dynamics in BRICS stock markets through thorough analysis.

4. Limitation

This study only examines BRICS stock market performance using GDP, inflation, and interest rates, neglecting other vital factors like dividends, unemployment rates, foreign direct investment, and exchange rates. This limitation could impact the depth of understanding of market dynamics. The data, sourced from macrotrends.com and other secondary sources websites over the past 26 years, might lack certain data points or contain inaccuracies, potentially affecting the analysis's reliability. Focusing solely on general stock market indices ignores sector-specific trends, such as banking or manufacturing, potentially overlooking crucial nuances. The study's findings are confined to the BRICS nations and specific statistical tools used, limiting their applicability to other contexts or markets.

5. Literature review

In the realm of stock exchanges, various studies explore how macroeconomic factors like GDP, inflation, unemployment rates, stock market value, interest rates, and fiscal deficits affect stock prices. These articles review selected research in this area, summarizing findings to understand the relationship between macroeconomics and stock market performance.

(Kushwaha et al., 2023)This study examines the connectionamong inflation and the gross domestic product (GDP) and how it affects the Indian Bombay Stock Exchange (BSE). The study shows a moderate negative link between inflation and the BSE index and a high positive correlation between GDP and the index using data from 1980 to 2021. According to the regression model, 88.5% of the fluctuation in the BSE index can be explained by GDP and inflation taken together. Furthermore, according to the model, the BSE index rises by 17.08% for every percentage point increase in GDP and decreases by 2.17% for every percentage point increase in inflation. The analysis emphasizes the importance of GDP and inflation as variables that explain stock market performance, but it also emphasizes the necessity for more research into other macroeconomic variables in order to fully comprehend the dynamics of stock prices.

(Desai & Patel, 2022)The Indian stock market shows a crucial role in the nation's economic landscape by facilitating corporate financing, mobilizing savings, and enhancing liquidity for investors and businesses. This study investigates how important macroeconomic factors have affected India's National Stock Exchange (NSE) between 2011 and 2020. The variables under scrutiny include GDP, inflation, exchange rates, gold prices, and unemployment. Employing regression analysis, correlation, and descriptive statistics, the study examines the association concerning these macroeconomic indicators and the performance of the NSE. The findings reveal a positive correlation between the NSE's performance and GDP, inflation, gold prices, and exchange rates, while unemployment does not exhibit a significant impact on the NSE.

(Algarini, 2020)The goal of this study is to determine equilibrium correlations, both short- and long-term, involving stock market values and important macroeconomic factors, such as GDP, interest rates, foreign direct investment, and inflation. Based on annual time series data from 1993 to 2018, the research shows that all macroeconomic variables show co-integration with stock market values and display stationarity in the first difference. The findings additionally demonstrate a long-term correlation connecting GDP and the remaining variables and MV and all macroeconomic indicators. Furthermore, a lag-based short-term link is seen between all variables and stock market prices. The ramifications imply that Saudi Arabian authorities ought to take the stock market index's reaction to monetary policy and economic activity measurements into account.

(Davcev et al., 2018)This examine investigates the affiliation among interest rates and GDP growth in Bulgaria, Romania, and FYROM (Former Yugoslav Republic of Macedonia). Utilizing an established theoretical framework, the research aims to quantitatively assess the significance of these factors for economic growth. Granger causality analysis and co-integration analysis methods are employed to explore the interconnections among interest rates, GDP growth, and fiscal policies. Unit root tests are conducted to assess the stability of the data series. The study encompasses the period from 2000 to the present, capturing a period of relative prosperity preceding the debt crisis of the late 2000s. The primary objective of this research is to examine how monetary and fiscal policies interact in the context of developing nations striving for economic expansion while managing currency strength.

(Osamwonyi & Evbayiro-Osagie, 2012)Using annual data from 1975 to 2005, this study examines the link among macroeconomic elements and the Nigerian capital market index. It examines metrics like money supply, GDP, interest rates, inflation, exchange rates, and fiscal deficit. Findings suggest that macroeconomic factors significantly influence the stock market index. The study recommends adopting appropriate economic policies to foster growth in the capital market.

(Geetha et al., 2011)This study examines the correlation among stock returns in the United States, China, and Malaysia and inflation, with a distinction made between expected and unexpected inflation. It identifies long-term connections between stock returns and both types of inflation across all three countries, while also observing a short-term link specifically in China. Data from the International Financial Statistics database, covering the period from January 2000 to November 2009, as well as statistics from China's National Bureau of Statistics, are utilized in the analysis. To assess long-term associations, the examine employs the augmented Dickey-Fuller test, while short-term relationships are analyzed using vector error correction modelling.

5.1 Research Gap

After a comprehensive review of the literature, it is obvious that there is a lack of compromise regarding the effect of macroeconomic determinants on the stock market. The existing body of research presents conflicting findings, which can be attributed to differences in research methodologies, variable selection, timeframes, and analytical techniques across various studies. As a result, more research is required to have a improve understanding of the connection involving underlying macroeconomic factors and stock market swings.

6. Research Methodology

The study sourced its data from reputable sources such as www.macrotrends.net, (macrotrends, 2023), www.finance.yahoo.com(SEE Index, 2024), www.worldbank.org(World Bank, 2023), www.wsj.com(wsj.com, 2024), www.tradingeconomics.com(BOVESPA, 2024), www.cnbc.com(MOEX, 2024a). These sources provided reliable data on various economic indicators and stock market indices. The research aimed to observe the association among inflation, GDP, real interest rates, and stock market data using a multiple regression model. The model incorporated

independent variables including real GDP (X1), inflation (X2), real interest rate (X3), and the stock index (Y), expressed in square root form to accommodate potential non-linear relationships. Data spanning the past 26 years (1997 to 2022) were collected to explore these relationships comprehensively. Employing a correlational research design model, statistical tools such as correlations, regression analysis, and ANOVA were utilized alongside SPSS Version 25 software to analyse the data and derive conclusions.

7. Results and discussion

The dataset underwent processing, including consolidation, manipulation, and analysis, facilitated by SPSS software. Integral to this process was the evaluation of linearity and normality assumptions, pivotal for regression analysis. Various statistical techniques such as ANOVA, regression analysis, correlation coefficient calculations, and assessment of coefficient of variation were deployed to scrutinize the data, aligning with the objectives of the study.

7.1 Correlation Analysis

A complete examination of relationships connecting distinct variables is undertaken through a correlation study, employing the "r" coefficient within the -1 to +1 range. This research is directed towards appraising the impact of microeconomic factors on the starting point of the evaluation, initiating with a meticulous correlation analysis. (Kafle, 2019)

Table 1: Correlation Analysis model summary of Brazil

		SQRTGDP	SQRTInflationRate	SQRTInterestRate	SQRTBSM
SQRTGDP	Pearson Correlation	1	-.240	-.717**	.727**
	Sig.		.237	.000	.000
SQRTInflationRate	Pearson Correlation		1	-.042	-.255
	Sig.			.841	.208
SQRTInterestRate	Pearson Correlation			1	-.762**
	Sig.				.000
SQRTBSM	Pearson Correlation				1
	Sig.				

This table shows that moderate positive connection linking GDP and Brazil Stock market with significantly. The analysis reveals a moderately negative correlation (-0.717) between economic growth (SQRTGDP) and interest rates in Brazil, suggesting a potential relationship where economic growth may lead to lower interest rates, and vice versa. However, the association among inflation and interest rates is weak (-0.240) and not statistically significant, indicating a possible, but very weak, tendency for interest rates to rise with inflation. Additionally, there's minimal correlation between inflation and stock market movement (SQRTBSM), with a very weak negative correlation (-0.023). While correlation doesn't imply causation, these findings provide insights into Brazil's economic dynamics, subject to external influences and potential changes over time. Further analysis, such as regression techniques, may offer deeper insights into causal relationships.

Table 2: Correlation Analysis model summary of Russia

		SQRTGDP	SQRTInflation	SQRTInterestRate	SQRTMOEX
SQRTGDP	Pearson Correlation	1	-.716**	-.184	.814**
	Sig.		.000	.548	.000
SQRTInflation	Pearson Correlation		1	.249	-.720**
	Sig.			.413	.000
SQRTInterestRate2	Pearson Correlation			1	-.108

SQRTMOEX	Sig.	.725
	Pearson Correlation Sig.	1

Russia's economic landscape, explored through correlation analysis, reveals significant relationships between key indicators. A strong positive correlation between economic growth and Moscow Interbank Currency Exchange (MOEX) performance indicates that a thriving economy typically accompanies a robust stock market in Russia. However, there's a moderately adverse connection among economic growth and interest rates, suggesting that interest rates may not always decrease alongside economic expansion. Conversely, a moderate negative correlation between inflation rate and interest rates implies that the central bank may raise interest rates to combat inflation. Furthermore, a moderate negative correlation connecting inflation rate and stock market performance suggests that inflation could dampen investor confidence, potentially leading to a decline in stock prices. While correlation doesn't imply causation, these findings provide valuable insights into Russia's economic dynamics, influenced by various external factors and subject to potential changes over time.

Table 3: Correlation Analysis model summary of INDIA

		SQRTGDP	SQRTInflation	SQRTInterestRate	SQRTBSE
SQRTGDP	Pearson Correlation	1	.014	-.545**	.971**
	Sig.		.946	.005	.000
SQRTInflation	Pearson Correlation		1	-.343	-.023
	Sig.			.093	.913
SQRTInterestRate	Pearson Correlation			1	-.574**
	Sig.				.003
SQRTBSE	Pearson Correlation				1
	Sig.				

The table shows how four economic factors in India are related: GDP, inflation rate, interest rate, and Bombay Stock Exchange (BSE) index. We find that when GDP grows (shown by SQRTGDP), the stock market tends to go up too. Also, when GDP rises, interest rates usually go down. There's a small link between inflation and interest rates, suggesting they might move in opposite directions slightly. However, there's hardly any connection between inflation and the stock market. Remember, just because these factors are related doesn't mean one causes the other. Other things could be affecting them both. Also, this analysis only looks at pairs of factors, and there might be more complex interactions among all four. And these relationships could change over time. For a deeper understanding, we might need to use more advanced techniques like regression analysis to see how changes in one factor affect the others.

Table 4: Correlation Analysis model summary of China

		SQRTGDP	SQRTInflationRate	SQRTInterestRate	SQRTSSE
SQRTGDP	Pearson Correlation	1	.038	-.477*	.690**
	Sig.		.867	.034	.000
SQRTInflationRate	Pearson Correlation		1	.094	.047
	Sig.			.729	.837
SQRTInterestRate	Pearson Correlation			1	-.365
	Sig.				.114
SQRTSSE	Pearson Correlation				1
	Sig.				

The correlation analysis of China's economic indicators reveals intriguing insights. There's a significant adverse correlation among GDP and interest rates, suggesting that as the economy strengthens, interest rates tend to decline. However, the correlation involving GDP growth and Shanghai stock exchange (SSE) performance is weakly optimistic, indicating a less certain relationship. Similarly, the correlation involving inflation rate and interest rates is weakly

positive, contrary to traditional expectations. Additionally, there's a very weak negative linkingamong inflation rate and stock market performance, suggesting minimal influence. It's important to note that association doesn't imply causality, and external elements may manipulate these relationships. Further analysis, such as regression techniques, is needed for a deeper understanding.

Table5: Correlation Analysis model summary of South Africa

		SQRTGDP	SQRTInflation	SQRTInterestRate	SQRTJSE
SQRTGDP	Pearson Correlation	1	-.316	-.590**	.862**
	Sig.		.123	.002	.000
SQRTInflation1	Pearson Correlation		1	.225	-.297
	Sig.			.280	.150
SQRTInterestRate	Pearson Correlation			1	-.673**
	Sig.				.000
SQRTJSE	Pearson Correlation				1
	Sig.				

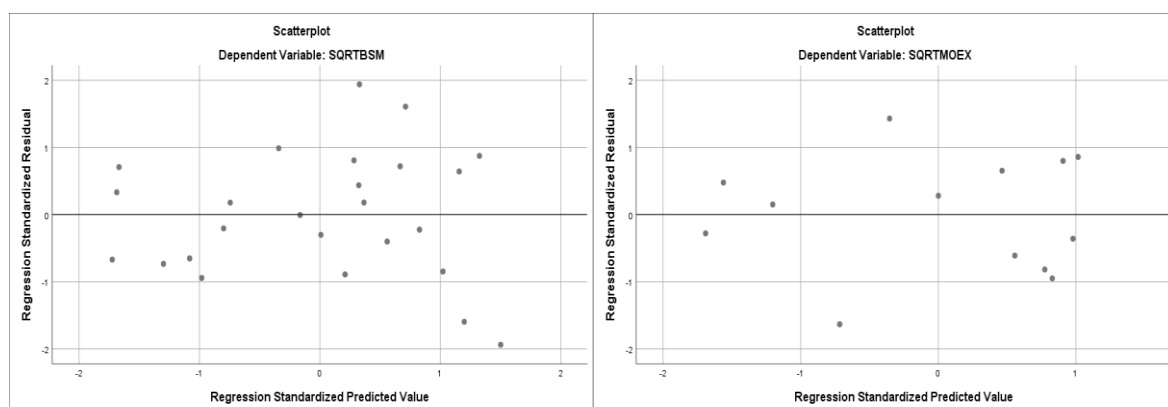
The correlation analysis of South Africa's economic indicators unveils significant connections. GDP and Johannesburg Stock Exchange (JSE) performance show a strong positive correlation, suggesting simultaneous prosperity. Additionally, there's a moderately negative linkamong economic growth and interest rates, implying potential rate decreases with economic strength. However, the connectioninvolving inflation and interest rates lacks clarity, with a weak negative correlation. Similarly, there's minimal correlation among inflation and stock market interchange and denial correlation involving interest rate and stock market. While correlation doesn't imply causation, these findings offer valuable understandings into South Africa's economic dynamics, albeit subject to potential changes over time. Further analysis, particularly using regression techniques, could illuminate causal relationships more comprehensively.

7.2 Regression analysis

Regression analysis is a dependable tool for discerning the influential variables on a subject of interest. It enables the identification of significant factors, disregarding insignificant ones, and elucidates their interrelationships succinctly.(Jordan, 2021)Regression analysis serves as a statistical method to explore relationships among variables.(Sykes, 1993)Regression outcomes can be understood either through statistical significance tests or through practical, non-statistical interpretation.(Rubinfeld, 2000)

7.3 Linearity

One method for determining whether there is a linear relationship joining two variables is a scatterplot. A straight-line pattern formed by the plot's indicates indicates a linear relationship relating the variables. In such cases, as one variable increases (or decreases), the other variable also tends to increase (or decrease) at a consistent rate.(Natural resources, 2016) The provided figure displays a scatter plot, aiding in the examination of linearity between these variables.



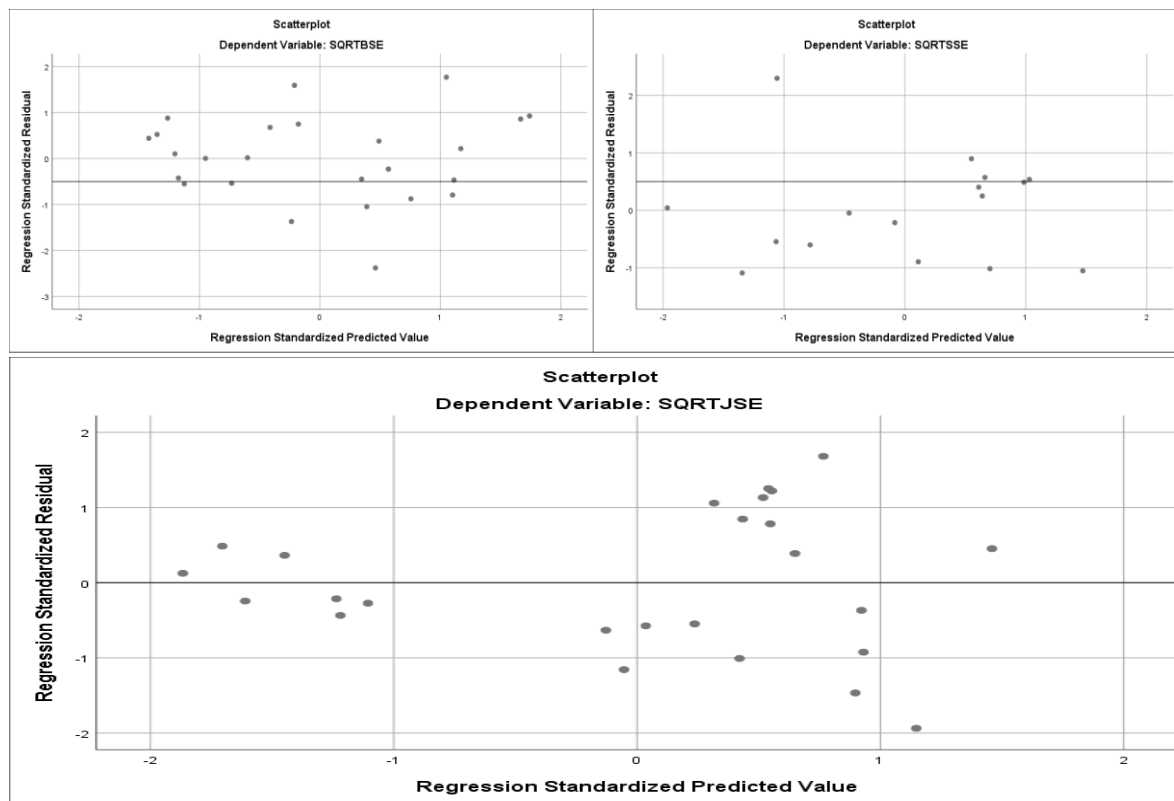


Figure 1: Scatterplot

We use Analysis of Variance (ANOVA) to evaluate the regression model's fit and estimate the model's significance. Table 6 displays the results of this analysis.

Table 6: ANOVA for Evaluating a Model's Significance with Data from BRICS

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
Brazil	Regression	94922.7	3	31640.9	15.009	.000
	Residual	44271.6	21	2108.17		
	Total	139194	24			
Russia	Regression	2682.57	3	894.189	11.241	.002
	Residual	715.955	9	79.551		
	Total	3398.52	12			
India	Regression	81605.3	3	27201.8	130.484	.000
	Residual	4377.84	21	208.468		
	Total	85983.1	24			
China	Regression	859.034	3	286.345	13.735	.000
	Residual	250.172	12	20.848		

	Total	1109.21	15			
South Africa	Regression	78689.9	3	26230	26.742	.000
	Residual	20597.9	21	980.853		
	Total	99287.8	24			

The statistical implication of the connection connecting the dependent and independent variables is substantiated by a p-value of 0.000, which is under the conventional significance level of 0.05. This is evident from the ANOVA results, confirming a highly significant association between the dependent and independent factors across all indices, after correlation analysis and linearity testing. The collective influence of these factors was thoroughly examined. Hence, considering the GDP, inflation, and interest rate data of BRICS nations, this model demonstrates suitability for estimating stock exchange values.

Table 7: Standard Error and Determination Coefficient of the Fitted Model for BRICS

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
Brazil	0.826	0.682	0.637	45.91485
Russia	0.888	0.789	0.719	8.91911
India	0.974	0.949	0.942	14.43843
China	0.88	0.774	0.718	4.56593
South Africa	0.89	0.793	0.763	31.31857

Brazil: The model shows a promising fit, explaining a moderate portion (68.2%) of the deviation in the data as evidenced by the R-squared value. This suggests the model can capture a significant association linking the independent variables and the predicted outcome. However, there's room for improvement, as the standard error of 45.91 indicates that on average, model predictions deviate from actual values by nearly that amount. Additionally, a remaining 31.8% of the variation remains unexplained, suggesting further investigation into potential missing factors or model refinements might be fruitful.

Russia: The model shows a very encouraging outcome. With an R-squared of 0.789, the model accounts for 78.9% of the variation observed in the dependent variable for Russia. A excellent fit for the model is indicated by this high R-squared value. Nonetheless, the model is unable to account for the remaining 21.1% of variation. With a standard error of 8.91911, the model's forecasts for Russia will, on average, differ from the real numbers by 8.92.

India: With an R-squared of 0.949, the model accounts for 94.9% of the variation observed in the dependent variable for India. The R-squared value is quite high, advising that the model fits the data quite well. With a standard error of 14.43, the model's average forecasts for India differ from the actual data. R-squared, however, merely indicates how well the model fits the data; it does not always indicate how well the model captures reality.

China: The fitted model shows promise for predicting outcomes in China. The standard error of 4.57 indicates a relatively good fit, with predictions on average deviating from actual values by about that amount. Additionally, the R-squared value of 0.774 implies the model describes a significant portion (77.4%) of the variation in the dependent variable. It's worth noting, however, that some unexplained variation (22.6%) remains, suggesting room for further model improvement.

South Africa: The model accounts for 79.3% of the variation in the dependent variable for South Africa, according to the R-squared value of 0.793. A excellent fit for the model is indicated by this high R-squared value. The standard error is 31.31857, which means that on average, the model's projections for South Africa will be off by about 31.32 from the actual values. Further exploration into the specific variables used and their impact on the adjusted R-squared would provide a clearer picture.

Overall, the model seems to provide a good fit for most of the BRICS countries, with R-squared values. However, it's important to note that there is still unexplained variation in all the countries, and the standard error is relatively high for some countries, indicating that the model's predictions may not always be very accurate. (Natural resources, 2016)

7.4 Histogram

Figure 2: Illustrates the plotting of a histogram to verify the normalcy of the data.

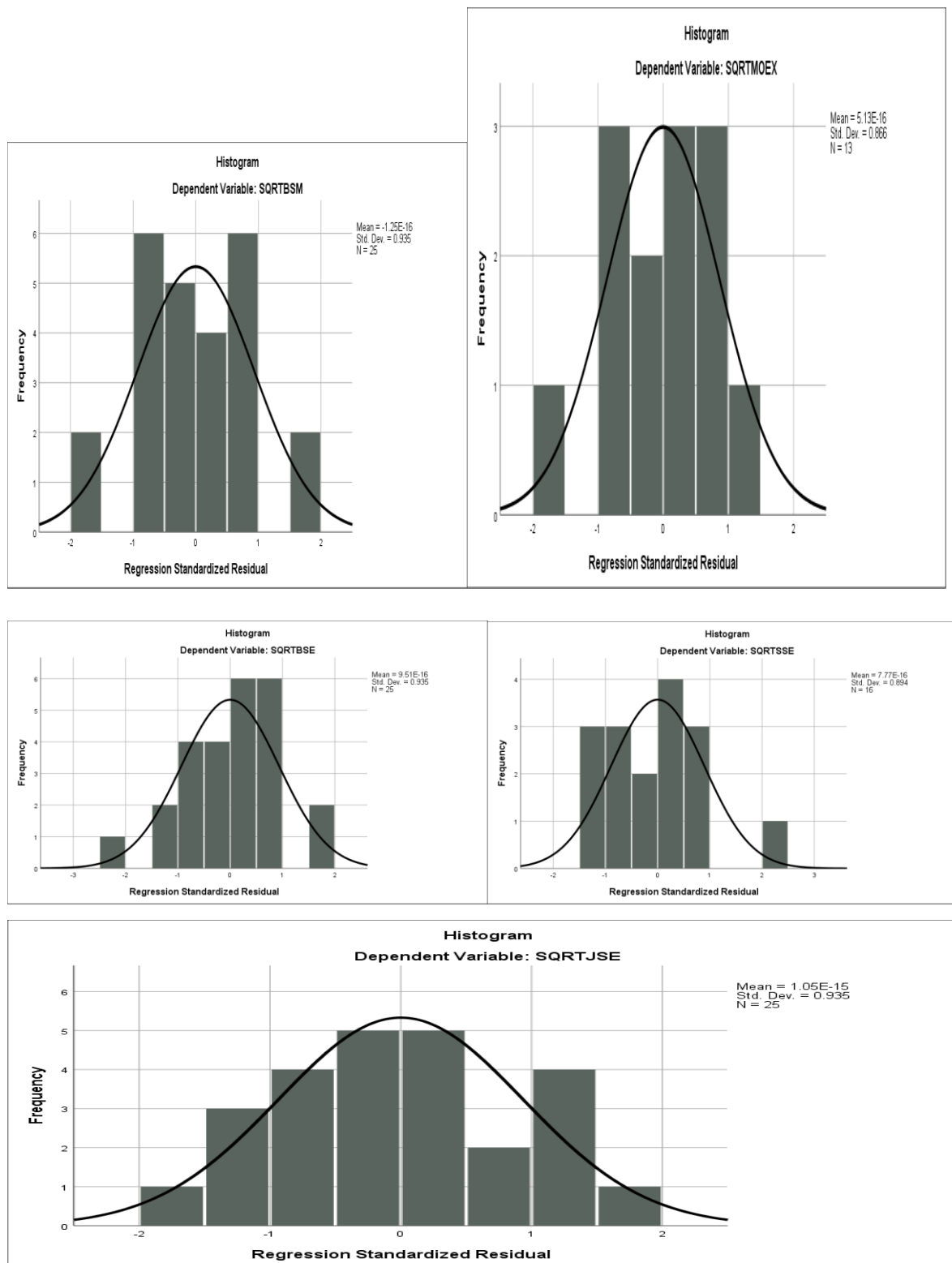


Figure 2: Histogram to check Normality of data

7.5 Normal P-P plot

Normal p-p plot is a valuable tool for checking the normality of residuals in linear regression. By analyzing this plot, we can assess the validity of your model and identify potential areas for improvement.

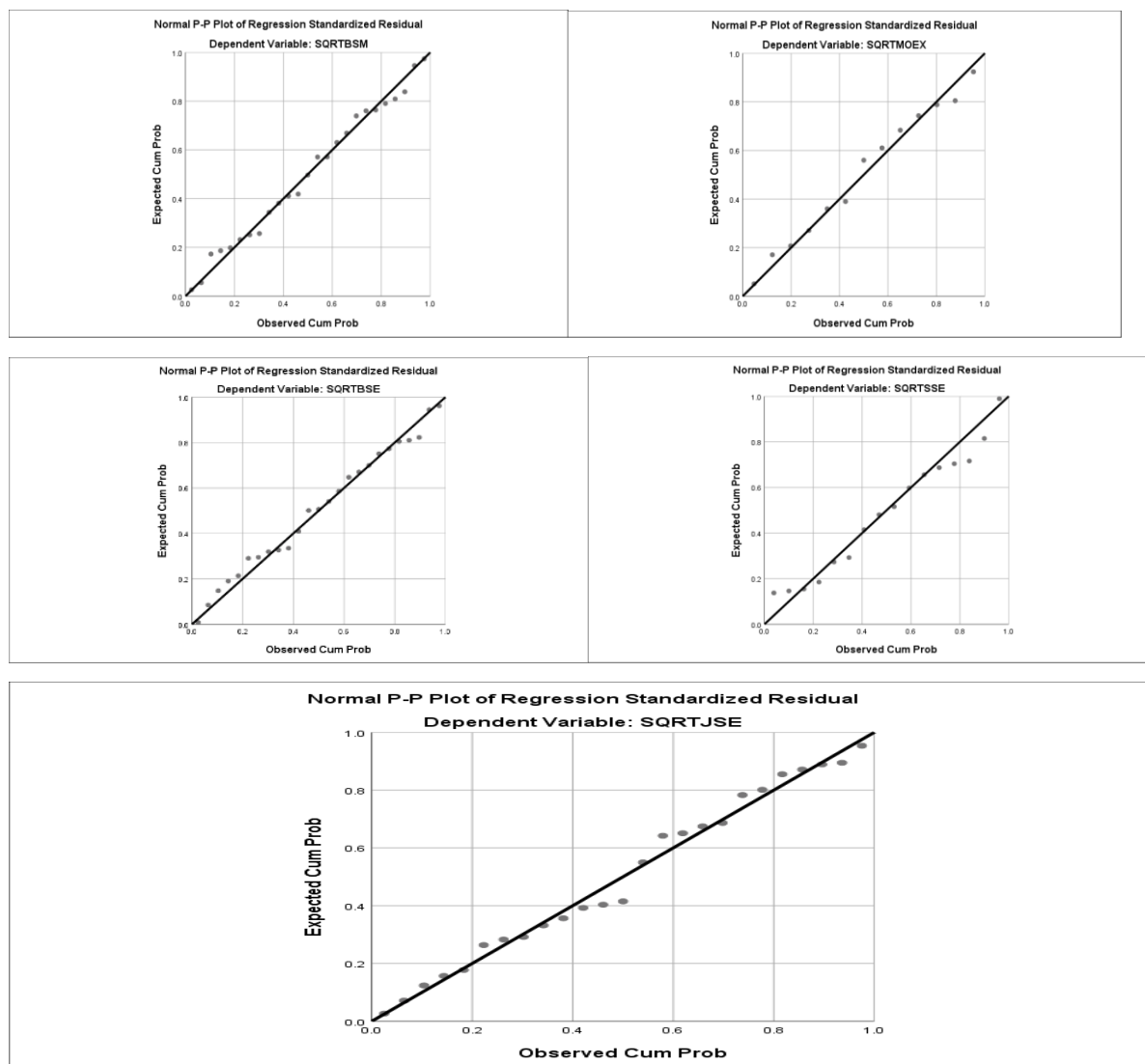


Figure:3 Normal P-P plots

7.6 Regression Model

Regression research utilizes statistical analysis to uncover associations among independent and dependent variables, enabling the prediction of future associations. It quantifies the strength of connections between these variables. (Taylor, 2020) Regression analysis, as explained by Professor Jan Hammond, facilitates understanding data relationships and predicting trends. Scatter plots visualize variables, while regression lines quantify their associations. (HBR, 2021)

Table 8: Regression Model, test of regression coefficient and collinearity test for BRICS

Coefficients							
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF

BRAZIL	(Constant)	481.812	152.96		3.15	0.005		
	SQRTGDP	1.926	1.527	0.24	1.262	0.221	0.417	2.399
	SQRTInflationRate	-33.345	20.633	-0.215	-1.616	0.121	0.857	1.167
	SQRTInterestRate	-41.508	12.869	-0.599	-3.225	0.004	0.44	2.274
e. Dependent Variable: SQRTBSM								
RUSSIA	(Constant)	46.171	25.732		1.794	0.106		
	SQRTGDP	0.464	0.395	0.32	1.173	0.271	0.314	3.181
	SQRTInflation	-9.634	4.272	-0.624	-2.255	0.051	0.305	3.276
	SQRTInterestRate2	1.38	2.059	0.106	0.67	0.519	0.937	1.068
c. Dependent Variable: SQRTMOEX								
INDIA	(Constant)	8.594	30.156		0.285	0.778		
	SQRTGDP	4.295	0.284	0.918	15.146	0	0.66	1.514
	SQRTInflation	-7.97	6.481	-0.067	-1.23	0.232	0.829	1.206
	SQRTInterestRate	-8.343	5.574	-0.097	-1.497	0.149	0.583	1.716
CHINA	(Constant)	38.956	6.382		6.104	0		
	SQRTGDP	0.252	0.042	1.074	6.057	0	0.598	1.673
	SQRTInflationRate1	-11.258	4.829	-0.396	-2.331	0.038	0.651	1.537
	SQRTInterestRate1	2.443	2.417	0.153	1.011	0.332	0.822	1.216
SOUTH AFRICA	(Constant)	1.435	79.19		0.018	0.986		
	SQRTGDP	13.697	2.454	0.707	5.582	0	0.617	1.622
	SQRTInflation1	-2.371	17.098	-0.015	-0.139	0.891	0.898	1.114
	SQRTInterestRate	-27.421	12.976	-0.26	-2.113	0.047	0.651	1.537

$$SQRTY = 481.8 + 1.92 SQRTX_1 - 33.345 SQRTX_2 - 41.5 SQRTX_3 + e \text{ ----- (i) \{Brazil\}}$$

$$SQRTY = 46.17 + 0.464 SQRTX_1 - 9.63 SQRTX_2 + 1.38 SQRTX_3 + e \text{ ----- (ii) \{Russia\}}$$

$$SQRTY = 8.549 + 4.295 SQRTX_1 - 7.970 SQRTX_2 - 8.343 SQRTX_3 + e \text{ ----- (iii) \{India\}}$$

$$SQRTY = 38.956 + 0.252 SQRTX_1 - 11.26 SQRTX_2 + 2.44 SQRTX_3 + e \text{ ----- (iv) \{Chnia\}}$$

$$SQRTY = 1.435 + 13.697 SQRTX_1 - 2.37 SQRTX_2 - 27.42 SQRTX_3 + e \text{ ----- (v) \{South Africa\}}$$

Where, X_1 , X_2 , X_3 represents GDP, Inflation, and Interest rate respectively.

The analysis of five regression models specifies insights into the relationships amongst various economic indicators and stock market indices. Model (i) suggests an insignificant relationship between GDP and the BSM index, while inflation

and interest rate changes significantly impact the BSM index. Additionally, all variables together significantly predict the BSM index. Model (ii) shows that GDP has an insignificant relationship with the MOEX index, while inflation has a significant negative impact. Interest rate changes have an insignificant effect on the MOEX index. Moreover, all variables together do not significantly predict the MOEX index. Model (iii) indicates a significant confident connection linking GDP and the BSE index, with a 1% increase in GDP leading to a 4.3% increase in the index. In contrast, inflation and interest rate changes show statistically insignificant relationships with the BSE index. In Model (iv), GDP demonstrates a significant positive relationship with the SSE index, while inflation exhibits a significant negative relationship. Interest rate changes have an insignificant effect on the SSE index. Additionally, all variables together significantly predict the SSE index. In Model (v), GDP has a significant positive association with the JSE index, while inflation shows an insignificant effect. However, interest rate changes significantly impact the JSE index negatively. All variables together significantly predict the JSE index.

RGDP proves to be a significant predictor for some stock market indices, while inflation and interest rates show mixed effects across different indices. These findings contribute valuable insights for forecasting stock market movements and understanding the economic dynamics of respective countries. These results highlight the dense interplay relating economic factors and stock market dynamics, suggesting the importance of considering multiple variables when predicting market trends. While GDP emerges as a robust predictor in several models, further research is needed to understand the nuanced relationships among inflation, interest rates, and stock market performance.

The regression analysis findings indicate that the independent variables demonstrate no collinearity, as evidenced by Variance Inflation Factor values all below 5. This fulfills the assumption of the absence of multicollinearity in multiple linear regression. In the conclusion, the regression model's capacity to effectively predict the BRICS stock market based on GDP, inflation, and interest rate is underscored by the absence of multicollinearity between the dependent and independent variables.

8. Conclusion and recommendation

This study delves into the lasting connection between GDP, inflation, and interest rates in the BRICS stock markets from 1997 to 2022. Regression analyses show that these factors collectively explain 68.2%, 78.9%, 94.9%, 77.4% and 79.3% of variations in the BSM, MOEX, BSE, SSE, and JSE indices respectively, highlighting their significant impact. The analysis of the correlation and regression models across BRICS countries provides valuable understandings into the relationships concerning economic indicators and stock market indices. The results indicate that RGDP demonstrates a significant influence on stock market performance in several models across Brazil, Russia, India, China, and South Africa highlighting its importance as a predictor. However, the effects of inflation and interest rates vary across different regions, with some models showing significant associations while others exhibit insignificance. The results show underscore the complexity of the connection among economic factors and stock market dynamics within BRICS nations, emphasizing the need for comprehensive analysis when predicting market trends. Furthermore, the research highlights the importance of considering multiple variables and employing advanced statistical procedures such as correlation and regression analysis to understand the intricate dealings within the data. While correlation analysis elucidates the associations between variables, regression analysis provides a deeper understanding of the predictive power of these variables.

Based on these findings, it is recommended that investors, policymakers, and researchers consider the interplay concerning economic indicators and stock market performance within BRICS nations when making decisions. Additionally, further research is guaranteed to explore the fundamental mechanisms leading these relationships and to refine predictive models for enhanced accuracy. Overall, this study contributes to a better interpretation of the factors influencing stock market behaviour within BRICS nations and provides valuable comprehensions for stakeholders navigating the complex landscape of global financial markets. By leveraging these insights, stakeholders can make more informed decisions and mitigate risks associated with market volatility across India, China, Russia, South Africa, and Brazil.

Reference

- Algarini, A. (2020). Impact of Gdp, Foreign Direct Investment, Inflation Rate, and Interest Rate on Stock Market Values in Saudi Arabia. *International Journal of Social Science and Economic Research*, 5(7), 1667–1678.
- BANTON, C. (2023). Dow Jones BRIC 50 Index. *Investopedia.Com*.

- https://www.investopedia.com/terms/d/dowjones_bric50_index.asp#:~:text=Key%20Takeaways%3A,The%20Dow%20Jones%20BRIC%2050%20Index%20is%20a%20market%20capitalization,Russia%2C%20India%2C%20and%20China.
- BOVESPA. (2024). *Trading Economics, Brazil Stock Market*. <https://tradingeconomics.com/brazil/stock-market>
- Bovespa Index. (2024). *Market Watch*. <https://www.marketwatch.com/investing/index/bvsp?countrycode=br>
- BRICS. (2021). BRICS Economic Bulletin. *BRICS, India*. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/<https://brics2021.gov.in/brics/public/uploads/docpdf/getdocu-72.pdf>
- Chen, J. (2023). BRICS: Acronym for Brazil, Russia, India, China, and South Africa. *Investopedia.Com*. <https://www.investopedia.com/terms/b/brics.asp>
- CHEN, J. (2024). What Is the Bombay Stock Exchange (BSE)? *Investopedia.Com*. <https://www.investopedia.com/terms/b/bombaystockexchange.asp>
- Davcev, L., Hourvoulides, N., & Komic, J. (2018). Impact of Interest Rate and Inflation on GDP in Bulgaria, Romania and FYROM. *Journal of Balkan and Near Eastern Studies*, 20(2), 131–147. <https://doi.org/10.1080/19448953.2018.1379746>
- Desai, H., & Patel, D. M. (2022). *A Study on Impact of Macro Economic Variables on Indian Stock Markets (NSE)* (SSRN Scholarly Paper 4515777). <https://papers.ssrn.com/abstract=4515777>
- Geetha, C., Mohidin, R., Chandran, V. V., & Chong, V. (2011). The relationship between inflation and stock market: Evidence from Malaysia, United States and China. *International Journal of Economics and Management Sciences*, 1(2), 1–16.
- HBR. (2021, December). *What Is Regression Analysis in Business Analytics?* Business Insights Blog. <https://online.hbs.edu/blog/post/what-is-regression-analysis>
- Jordan, M. (2021, June 8). *What is Regression Analysis and Why Should I Use It?* | Alchemer Blog. Alchemer. <https://www.alchemer.com/resources/blog/regression-analysis/>
- JSE. (2023). *Functions of an Exchange and Overview, Johannesburg Stock Exchange, Purpose of a Share Exchange*. <https://www.jse.co.za/learn-how-to-invest/accessing-market/functions-exchange>
- Kafle, S. C. (2019). Correlation and Regression Analysis Using SPSS. *OCEM Journal of Management, Technology & Social Sciences*, 126–134.
- Kushwaha, S., Kafle, S. C., & Khanal, B. (2023). Impact of GDP and Inflation on Stock Market in India: A Case Study of BSE Index. *BMC Journal of Scientific Research*, 6(1), 136–148.
- macrotrends. (2023). *Www.macrotrends.net*. <https://www.macrotrends.net/global-metrics/countries/IND/india/gdp-gross-domestic-product>, <https://www.macrotrends.net/global-metrics/countries/IND/india/inflation-rate-cpi>, <https://www.macrotrends.net/countries/CHN/china/gdp-gross-domestic-product>, <https://www.macrotrends.net/countries/CHN/china/inflation-rate-cpi>, <https://www.macrotrends.net/global-metrics/countries/BRA/brazil/gdp-gross-domestic-product>, <https://www.macrotrends.net/global-metrics/countries/BRA/brazil/inflation-rate-cpi>, <https://www.macrotrends.net/global-metrics/countries/RUS/russia/gdp-gross-domestic-product>, <https://www.macrotrends.net/global-metrics/countries/RUS/russia/inflation-rate-cpi>, <https://www.macrotrends.net/global-metrics/countries/ZAF/south-africa/gdp-gross-domestic-product>, <https://www.macrotrends.net/global-metrics/countries/ZAF/south-africa/inflation-rate-cpi>
- Medel, D. (2019). ESSAY ON EMERGING MARKETS. <https://www.researchgate.net/>. <https://doi.org/10.13140/RG.2.2.36145.22887>
- MOEX. (2024a). *IMOEX: Moscow Interbank Currency Exchange*. <https://www.cnbc.com/quotes/.IMOEX>
- MOEX. (2024b). *Trends foreign exchange market, stock market, indexes, derivatives market, money market, precious metals, deposits*. <https://www.moex.com/>
- National, L. (2014). The Challenges and Opportunities for the BRICS Countries to Lead. *Hardcopy Version at National Academies Press*. <https://www.ncbi.nlm.nih.gov/books/NBK195960/>
- Natural resources, biometrics. (2016). Correlation and Simple Linear Regression. *Courses.Lumenlearning.Com*. <https://www.google.com/search?>
- Osamwonyi, I. O., & Evbayiro-Osagie, E. I. (2012). The Relationship between Macroeconomic Variables and Stock Market Index in Nigeria. *Journal of Economics*, 3(1), 55–63. <https://doi.org/10.1080/09765239.2012.11884953>

Rubinfeld, D. L. (2000). Reference guide on multiple regression. *Reference Manual on Scientific Evidence*, 179, 425–469.

SEE Index. (2024). *SEE Composite Index*. <https://finance.yahoo.com/quote/000001.SS/history/>

SSE. (2019). *Overview, History and Development*. <http://english.sse.com.cn/aboutsse/overview/>

Sykes, A. O. (1993). *An introduction to regression analysis*.

https://chicagounbound.uchicago.edu/cgi/viewcontent.cgi?article=1050&context=law_and_economics

Taylor, S. (2020, February). Regression Analysis. *Corporatefinanceinstitute*.

<https://corporatefinanceinstitute.com/resources/data-science/regression-analysis/>

World Bank. (2023). *The World Bank Group*.

<https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=IN>

wsj.com. (2024). WSJ Market. *Www.Wsj.Com*. <https://www.wsj.com/market-data/quotes/index/ZA/XJSE/ALSH/historical-prices>