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A Comparative Analysis of the S&P Bse Sensex and Global Stock Indices: Implications for Portfolio Diversification

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ABSTRACT: In an era of increasing financial globalization, the degree of co-movement between international stock markets has become a critical factor for portfolio managers and individual investors. This study investigates the correlation between India's S&P BSE SENSEX and five prominent global indices: NASDAQ (USA), Karachi Stock Exchange (KSE - Pakistan), Philippine Stock Exchange Index (PSEI), Toronto Stock Exchange (TSX - Canada), and the MSC Thailand Index. Utilizing historical daily closing prices from January to March 2024, the research employs Pearson's correlation coefficient to determine the strength and direction of these relationships. The findings reveal a moderate positive correlation (0.493) with the NASDAQ, suggesting that while Indian markets are influenced by global tech trends, they still offer significant diversification benefits. Conversely, relationships with other regional indices like MSC Thailand were found to be weaker, highlighting the importance of geographical diversification. The paper concludes with strategic recommendations for risk management in volatile global environments.

Keywords: S&P BSE SENSEX, Global Stock Indices, Pearson Correlation Coefficient, Market Interconnectedness, Financial Globalization

I. INTRODUCTION

The modern financial landscape is characterized by deep interconnectedness, where economic shifts in one region can rapidly trigger volatility across global borders. For investors, this integration presents both a challenge and an opportunity: while it allows for greater capital mobility, it also complicates the quest for non-correlated assets to mitigate risk. Understanding the specific relationships between domestic and international indices is therefore paramount for building resilient portfolios.

This study focuses on the S&P BSE SENSEX, the benchmark index of the Bombay Stock Exchange, and its alignment with various international markets. By analyzing correlation coefficients, this research aims to provide actionable insights into how closely Indian equities move in tandem with global counterparts.

II. LITERATURE REVIEW

Mishra and Pradhan (2018): Explored the integration of Indian markets with foreign counterparts, noting that financial liberalization has increased market efficiency and synchronicity. **Ghosh and Maji (2019):** Investigated risk-return trade-offs between India, the US, and Japan, finding that macroeconomic indicators and investor sentiment are primary drivers of volatility. **Chandra and Kumar (2017):** Focused on behavioral finance, analyzing how psychological biases and market sentiment impact both Indian and foreign market trends. **Banerjee and Mukherjee (2016):** Examined the impact of GDP growth and interest rates, highlighting the fundamental economic link between global markets.

Jain and Ghosh (2018): Studied corporate governance norms, concluding that transparency in Indian markets has improved investor confidence relative to global standards. **Singh and Jain (2019):** Analyzed capital flows, demonstrating how Foreign Portfolio Investment (FPI) acts as a bridge for market integration. **Roy and Kundu (2017):** Conducted



sectoral analyses, finding that IT and finance sectors show the highest correlation with global indices. **Das and Mohapatra (2020)**: Assessed regulatory frameworks, noting that SEBI's alignment with global standards has facilitated easier cross-border investing. **Gupta & Sharma (2021)**: Argued that emerging markets like India are increasingly resilient but still sensitive to US Federal Reserve policy changes. **Lee (2022)**: Found that during global crises, correlations between indices tend to spike, reducing the benefits of international diversification exactly when needed most.

Research Gap

Research Gap: While many studies examine long-term integration, there is a lack of granular analysis regarding the post-pandemic recovery phase (2024) and the specific relationship between the SENSEX and secondary regional indices like the MSC Thailand or KSE.

Research Questions

- What is the degree of correlation between S&P BSE SENSEX and major global indices?
- Does the Indian market show a stronger affinity toward Western tech-heavy indices (NASDAQ) or regional Asian markets?

Research Objectives

- To calculate correlation coefficients between the SENSEX and selected global indices.
- To assess the strength and direction of these linear relationships.
- To provide diversification recommendations for Indian investors.

III. HYPOTHESES

- **H1:** There is a significant positive correlation between the S&P BSE SENSEX and the NASDAQ.
- **H2:** There is a weak or negligible correlation between the S&P BSE SENSEX and the MSC Thailand Index.

Research Design

- **Data Variables:** Daily closing prices of S&P BSE SENSEX, NASDAQ, KSE, PSEI, TSX, and MSC Thailand.
- **Data Sources:** Historical financial data from January 2, 2024, to March 28, 2024.
- **Sample Size:** 60 trading days of comparative data.
- **Analysis Methods:** Quantitative analysis using the Pearson Correlation Coefficient formula:

IV. DATA ANALYSIS AND INTERPRETATION

Based on the study conducted on the **S&P BSE SENSEX** and its relationship with global indices, here are the detailed data tables, interpretations, and results from the provided research.

1. Comparative Correlation Analysis Table

This table summarizes the correlation between India's S&P BSE SENSEX and five major international stock indices based on daily closing prices from early 2024.

Global Index	Region/Market	Correlation Coefficient (r)	Type of Relationship
NASDAQ	USA (Technology)	0.492951	Moderate Positive +1
KSE	Pakistan (Regional)	Moderate	Positive +1
PSEI	Philippines (Regional)	Moderate	Positive +1
TSX	Canada (Global)	Moderate	Positive +1
MSC Thailand	Thailand (Regional)	Weak	Low Positive +1

Interpretation of the Correlation Summary Table

The primary metric used is the **Pearson Correlation Coefficient (r)**, which ranges from -1.0 to +1.0.



- **SENSEX vs. NASDAQ ($r = 0.493$):** This value indicates a **Moderate Positive Correlation**. It implies that approximately 24% (r^2) of the variance in the SENSEX can be explained by movements in the NASDAQ. While the Indian market is influenced by the US tech sector, it still retains roughly 76% independence, likely due to domestic factors like RBI policy, local earnings, and monsoon impacts.
- **SENSEX vs. Regional Indices (KSE, PSEI, TSX):** These also show moderate positive correlations. This suggests a "Global Beta" effect—when global liquidity is high or risk appetite is strong, all these markets tend to rise together.
- **SENSEX vs. MSC Thailand:** The **Weak Correlation** suggests that the Thai market is driven by distinct regional economic drivers (like tourism and electronics exports) that do not always align with the service-and-consumption-heavy Indian economy.

2. Detailed Data Sample: SENSEX vs. NASDAQ (March 2024)

The following table shows the raw data points used to calculate the correlation coefficient ($r = 0.492951$) between the S&P BSE SENSEX and the NASDAQ.

Date	S&P BSE SENSEX (X)	NASDAQ (Y)	X·Y (Product)
Mar 28, 2024	73,651.35	16,379.46	1,206,369,341
Mar 27, 2024	72,996.31	16,399.52	1,197,104,446
Mar 26, 2024	72,470.30	16,315.70	1,182,403,674
Mar 25, 2024	72,831.94	16,384.47	1,193,312,736
Mar 22, 2024	72,641.19	16,428.82	1,193,409,035
Mar 21, 2024	72,101.69	16,401.84	1,182,600,383
Mar 20, 2024	72,012.05	16,369.41	1,178,794,771
Jan 02, 2024	71,892.48	14,765.94	1,061,560,046
TOTAL SUM	4,412,592.75	957,213.74	69,256,766,861.97

Interpretation of the Raw Data Comparison (SENSEX vs. NASDAQ)

- **Trend Consistency:** By observing the daily closing prices in the table, one can see that on days when the NASDAQ saw a significant rally (e.g., late March), the SENSEX often followed with a gain in the subsequent trading session.
- **Time Zone Lag:** Because the Indian market closes before the US market opens on the same calendar day, the SENSEX often reacts to the previous night's NASDAQ closing. This "lead-lag" relationship is captured in the daily data points, confirming that Indian sentiment is highly sensitive to overnight US cues.

3. Detailed Data Sample: SENSEX vs. Karachi Stock Exchange (KSE)

This table provides the comparison with the regional Karachi Stock Exchange (KSE) index.

Date	S&P BSE SENSEX (X)	Karachi Index (Y)	X·Y (Product)
Mar 28,2024	73,651.35	67,142.12	4,945,107,779.86
Mar 27,2024	72,996.31	66,547.79	4,857,743,108.65
Mar 26,2024	72,470.30	65,906.28	4,776,247,883.48
Mar 11,2024	73,502.64	64,801.70	4,763,096,026.49
Feb 29,2024	72,500.30	65,325.69	4,736,132,122.71
Feb 01, 2024	71,645.30	61,979.18	4,440,516,944.85

Interpretation of Results for Portfolio Diversification

The data yields three critical strategic insights:

1. **Limited Hedging in the US:** Because the correlation with NASDAQ is nearly 0.50, an investor cannot fully protect their portfolio from a crash in Indian stocks by buying US tech stocks, as both are likely to drop simultaneously during global panics.
2. **The "Thailand" Opportunity:** The weak correlation with the MSC Thailand index indicates a **high diversification potential**. Adding assets with low correlation to a portfolio reduces the overall standard deviation (risk) without necessarily sacrificing returns.
3. **Emerging Market Sensitivity:** The moderate correlation with Pakistan (KSE) and the Philippines (PSEI) suggests that "Emerging Markets" are often treated as a single asset class by foreign institutional investors (FIIs). When FIIs withdraw capital from Asia, both India and its neighbors feel the impact regardless of individual country fundamentals.

Summary Statistical Interpretation

- **Positive Directionality:** None of the indices showed a negative correlation. This confirms that in the current era of high-frequency trading and global capital flows, major stock markets almost always move in the same direction over the long term, even if the magnitude of those moves differs.
- **Volatility Overlap:** The data suggests that volatility in the SENSEX is "imported" to some degree from developed markets, especially during the US earnings season.

Interpretation: The correlation coefficient of **0.493** indicates a **moderate positive linear relationship**. This suggests that as the NASDAQ (often a proxy for global growth and tech sentiment) increases, the SENSEX tends to follow, though the link is not absolute.

V. RESULTS AND FINDINGS

1. **Moderate Global Integration:** The Indian market is moderately integrated with the US tech market (NASDAQ), reflecting the heavy weight of IT companies in the SENSEX.
2. **Regional Independence:** The study found varying degrees of correlation with regional markets like KSE and MSC Thailand, often showing weaker links than the US markets.
3. **Market Efficiency:** The SENSEX's unique volatility factors (GDP growth, local interest rates) provide a buffer against total global synchronization.

VI. FINDINGS OF THE STUDY

1. **Varying Degrees of Correlation:** The study reveals that the S&P BSE SENSEX exhibits different levels of correlation with prominent international indices. While it shows moderate positive alignments with some, its relationship with others remains weak, reflecting the diverse drivers of global markets.
2. **Moderate Positive Correlation with NASDAQ:** The calculated correlation coefficient between the S&P BSE SENSEX and the NASDAQ is **0.492951**. This indicates a moderate linear relationship where the two indices tend to move in the same direction, but the link is not extremely strong.
3. **Regional and Global Alignment:** The Indian market also demonstrates moderate positive correlations with the **Karachi Stock Exchange (KSE)**, **Philippine Stock Exchange Index (PSEI)**, and the **Toronto Stock Exchange (TSX)**. This suggests that broader global economic sentiments often influence these markets similarly.
4. **Weak Relationship with MSC Thailand:** In contrast to the other indices, the relationship between the SENSEX and the **MSC Thailand index** was found to be weak. This implies that the Thai market may be driven by specific regional factors that are independent of the movements in the Indian stock market.
5. **Historical Volatility Trends:** Historically, the Indian stock market has exhibited higher volatility compared to some major foreign markets. This volatility is often influenced by domestic factors such as political stability, GDP growth prospects, and currency fluctuations.

VII. RECOMMENDATIONS

1. **Geographical Diversification:** Investors should look toward indices with low correlation (e.g., Thailand) to hedge against downturns in major Western markets.
 2. **Risk Hedging:** Given the 0.49 correlation with NASDAQ, Indian investors should be cautious when holding both Indian IT stocks and US tech stocks simultaneously.
 3. **Strategic Portfolio Diversification:** Since the SENSEX is only moderately correlated with indices like the NASDAQ and KSE, investors should consider diversifying their portfolios by including assets from these markets. This can help mitigate risk by spreading exposure across different geographical regions and economic sectors.
 4. **Risk Management through Hedging:** Given the diverse correlation coefficients found in the study, investors are advised to carefully assess their risk tolerance. Adjusting asset allocations or employing hedging strategies may be necessary to manage potential risks effectively, especially during periods of global market turbulence.
 5. **Leverage Low-Correlation Assets:** The weak correlation with the MSC Thailand index presents a unique opportunity for diversification. Investors can use such low-correlated markets to balance their portfolios, as these assets are less likely to decline simultaneously with the Indian market.
 6. **Continuous Market Monitoring:** Because financial markets are dynamic, the historical relationships captured by correlation coefficients may change over time. Investors should continuously monitor global economic developments and monetary policy decisions from major central banks (like the US Federal Reserve) to anticipate shifts in market correlations.
- Informed Decision Making:** Understanding the specific factors influencing these correlations—such as trade policies, geopolitical events, and interest rate changes—is crucial for making proactive investment decisions rather than reactive ones.

VIII. CONCLUSION

The S&P BSE SENSEX demonstrates a dynamic relationship with global financial markets, characterized by a moderate positive alignment with the NASDAQ and varied relationships with regional Asian indices. This moderate correlation confirms that while India is not immune to global shocks, it maintains enough independence to remain a vital component of a diversified international portfolio.

By understanding these correlation coefficients, investors can better navigate market volatility and optimize their risk-return profiles. Staying informed on both domestic economic indicators and global market trends is essential for pursuing long-term financial goals in an increasingly interconnected world.

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