

EVALUATING STOCK MARKET PERFORMANCE DURING ECONOMIC RECESSIONS

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Abstract

This paper, "Assessing Stock Market Performance During Economic Recessions," deals with the effect of the 2008 Global Financial Crisis and the COVID-19 Pandemic Recession on the BSE SENSEX and BSE 100 indices. The present study is based on secondary data analysis, which analyzes the stock price trend with key economic indicators such as GDP growth, inflation, and unemployment. Using time series forecasting techniques such as moving averages, ARIMA models, and exponential smoothing, the research study determines the market volatility patterns and phases of recovery. The results indicate that both recessions led to a deep downturn, but the markets showed resilience and recovery, facilitated by investor sentiment and government intervention. A high correlation of 0.999 between BSE SENSEX and BSE 100 indicates synchronized market movements. This research helps uncover market dynamics, stock volatility, and predictive modeling toward understanding the dynamics of financial market behavior in a crisis.

Keywords: Stock Market Performance, Economic Recessions, BSE SENSEX & BSE 100, Financial Crisis

INTRODUCTION

A stock market is any market in which companies offer their stock to the public to sell in exchange for capital. Shares of stock, also referred to as 'equity', are one of the most common form of securities that give holders voting rights and residual interest in the profits of the company in the form of capital gains and dividends.

Stock markets can also be used by existing publicly traded companies to allow their shares to be bought or sold by individuals and institutions with the aim of investing in companies with the view of benefiting from their performance or betting on the price fluctuations in the short run. They are vital in price-setting functions since the actions of the buyers and sellers define the market value of firms. In addition, the markets for stocks of public companies ensure corporate governance since companies that are listed are required to make financial information available to the shareholders.

The activities that take place at the stock markets are some of the most reliable ways to gauge the performance of the economy as well as the general outlook of the financial system. The movements of the stock prices can be a good indicator of the confidence of investors in the economy while the opposite may be said when stock prices fall.

Stocks refer to ownership interest in a firm and many of them provide voting rights to shareholders and a right to the residual income of the corporation in the form of capital gains and dividends.

While engaging in investments, individuals and institutions meet in stock exchanges to buy or sell shares of companies.

Prices of shares are not fixed but are negotiated based on the supply and demand system where buyers and sellers make their offers and bids.

How Do Stock Markets Work?

The stock markets are those places where buyers and sellers come to exchange shares of companies listed there. Essentially, it is supply-demand type markets wherein share prices vary in terms of the perceived worth of companies as well as market conditions. That means when more people want to buy stocks than sell them, then its price is usually to go up and vice versa.

The stock markets serve both the primary and the secondary markets. A primary market is the first point where new stocks are issued through an IPO. Here, companies sell shares directly to investors for capital mobilization for business operations or expansion. After these shares have gone out in the open, they move into the secondary market, where most daily trading happens. Here, the share trading does not have to do with the company. Instead, the existing shares are traded among the investors.

Different types of market players play a fundamental role in stock markets. These include;

Share owners: individual and institutional investors such as mutual funds and pension funds

- Traders; that buy and sell over a short horizon
- Market makers (MMs), who provides liquidity
- Brokers that facilitates the trades

In addition, regulatory bodies regulate market operations to ensure protection of investors and upholding of market integrity. This forms a complex ecosystem that allows for the efficient allocation of capital and provides opportunities for investment and wealth creation.

How Do Stocks Work?

A company needs to divide what it feels or deems to be its total amount of capital raised in slices of ownership values to raise funds. Usually, these slices are regarded as shares and refer to percentages of ownership in an entity. Commonly, but not always, these shares carry voting rights and the potential to be allocated a portion or share of the company's profits through dividends or capital appreciation. The shares issued by the company to shareholders are referred to as outstanding shares because investors, not the corporation, hold them. The total value of the stock float of a company, or *o*, is described as market capitalization fluctuating according to the currently existing stock price and the outstanding number of shares issued by the company. Market capitalization goes up and down with the current market price of the shares and reflects the value placed on a company by the market.

Why Stock Markets Are Important

Stock markets are of great importance to any economy in the world today. They provide firms with an opportunity to raise capital because they can issue shares to the public and thus enable businesses to grow and expand through innovations. It thereby creates job opportunities and increases the technological base of society.

Apart from capital raising, the stock market allows for an efficient allocation of resources. They do this through the price discovery process where the real-time determination of the prices of stocks is made through the actions of buyers and sellers. This mechanism helps ensure that capital is directed toward the most promising and productive enterprises. Investors, through their choices to purchase and sell, indicate the companies that are likely to succeed and increase in stature—and which likely will falter and die. And in doing this, they help resource utilization go towards its most effective uses—which leads towards overall efficiency in the economy. The stock market is where investors get to build their wealth over time. Stock purchases enable people and financial institutions to benefit from company financial gains-or losses-by buying into them. So, millions of people put their money together in stocks to achieve long-term aims like retirement and college saving. Nowadays, more people also save for retirement and college costs and health care via investments by the stock.

What Is a Stock Exchange?

Once the firms sell public stocks, those can be freely traded on the stock market. Buyers can sell the shares among themselves. That is the secondary market for stocks, and most of the trading occurs at stock exchanges. This form of the larger stock market goes at least back to 1602 in Amsterdam and since then has evolved into some of the world's most complex institutions.

A stock exchange is an organized and regulated "place" (so much trading today is virtual) where stocks and other forms of securities are bought and sold. They play very important roles in the financial system, providing a marketplace through which companies can seek to raise capital by selling their stocks and bonds to the public.

The NYSE and Nasdaq are the best examples, since they are central locations for buying and selling stocks. There are major exchanges around the world, such as the London Stock Exchange, the Tokyo Stock Exchange, and the Shanghai Stock Exchange, each having its internal rules that investors observe due to differences in national or local laws. These should have the ability to give surety of fair trading and ensure investors are confident to undertake business there. They also are transparent about the trading procedures in which information related to the prices of securities may easily be accessed in real time. That is the reason why it is not tough to find the current price of stocks anywhere on any financial news website.

Even though they would not really be living up to the name, stock exchanges would still not be offering liquidity—that ease with which a person might buy or sell stocks without providing the quick possibility of just buying a stock or selling it even quicker should cash be required during trading hours.

Many stock exchanges also cross-list company shares to offer securities mainly listed with other exchanges. This would allow companies to access far more investors while raising funds, and the traders operating with particular exchanges have so much more to choose from.

This manual system is often referred to as the open outcry system, wherein traders employed oral and hand signal communications for buying and selling huge stocks in a block form at the trading pit or exchange floor.

Indian Stock Market: Exchanges and Indexes

This economy, with its huge population, is an engine of growth. On Jan. 22, 2024, its stock market capitalization surpassed Hong Kong's for the first time. According to data compiled by Bloomberg, the value of shares listed on Indian exchanges reached \$4.33 trillion, compared to \$4.29 trillion for Hong Kong.¹

India has two major stock exchanges: the Bombay Stock Exchange, known as BSE and National Stock Exchange, popularly referred to as NSE.

BSE is the oldest stock exchange of India.
India's Exchanges are regulated by SEBI.
The two notable Indian market indexes are Sensex and Nifty.
The BSE and NSE

Most of the trading in the Indian stock market occurs on its two stock exchanges: the Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE). The BSE was established in 1875. The NSE was founded in 1992 and began trading in 1994. Both exchanges follow the same trading mechanism, trading hours, and settlement process.²³

As of January 30, 2024, BSE had listed 5,315 firms, while its rival, NSE had 2,266 firms as on December 31, 2023.⁴⁵ Nearly all the Indian significant firms are listed in both exchanges. BSE is the older stock market while NSE is the volume leader.

Stock Market Index

A stock market index is a statistical source measuring the fluctuations of a financial market. The indices are performance indicators that reflect the performance of a certain market segment or market.

A stock market index is typically developed by picking equities from similar companies or stocks that satisfy a particular defined set of criteria. In this case, the equities are already listed in the exchange and traded in the market. Share market indexes can be constructed using all sorts of variables, such as industries, segments, or even market capitalization.

Every stock market index measures the fluctuation and performance of the stocks making up the index. As such, any success that an index of stocks experiences is just commensurate with how the stocks within the index performed. In plain English, if the prices of the stocks in an index increase, then so does the index.

Types of Stock Market Indices

a) Sectoral Index

The BSE and NSE have some robust gauges that measure companies within a particular sector. Examples of sectoral gauges include the S&P BSE Healthcare and NSE Pharma, which are often a good indicator of the change within the pharmaceutical sector. The S&P BSE PSU and Nifty PSU Bank Indices are indices that are gauges of all listed public sector banks. However, neither must have equal indexes for all industries, although this is a leading cause in general.

b) Benchmark Index

The Nifty 50 index comprises the best 50 equities and the BSE Sensex index comprises the best 30 performing stocks, which are indices of the NSE and the Bombay Stock Exchange respectively. This is a benchmark index because they use the best standards to regulate the companies they choose. Consequently, they are considered the most reliable source of information regarding how markets work in general.

c) Market Cap Index

Few indices choose companies based on their market capitalization. Market capitalization is the stock exchange market value of any publicly traded corporation. Indices such as the S&P BSE and NSE small cap 50 are companies with a lower market capitalization as defined by the Securities Exchange Board of India (SEBI).

d) Other Kinds of Indices

Other such indices, which are somewhat larger in size and carrying a greater number of shares on the list, are the S&P BSE 500, NSE 100, and S&P BSE 100. It might be the case that you don't have a high risk-taking appetite, but the stocks that form Sensex can take great risks. Investment portfolios do not serve all needs. Hence, investors need to be keen and invest where they feel safe.

What is Recession?

Recession could therefore be termed simply as an apparent and deepening contraction of the level of economic activities over a relatively long-term-period: two consecutive quarters of negative growth in Gross Domestic Product. At this point in time during recession, there is obviously reduction of consumers' consumption and investments followed by reduced employment and hence less output in the economy.

Normally, the most defining characteristic of a recession is that lesser consumers spend. Normally, consumers, whenever vague, tend to tighten their purse strings and curtail as much as they can from luxuries or anything that could be avoided for the spending of money on something more vital. These economies within consumer spending then throw waves back into the economy also as the firms themselves are losing customers and possess less cash on hand.

That way creates negative feedback to recession. For instance, if firms face problems either reduce the levels of production or either retrench or cut down workers and affects the consumers power to spend hence continues in depression circles.

Normally, investment levels decline when the recessionary period is protracted. Environmental uncertainty makes a firm shy away from investment in new projects or expanding their business. If the level of decline is higher and simultaneously investment levels are low, it then implies that there exists a lower productivity level.

Normally, the rate of unemployment increases more during the time of recessions because companies can also lay off some of their employees or even stop hiring new people. When the demand for the products or services of a given company reduces, then that company has to reduce the number of employees to reduce the costs, which affects an individual and family and yet still continues to impact the economy as a large.

It is a reality that the unemployment rate has shoot up to the all time high 10% in recession, 2008 to the month of October in the year 2009. Reversal of all the conditions witnessed in this recession was present in such sectors like construction, manufacturing, finance, etc about employment.

Therefore, this leads to negative reinforcement of depression. This is because during the period when companies face crises, at that point, companies cut down or halt the production levels by laying off some of the employees, which comes out to be detrimental to consumers' expenditure so that they fall in a vicious circle of depressions.

In general, it has levels of investment so low, along with going low even in recessionary period. This uncertainty in environment causes firms from investing for new projects as well and results in heightened levels of expansion. So, levels of investments create more number of movements and results in lesser productivity being formed

This by and large normally indicates very vast amounts of numbers of rate of unemployment. Sometimes, this occurs hand in hand with the recession time. This is because while some firms send workers back home, they too recruit at other times and also a firm may, at any time, conclude no one is to be employed fresh within that business, so therefore, in cases where a firm decreases the number of its existing employees working within the company or business in case there arises a reduced demand on purchasing those commodities or service and, therefore reduces the operating costs. It is an activity at the micro-level but in relation to the individual and the family but with ripples reaching as high as the general economy.

Unemployment had reached an all-time high of 10 percent by October 2009. During 2008, recession had set in, with most sectors, whether manufacturing, construction, or finance, slashing workforce.

Why recession occurs: Cause

One question that arises here is, why recession occurs? Different reasons exist because the process involves economic imbalances, financial crises, and other types of external causes.

Economic Imbalances

Economic imbalances are the cause of recession. The distribution is not even as per supply and demand in the economy results in inflation or deflation. Due to which, a speedy increase in the price results whereas when the demand is scarce the price drops. Imbalance is there in the economy, where there is no state of equilibrium due to which it results in recession.

Financial Crises

Perhaps the most dramatic example is a financial crisis, which has always been the trigger main event for a recession. Perhaps one of the worst global recessions in memory began with the bust in 2008 in the housing market; it was as if running a domino through the entire financial system was enough to affect the subprime mortgage market. Failure at the banks of enormous loss due to bad loans forces the banks to be tougher while lending loans and this in turn constricts the availability of credits. Credit in such circumstances gets quite stiff, being quite destructive as much for business sectors and also consumer sectors as an unending and quite deepening recession is produced in consequence.

External Factors

External factors can contribute a lot to recessions. That includes wars or other geopolitics conflicts, which create disarrays in trade flows and insecurity in markets that eventually destabilizes business and investors.

Natural disasters such as hurricanes, earthquakes, and pandemics like COVID-19 may cause a great impact on the economy of supply chains and damaged infrastructure and reduced spending from consumers.

Extrinsic shocks, by and large amplify existing weakness in an economy or a financial system. As such, they tend to be more of an explosion trigger of existing weaknesses into a recession.

Layoffs are on the rise in a recession

A recession is nothing but a snowballing effect, and all their consequences become multiple for an economy. All of these have heavy ramifications that fall on individuals, organizations, and financial lives of one and all. Now let us discuss the impact in-depth:

More job losses during a recession

The main effect of a recession is that more and more people are thrown out of their jobs due to which unemployment rises. Lesser demand for business products or services leads to lower profits during a recession; therefore, organizations have to cut back and downsize by downsizing or retrenching employees to curb costs and stabilize. This would then leave many people without proper employment or even out of employment.

Lower profit margins and it may even shut down.

The worst that any firms in an industry can endure is the economic crisis when a firm suffers from one. All businesses are bound to face a decrease in sales and profitability as it's a period when consumers will spend less and their subsequent less economic activities. The after-effects of decreased income may even compel

some businesses into bankruptcy status or close their operations. Regarding an economic recession, loss is the greatest burden in small-scale businesses as it is not capital-intensive projects, hence less need for bank credit

Earlier Cases of Depression

The Great Depression

The worst depression in the world's history is that of 1929, which is termed as the Great Depression. It was a time period marked with financial stress along with the mass level of unemployment. It was one of the most disastrous times, beginning with Black Tuesday in October 1929, when the stock market had a collapse. Business organizations came crumbling down, and the banks broke down, and the people lost all their savings that made their life worthwhile. Its impact was not limited to the United States but the entire world.

Global Financial Crisis

Global Financial Crisis of 2007-2009 was that period which had highly negative influence on the world economy. It is so massive because it was once in the form of a bursting housing bubble in the United States and later turned into a fiscal mess. Almost all the significant institutes of finance had to suffer their total destruction, or their respective government has to come in and rescue them from total damage. It caused global recession, landing in the several countries passing through their banks, property sectors, and production areas

Dot-com Bubble Burst

Economic contraction was also inducted in the dot-com bubble of 2000. Everything then was speculated and overspent in those companies who had nothing to say in the business realms or even possessed any business potentiality. As these started crashing down and mishaps started popping up from everywhere, investors' anticipations also came crashing as did their confidence. This went on to become a worst affair, so far as dipping stock prices, enormous loss on the part of the investors and the economy also has started recession

LITERATURE REVIEW

Kose, M. A., Sugawara, N., & Terrones, M. E. (2020). *Global Recessions*. CAMA Working Paper 10/2020. This paper details the in-depth analysis of four global recessions, namely in 1975, 1982, 1991, and 2009. According to the authors, each episode had brought on severe contractions in annual global real GDP per capita along with synchronized declines in other global economic indicators, including trade and industrial production. The 2009 recession was the most severe, primarily affecting advanced economies, but relatively better in emerging markets, due to the triggering global financial crisis. Notably, economic globalization has increased cross-border financial and trade linkages, increasing the synchronization of global business cycles. This paper uses a combination of statistical and judgmental approaches to date recessions, measure their depth, and analyze recovery patterns in order to give prominence to the heterogeneity in resilience across regions and income levels.

This further extends prior literature, which now incorporates data from 1950 to 2019, and thus allows for insight into structural differences between advanced economies and emerging markets. For instance, since 2009, the emerging economies showed stronger recoveries, owing to better financial regulations and macroeconomic frameworks. The advanced economies, however, suffered from a weak recovery because of financial market legacies and high unemployment rates. The paper has an underlining role of policy; as coordinated monetary and fiscal interventions have helped to dampen downturns but have been effective differently across economies. It is foundational research into global economic crises because of the comprehensive dataset and nuanced understanding of economic fluctuations.

Zaxidov, G. (2024). "Economic Indicators: Tools for Analysing Market Trends and Predicting Future Performance." *International Multidisciplinary Journal of Universal Scientific Perspectives*, 2(3), 23-29.

Economic indicators serve as the metrics of measuring analysis of market trends and forecasting further economic performance. Zaxidov research addresses the roles of principal economic indicators within the formation of dynamics, notably GDP growth, inflation levels, unemployment rates, and spending by consumers. These would be the dynamics of the markets for strategic decisions taken in certain sectors. This study bases its analysis on a mixed-method approach, where both quantitative techniques like regression and correlation analysis and qualitative insights are utilized. The quantitative data for this approach was sourced from credible sources such as government databases and international agencies. This research therefore cuts across various time periods and, by implication, captures the longitudinal trends and fluctuations in the performance of the economy. Major observations depict a robust positive correlation between the GDP growth and the index of the stock market as in the stable GDP growth rate of around 5 percent annually from 2010 up to 2020 which were accompanied by increases in mood among investors and market conditions. The exciting outcome would have been the pretty high inflation rate over the period, on an average of 10% on consumer purchasing and the aftermath policies of measures monetary to offset price increases. Some of the limits covered under research include methodology errors with revised data, bias, and having a lag in the issuance of time, which vitiates the predictive attributes. In a way, qualitative analysis contextualizes the quantitative findings to point out how

such indicators do not present a sense of foresight but demand more nuanced interpretation, especially in relation to accounting for the influence of global trends, policy decisions, and other kinds of external shocks in affecting economic systems. The study describes the role of economic indicators in enhancing the ability of stakeholders to predict changes in the economy, manage risks, and capitalize on opportunities within volatile market landscapes.

Şenol, Z., & Zeren, F. (2020). "Coronavirus (COVID-19) and Stock Markets: The Effects of the Pandemic on the Global Economy." *Eurasian Journal of Research in Social and Economics*, 7(4), 1-16.

This paper analyzes the impact of COVID-19 on world stock markets during the initial pandemic period, from January 21, 2020, to April 7, 2020. Şenol and Zeren assess long-term relationships between stock market indices and COVID-19 cases and deaths using the Fourier Cointegration method, for MSCI World, Emerging Markets, European, and G7 indices. They find a statistically significant cointegration relationship, which means that the progression of the pandemic affected stock markets worldwide. The authors contextualize these results by comparing COVID-19 to previous pandemics, noting its unprecedented scale and impact on financial systems. For instance, while past pandemics such as SARS had a limited effect on markets outside specific sectors, COVID-19 caused widespread declines. The paper highlights severe declines in major indices, including Dow Jones and FTSE100, with some markets showing volatility levels that are on par with historic crises. Policy responses around the world were also critical; governments implemented substantial fiscal packages, short-selling bans, and liquidity measures to mitigate financial instability. But, of course, structural changes in financial markets, such as delayed data reporting, are bound to affect the performance of models like Fourier Cointegration. Investors should closely monitor the trends of the pandemic; lower-case regions may provide more resilient investment opportunities. Their findings indicate that even if markets stabilize eventually, continuous analysis will be needed in order to fully understand COVID-19's long-term impact on global economic stability and investment behaviors

Baker, S. R., Bloom, N., Davis, S. J., & Sammon, M. (2022). "What Triggers Stock Market Jumps?" National Bureau of Economic Research.

This study examines the proximate causes of large daily stock market jumps across 19 national markets, covering about 8,000 major moves between 1900 and 2020. The paper finds that policy-driven news, particularly on monetary and fiscal policy, is a primary driver of upward market jumps, especially during times of economic downturn. The new methodology here is that it analyses the content of next-day newspaper reports to classify the drivers of stock market movements into 17 primary drivers, which includes monetary policy, macroeconomic news, and corporate earnings. Among other major conclusions, the paper ascribes counter-cyclical policies targeting market stabilization at adverse conditions to upward jumps relating to policy news being twice as frequent as downward ones. Besides, they document jumps related to monetary policy tend to result in lower volatility after the jumps; this could be seen as an aspect of a stabilizing effect of monetary interventions that goes beyond market volatility. Finally, important news about the U.S. economy and policy significantly influences foreign markets, since a third of economically significant jumps in foreign markets are caused by news made in the United States. In return, this phenomenon emphasizes once again the paramount place of the U.S. in the global financial system. The paper further develops a "clarity" measure, which reflects how easily market jumps can be attributed to specific causes; and it finds that clearer days are associated with subsequent volatility that is lower. This research thereby provides a rich empirical basis on how different types of news affect short-term market behavior and long-term volatility indicating that clarity in financial reporting and the nature of news that moves markets both play paramount roles in shaping global financial stability.

Thakur, S., & Sangeeta (2024). *Exploring the Economic Impact: Forex and Indian Stock Market. International Journal of Advance Innovations Thoughts & Ideas.*

This paper discusses interlinkages between the Forex market and the Indian stock market, thus underlining their roles in economic growth and stability. The Forex market is a global financial platform with more than \$6 trillion transacted daily; hence it underpins global trade and investment through currency exchanges and price stability. RBI stabilizes the currency and comes up with monetary policy concerning inflation and interest rates for India. Effective management of the currency attracts foreign direct investments that increase liquidity in the market and boost economic growth. The paper focuses on how investors use hedging and derivatives to reduce currency risks hence illustrating the impact of the market on export-oriented industries such as technology and pharmaceuticals.

The formation of capital to a large extent in the form of the Indian stock market represented by the Bombay Stock Exchange and National Stock Exchange is crucial, which indicates healthy signs of the economy. Investor sentiment is thus read through indexes like BSE Sensex and NSE Nifty and determines levels of consumption, investments, and corporate strategies. Most of the contributions to the increase in foreign investments have been accounted for by liberalization policies of the 1990s, which, thereby, has improved market liquidity and integration with global markets. Fluctuations of the exchange rate are substantially correlated with investor confidence and stock market stability. Examples include the global financial meltdown that occurred in 2008

and the taper tantrum of 2013. In fact, evidence found from theory implies depreciation makes way for capital outflows coupled with heightened volatility in markets together with reduced stock prices.

Parihar, A. S., & Gupta, G. C. (2024). *Examine How Political and Economic Uncertainty Influences Stock Market Volatility and Investor Behaviour. International Journal of Commerce and Management Research.*

This paper examines the driving forces for stock market volatility and investor behavior, using econometric models along with a historical perspective on events over the past two decades, assessing how geopolitical events as well as changes in the economy can affect the flow of the market. Political events, such as elections, policies, and geopolitical tensions, have been identified as triggers for market instability, as investors reassess their risk profiles and adjust their portfolios accordingly. In a similar manner, economic factors, such as inflation and recession, influence market performance and reflect that investors are concerned about unstable periods. The research based on behavioral finance theories explains the herd mentality and risk aversion of the investor, which further increases volatility in the market. This evidence empirically shows that investor psychology and psychological biases have an essential role in the reactions of the market and make volatility more present during unstable periods.

Such implications into how volatility is influenced through a number of moderating factors give insights into their areas, for instance, such that market liquidity, an investor's risk appetite, or regulatory frames. It grants due importance to the need of clear communication by policymakers about policy that minimizes the uncertainty level so that improving stability comes in the case. This paper would make literature richer by offering insight into how uncertainty could be reduced by superior risk management practice and flexible monetary policy, and this work, therefore focuses on the fact that financial markets internationally are well integrated, and it would thus need international coordination to overcome effects of cross-border political as well as economic uncertainties.

Fitriana, P. M., Saputra, J., & Halim, Z. A. (2023). *Stock Market Performance During COVID-19 Pandemic: A Systematic Literature Review. Theoretical and Practical Research in Economic Fields.*

This article reports a systematic literature review of how COVID-19 has impacted stock market performance across various nations worldwide. The authors used 57 papers published between 2020 and 2023 with a systematic literature review procedure followed while adhering to the standards used in PRISMA. The results show that the pandemic resulted in very sharp short-term falls in the global stock market indices, especially in early 2020, as investors reacted to growing health and economic concerns. Volatility was high in most markets. There were the largest recorded drops ever of the S&P 500 and NASDAQ. Different impact between developed and developing economies; this happened as developed markets faced much lesser problems since most measures were offered to handle their market situations. Fiscal and monetary stimuli have also featured heavily in interventions during market rebound phases. Investor sentiment was therefore heavily influenced by the trend of the pandemic, and markets stabilized due to news related to vaccine development. Therefore, this study points toward the understanding of investor behavior and government policies in determining how markets react during a crisis.

The paper further identifies how the global stock markets are connected with each other. One such disruption in one area created ripples all over the world. Long-term research on the pandemic and how it has affected market stability along with economic policies needs further study. It ended by stating the conclusion of the study, where it mentioned that the frights and sell-offs at its early stages are being replaced by the recovery phase of the distinct regions with more clarification regarding COVID-19 and its containment.

RESEARCH METHODOLOGY

Research Design

This paper presents the performance evaluation of the stock market during two major economic recessions: the 2008 Global Financial Crisis and the COVID-19 Pandemic Recession. The used secondary data comprises daily closing prices of BSE SENSEX and BSE 100, besides other key economic indicators. The aim is to analyze the behavior of the stock market before, during, and after these recessions and to predict future trends by using time series analysis.

Source Data:

Equity - Price: BSE SENSEX & BSE 100- Daily open-high-low-close prices- available from the Bombay Stock Exchange-BSE

Time frame:

The periods considered in this analysis are: 2008 - 2010 & COVID- 19 pandemic recession 2019 -2021. Over a period, this was spread as follows to capture the three trends before the recession , period the recession duration and then after itself.

Research Objective:

1. This is one of those studies on the effects of the 2008 financial crisis and how the COVID-19 pandemic has affected the BSE SENSEX and BSE 100 stock indices. I always wanted to know what some of the most important trends are about how markets react to these situations and shifts within their performances.
2. The stock market behavior concerning the economic indicators, which include GDP growth, inflation, and unemployment. Use of moving averages and ARIMA to predict how the behavior would be held in the future and by what pattern the stock market would recover from these crises.

CODE:

```
# Import Libraries
import pandas as pd
import matplotlib.pyplot as plt
from statsmodels.tsa.api import SimpleExpSmoothing
from statsmodels.tsa.arima.model import ARIMA
```

Pandas: Used to deal and manipulate datasets, mainly time series data.

Matplotlib. pyplot: A plotting library to plot lines.

SimpleExpSmoothing is the time series forecasting using Simple Exponential Smoothing.

ARIMA: A statistical model used for time series forecasting

```
# Load the data for BSE SENSEX and BSE 100 (you can replace file paths with actual ones)
sensex_data = pd.read_csv('BSE 100 (2008-10).csv', parse_dates=['Date'], index_col='Date')
bse100_data = pd.read_csv('BSE SENSEX (2008-2010).csv', parse_dates=['Date'], index_col='Date')
sensex_data_2 = pd.read_csv('BSE 100 (2019-2021).csv', parse_dates=['Date'], index_col='Date')
bse100_data_2 = pd.read_csv('BSE SENSEX(2019-2021).csv', parse_dates=['Date'], index_col='Date')

# Create a figure with subplots: 4 in the first row, 4 in the second row
fig, axes = plt.subplots(2, 4, figsize=(20, 10))
```

Four datasets are loaded with `pd.read_csv()` - two for BSE SENSEX for 2008–2010 and 2019–2021, and two for BSE 100 for the same periods. The `parse_dates=['Date']` parameter converts the Date column into a proper date format for time series analysis, and `index_col='Date'` sets the Date column as the index, which makes it easier to analyze and visualize data based on time.

It then generates a figure with 8 subplots arranged in a 2x4 grid using `plt.subplots()`. The 2 rows allow the first row to show raw data like closing prices and the second row to display deeper insights like moving averages or forecasts. The 4 columns are used to compare the four datasets: BSE SENSEX and BSE 100 for both periods. The `figsize=(20, 10)` ensures the plots are large and clear.

```
# Plot 1: BSE SENSEX 2008-2010
axes[0, 0].plot(sensex_data['Close'], label='BSE SENSEX 2008-2010')
axes[0, 0].set_title('BSE SENSEX Closing Prices (2008-2010)')
axes[0, 0].set_xlabel('Date')
axes[0, 0].set_ylabel('Closing Price')
axes[0, 0].legend()
```



```
# Plot 2: BSE SENSEX 2019-2021
axes[0, 1].plot(sensex_data_2['Close'], label='BSE SENSEX 2019-2021', color='purple')
axes[0, 1].set_title('BSE SENSEX Closing Prices (2019-2021)')
axes[0, 1].set_xlabel('Date')
axes[0, 1].set_ylabel('Closing Price')
axes[0, 1].legend()

# Plot 3: BSE 100 2008-2010
axes[0, 2].plot(bse100_data['Close'], label='BSE 100 2008-2010')
axes[0, 2].set_title('BSE 100 Closing Prices (2008-2010)')
axes[0, 2].set_xlabel('Date')
axes[0, 2].set_ylabel('Closing Price')
axes[0, 2].legend()
```

```
# Plot 4: BSE 100 2019-2021
axes[0, 3].plot(bse100_data_2['Close'], label='BSE 100 2019-2021', color='green')
axes[0, 3].set_title('BSE 100 Closing Prices (2019-2021)')
axes[0, 3].set_xlabel('Date')
axes[0, 3].set_ylabel('Closing Price')
axes[0, 3].legend()
```

Plot 1: BSE SENSEX 2008-2010

Plot closing price of BSE SENSEX from 2008 till 2010. Captions it and date the x-axis, close price is taken for the y-axis Identification with legend

Plot 2: BSE SENSEX 2019-2021

This is the last value of BSE SENSEX ranging from 2019-2021. The line is colored in purple along with a plus, and this includes title, axes along with a legend to get it as visible as possible.

Plot 3: BSE 100 2008-2010

This is the plot showing the closing prices of the BSE 100 for the 2008–2010 years. It has everything in the title, the names of the axes and their labels, and even the legend to make reading it easy as in all the plots.

Plot 4: BSE 100 2019-2021

It will be closing price graph for BSE 100 over years 2019-2021. There are just few titles, axis labels and legends and little colouring to vary it.

```
# Step 3: Moving Averages for BSE SENSEX
sensex_data['50_MA'] = sensex_data['Close'].rolling(window=50).mean()
axes[1, 0].plot(sensex_data['Close'], label='BSE SENSEX Close')
axes[1, 0].plot(sensex_data['50_MA'], label='50-day Moving Average', color='red')
axes[1, 0].set_title('BSE SENSEX with 50-day Moving Average (2008-2010)')
axes[1, 0].set_xlabel('Date')
axes[1, 0].set_ylabel('Price')
axes[1, 0].legend()
```

This code calculates and prints the 50-day moving average of the closing price of BSE SENSEX from 2008 through 2010. The moving average smoothes out short-term fluctuations to provide a definite trend over time. Code calculates the average closing price for each 50 days by using the `.rolling(window=50).mean()` method and stores it in a new column called '50_MA'. The graph has fifty days average next to original closing prices. To put it apart from the original data, the moving average line is shown in red color. The plot is named "BSE SENSEX with 50-day Moving Average (2008-2010)" with a legend and labeled axes for price and date.

Step 4: Exponential Smoothing for BSE SENSEX

```
model_ses = SimpleExpSmoothing(sensex_data['Close']).fit(smoothing_level=0.2, optimized=False)
sensex_data['SES'] = model_ses.fittedvalues
axes[1, 1].plot(sensex_data['Close'], label='BSE SENSEX Close')
axes[1, 1].plot(sensex_data['SES'], label='SES Smoothing', color='orange')
axes[1, 1].set_title('SES for BSE SENSEX (2008-2010)')
axes[1, 1].set_xlabel('Date')
axes[1, 1].set_ylabel('Price')
axes[1, 1].legend()
```

The closing prices of the BSE SENSEX index for the years 2008–2010 are subjected to Simple Exponential Smoothing (SES) by this code. SES is a forecasting technique that uses exponentially decreasing weights to smooth time series data. Since the smoothing level is set to 0.2 in this case, recent data is prioritized. After being computed, the fitted values (smoothed prices) are appended to the dataset as a new column called 'SES'. In order to show how SES captures trends in the data, reducing noise and highlighting general patterns during this time, the actual closing prices and smoothed values are finally presented on a graph.

Step 5: ARIMA Model for BSE SENSEX

```
arima_model = ARIMA(sensex_data['Close'], order=(1, 1, 1))
arima_result = arima_model.fit()
forecast = arima_result.forecast(steps=30)
axes[1, 2].plot(sensex_data['Close'], label='BSE SENSEX Close')
axes[1, 2].plot(forecast.index, forecast, label='ARIMA Forecast', color='green')
axes[1, 2].set_title('ARIMA Forecast for BSE SENSEX (2008-2010)')
axes[1, 2].set_xlabel('Date')
axes[1, 2].set_ylabel('Price')
axes[1, 2].legend()
```

This code predicts the future values of closing prices of BSE SENSEX using the ARIMA (AutoRegressive Integrated Moving Average) model. Differencing is done one time to make the data stationary, and the parameters in the model are set as `(1, 1, 1)`, in which '1' refers to one lag for both autoregressive and moving average parts. Once the ARIMA model is fitted to the data, a 30-step forecast is generated. Plotting the actual closing prices along with the predicted values in a graph will illustrate how ARIMA is forecasting the future trends of the BSE SENSEX index for the 2008–2010 period and thus helps in analyzing the possible moves and market behavior.

Step 6: Moving Averages for BSE 100 (2008-2010)

```
bse100_data['50_MA'] = bse100_data['Close'].rolling(window=50).mean()
axes[1, 3].plot(bse100_data['Close'], label='BSE 100 Close')
axes[1, 3].plot(bse100_data['50_MA'], label='50-day Moving Average', color='red')
axes[1, 3].set_title('BSE 100 with 50-day Moving Average (2008-2010)')
axes[1, 3].set_xlabel('Date')
axes[1, 3].set_ylabel('Price')
axes[1, 3].legend()
```

This code computes and prints the 50-day MA for the BSE 100 index from 2008 to 2010. In this way, it averages the closing prices within a 50-day rolling window, thereby reducing short-term volatilities and leaving out

long-term patterns. The new column in the dataset is assigned the name `50_MA` with the computed values of 50-day MA. It is easier to see general market trends and possible signals when the plot shows the actual closing prices alongside the 50-day MA. This allows easy comparison between daily price changes and the smoothed trend.

```
# Adjust the layout to avoid overlap
plt.tight_layout()
```

```
# Show all plots
plt.show()
```

`plt.show()` displays all plots clearly, whereas `plt.tight_layout()` adjusts spacing to avoid overlap between plot parts.

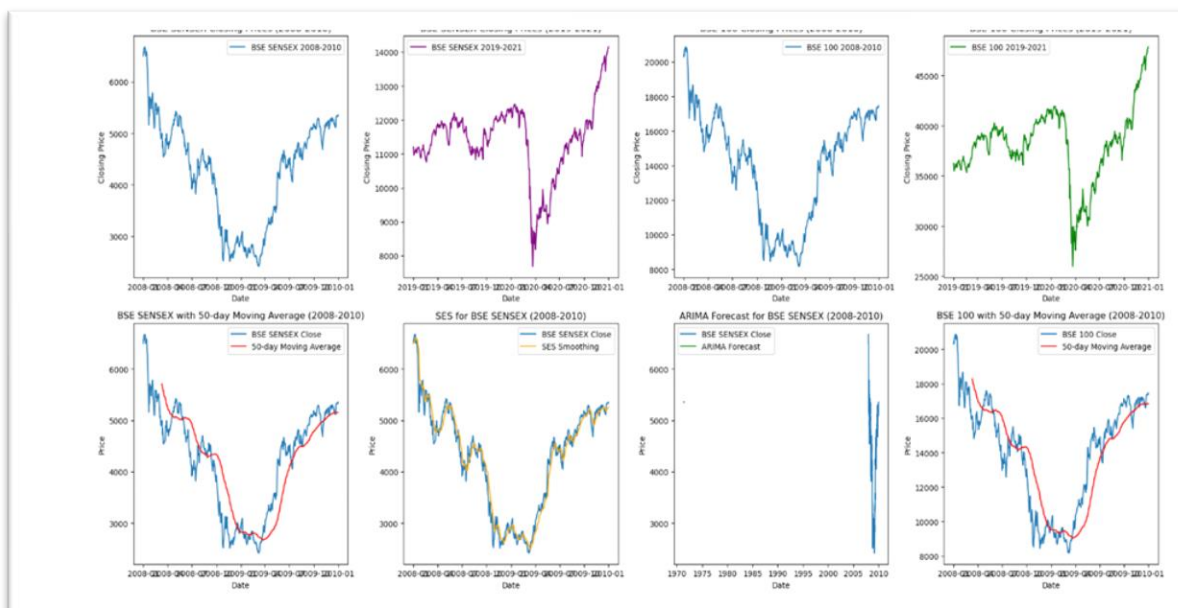
```
correlation = sensex_data['Close'].corr(bse100_data['Close'])
print(f"Correlation between BSE SENSEX and BSE 100: {correlation}")
```

It computes and prints the correlation coefficient of BSE SENSEX and BSE 100 closing prices showing the strength and direction of their relationship.

```
from statsmodels.tsa.seasonal import seasonal_decompose
result = seasonal_decompose(sensex_data['Close'], model='additive', period=30)
result.plot()
plt.show()
```

It uses an additive model on the closing prices of BSE SENSEX over a time span of 30 days. Those closing prices are decomposed into trend, seasonal, and residual elements, plotted in order to find out latent patterns and trends from data.

DATA ANALYSIS



BSE SENSEX Closing Prices (2008-2010)

This is the trend of BSE SENSEX of the years 2008 and 2010. All such prices have declined critically and seriously at that moment of time in the year of 2008, which led to a global financial melt-down. That time lies in lower levels at the beginning of the year 2009

Until the end of year 2009 and since it graphically presents, it's moving in a flat way and is moving all along up calendar year 2010.

Graph Explanation:

Graph shows how the crisis is hitting the market so that to form either weak market or strong market falling according to the recovery curve. BSE SENSEX Closing Prices (2019-2021)

BSE SENSEX for time - period of years 2019-2021.

That is happening in apparently visibly down trend that would suitably fall into windows of time within the given frame during early stages of COVID-19 at the start of 2020.

The market has recovered well after falling downwards for first time and up until 2021, showing apparent upward trend in the graph.

Closing BSE 100 prices, 2008-2010

Following graph is provided to illustrate closing prices of BSE 100 and the data of years involved is year-wise for time period of 2008-2010:

BSE 100 also declined exactly like Sensex but in a worse manner where it could not get out the situation of 2008 whereas it faced severe test along with its declining phase on the point of view of the financial global crises.

The Sensex recovery chart did go well at its very commencement by 2009 onwards.

Explanation: As BSE 100 also witnessed the same cyclical pattern of the trend of crisis and recovery. Therefore, this trend now witnessed is the market-wide trends.

BSE 100 Closing Prices (2019-2021)

This graph represents the BSE 100 for the years of 2019-2021.

COVID-19 epidemic heavily drowns the index in the initial period of 2020, yet bounces well in both the years, 2020 and 2021.

Interpretation: BSE 100 is rebounding well; therefore, investors regain confidence in the market. Much alike, in the case of SENSEX.

BSE SENSEX with 50-day Moving Average (2008-2010)

The red line plotted on the above graph shows the BSE SENSEX prices with a 50-day Moving Average

The moving average emphasizes the overall trend, but at the same time, the extreme fluctuations get damped.

Though the index trends downward in its initial period, the recovering stage after 2009 has been observed in the moving average too.

Interpretation: During crisis and recovery phases, the 50-day moving average can be useful in determining the overall rising and falling trend of the market.

SES for BSE SENSEX (2008-2010)

This graph is a result of Simple Exponential Smoothing on BSE SENSEX closing prices.

The orange SES line smoothest out the data and diminishes noise to track the general price changes.

Explanation: SES clearly shows the overall pattern of SENSEX for 2008-2010, which can reflect the crash and the subsequent recovery.

ARIMA Projection for BSE SENSEX (2008-2010)

Uses past tendencies to predict the future indices.

Data Plot here, is rather sloppy or stretched that suggests it is under-projected or the forecast has limited output.

Meaning: ARIMA is available for forecasting, but models chosen to configure it with and nature of data dictate how closely it approximates.

BSE 100 w/ 50-day MA (2008-2010)

This graph depicts the BSE 100 index with a 50-day moving average (red line).

The movement average points out the collapse and rebound of 2008 and 2009-2010, respectively, while making the price swings smooth

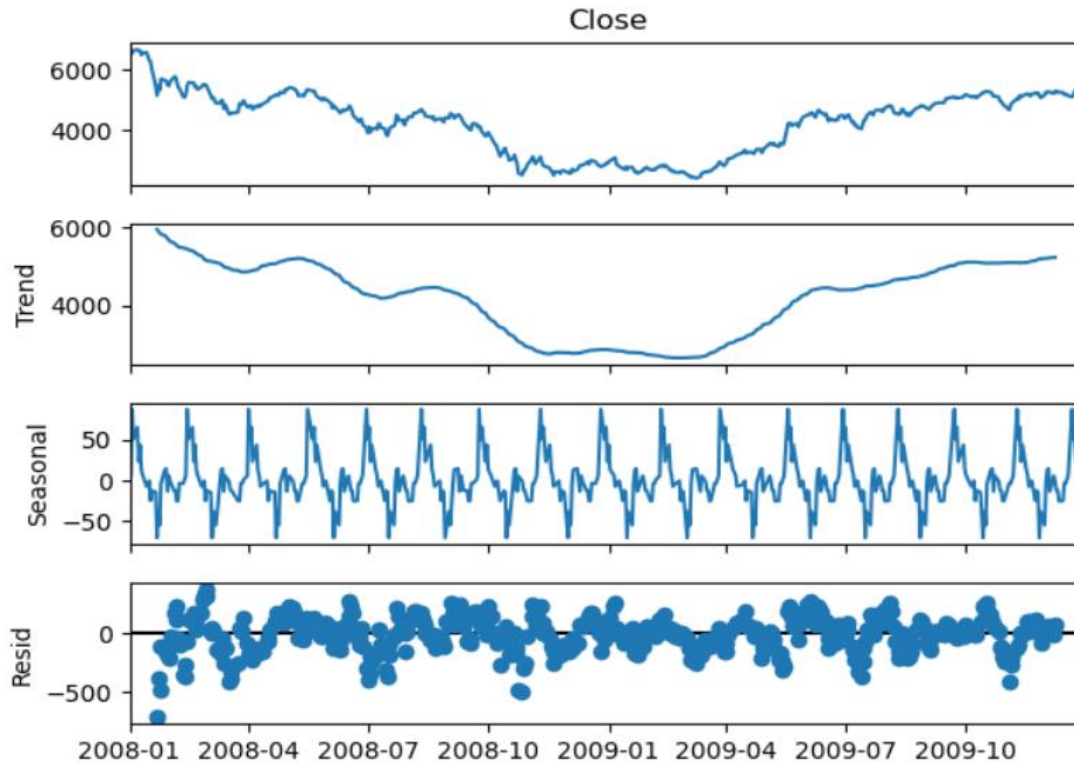
Interpretation: The 50-day moving average makes possible the observation of the recovering trend in the market by averaging out the price movement

Correlation between BSE SENSEX and BSE 100: 0.9990250177095018

This implies correlation at 0.999 represents an almost perfect positive relation that exists between BSE SENSEX and BSE 100, thereby signifying both the indices move nearly identical directions

It further means if BSE SENSEX moves in either upward or downward direction, BSE 100 moves nearly the same direction as well.

This should be so because both indices track similar stocks and reflect the general market trend



Seasonal Decomposition of BSE SENSEX closing prices are as follows:

Close (Original): Original data depicts the steepest fall in the year 2008 because of the financial crisis, followed by a gradual upward recovery in the year 2009.

Trend: It shows a very strong downward trend in 2008 and a steady upward recovery in 2009.

Seasonal: It depicts consistency and cyclical patterns repeating over 30 days.

Residual: It captures the random noise not explained by the trend or seasonal components.

Decomposition breaks the data into trends, seasonal patterns, and noise, thereby revealing information about market behavior and recovery.

FINDINGS & CONCLUSIONS

1. Economic Events

The worst that both BSE SENSEX and BSE 100 indices have witnessed, in terms of percentage in the sense of terms is the 2008 Financial Crisis. Two indices portray the trend from the year 2009 onwards where signs of recovery have been shown which serve as evidence on the market level to rebound after the crash.

In the pandemic of 2020 by COVID-19, the fall was steep, and both indices have bounced back substantially, indicating investor confidence in market recovery post-pandemic.

2. High Correlation Between BSE SENSEX and BSE 100

The correlation value of 0.999 indicates a very high positive relationship between the two indices. This means that both indices moved almost identically and depicted the general market behavior.

3. Moving Averages (50-Day)

The 50-day moving average filtered out short-term noise and fluctuations and highlighted overall trends. BSE SENSEX and BSE 100 had negative trends in crisis phases and positive trends in recovery phases. Moving averages captured the market turning points.

4. Exponential Smoothing (SES)

Simple Exponential Smoothing (SES) successfully smoothed out the BSE SENSEX data, and it reduced noise from the data set, leaving only the overall trend of data. It might be able to capture the fall during the 2008 crisis and also the recovery stage after the same.

5. ARIMA Forecasting

This included the use of ARIMA for predicting future trends by the BSE SENSEX. Although this was done on historical data, it reflected that the technique of ARIMA proves to be good for showing the possible trends in the market.

6. Seasonal Decomposition

Seasonal decomposition split the closing prices of BSE SENSEX into:

Trend: Obvious decline in the 2008 crisis and recovery after that.

Seasonal: Regular cyclical patterns repeating over time.

Residual (Noise): Noisy fluctuations not accounted for by the trend or seasonality.

This decomposition brought to light more details of the long-term trends and patterns of data.

BSE SENSEX and BSE 100 analysis show that:

1. Both indices are significantly correlated, meaning the performance of the overall market.
2. Major economic events such as the 2008 Financial Crisis and COVID-19 hit the indices hard but, in both cases, proved to be followed by powerful recoveries, which displayed market resilience.
3. Some of the tools used to analyze trends, smooth out fluctuations, and predict future movement are moving averages, exponential smoothing, ARIMA forecasting, and seasonal decomposition.
4. The market has trends for long periods and seasonal patterns as well, which are fundamental to understand and predict the movement of the market.

This research study focuses on the demand for market trend study of performance during economic recessions and recoveries.

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