AN INDUSTRY WISE STUDY OF BSE SENSEX STOCKS ON INFLATION, EXCHANGE RATE AND STOCK PERFORMANCE

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Abstract
The study revealed that the returns on stock prices were calculated on monthly and then annualized. It is observed that many companies gave good returns on investments to their investors. There were returns as high as 180 % per year. However, the volatility is also high. In the next level of analysis, to test the hypotheses of the study, the correlation analysis was carried out to find out whether there exists any relationship between inflation and stock returns. For majority of the companies the study found significant correlations all these correlations are linear. The correlations were both positive and negative. As correlations explain us only the direction of the movements, Regression was used to test the hypotheses. The regression analysis results are mixed. With regard to BHEL, L&T, Axis Bank, Infosys we find significant inverse relationship between inflation and stock returns. On the other hand RIL, HDFC, Cipla etc had no impact of inflation. Overall, the results of the study support our hypotheses that, inflation will have negative impact on stock returns. When the hypotheses were tested impact of inflation on industries, the results showed a significant negative relationship for all industries except, Metal & Mining, and Power Industry. Capital goods industry, Information Technology industry, FMCG, and Banking industries are highly susceptible to inflation.

Keywords: BSE Sensex, Inflation, Exchange Rate, Stock Performance, Correlation, ANOVA.

Introduction
The relationship between interest rates and inflation has been examined in both theoretical and applied finance. A large body of research points out that the stock price tends to perform poorly during inflationary periods. There is international evidence that common stock returns and inflation are negatively related in the post-war period. Real stock returns are negatively related to expected, unexpected, and changes in expected inflation. Fama (1981) alternative hypothesis grasp an inverse relationship between real stock returns and inflation is unauthentic because inflation acts as a proxy for real-activity variables in models that relate stock returns to inflation. Gultekin (1983) in a study of 26 countries during the post war period constantly failed to find support for the hypothesis that common stocks and the expected inflation rate were independent. A number of arguments have been put forward for the observed relationship between stock returns and inflation. The relationship between stock markets and exchange rates has drawn the attention of investors and policy makers alike, mostly because they both play crucial roles in influencing the development of a country's economy. This relationship has been utilized by fundamentalist investors and policy makers to predict the future trends for each other, and has been viewed as a valuable predicatory tool.

Literature Review
Relationship between Inflation and Gold Prices
The dynamics of the price for gold has been focused by academic literature in many respects over the last decades. The first literature strand consists of studies which address impacts of macroeconomic variables such as exchange rates, interest rates, or output on the price for gold. Studies of this kind have been provided by Sherman (1982, 1983), Fortune (1987), Dooley et al. (1995), and Wang and Lee (2011). Generally speaking, evidence for different relationships and causalities including the price of gold has been provided.

Finally, studies which are most closely related to our topic have analyzed the linkages between inflation and the price for gold. Kolluri (1981), Ghosh et al. (2004), and Wang et al. (2011) examine the inflation hedge effectiveness of gold by focusing on the short-run and the long-run relationship between the general price level and the price for gold. It is worth mentioning that studies which focus on 'safe haven' aspects mostly adopt daily instead of monthly data. In an early study, Mahdavi and Zhou (1997) tackle the question whether gold and other commodity prices are leading indicators of inflation based on the estimation of a conventional VECM for the USA using the Johansen (1988, 1991) framework for a quarterly sample period that ranges from 1970 to 1994 and conclude that consumer prices and the price of gold are not co-integrated.

Relationship between Inflation and Oil Prices
A large body of empirical research has confirmed that oil price increases have strong and negative influences for the real economy (e.g., Hamilton, 1983; Burbidge and Harrison, 1984; Gisser and Goodwin, 1986). Since the rapid fall of oil price in 1986, the established model has been challenged. There was little evidence to suggest that oil price decreases improve

economic activity, in the same way that oil price increases suppress economic activity. Several authors therefore reexamined the oil price-macroeconomic relationship, using instead asymmetric or nonlinear methods (i.e., Mork, 1989; Mork et al., 1994; Lee et al., 1995; Hamilton, 1996; Hamilton, 2003). They found that the negative linkage between oil price increases and economic activity still held. Consequently, it may be reasonable to partition oil price changes into oil price increases and decreases for the analysis of the related issue.

Relationship between Inflation and Interest Rates
The relation between interest rates and inflation has attracted much attention in recent years. Serious empirical research on this subject has resumed after a lapse of nearly four decades, from the early 1930s to the late 1960s. The point of departure of this work has been Irving Fisher's classic study, The Theory of Interest, published in 1930. Fisher found interest rates during the period 1890-1927 to respond slowly and incompletely to variations in inflation. The most common interpretation of these results is that inflationary expectations, which influence current interest rates, respond slowly to observations of past inflation. Eugene Fama has presented results that contradict those of earlier writers. More important, Fama's work suggests that interest rates immediately and completely reflect inflationary expectations.

Relationship between Inflation and Exchange Rates
Bergen (2010) is of the view that the high interest rate policy doesn't defend currencies against speculative attacks; implying that there is a stinking lack of any systematic association between interest rates and the outcome of speculative attack. However, Utami and Inanga (2009) while examining the influence of interest rate differentials on exchange rate changes based on the IFE theory found that interest rate differentials have positive but no significant influence on changes in exchange rate for the USA, Singapore and the UK, relative to that of Indonesia. On the other hand, interest rate differentials have negative significant influence on changes in exchange rate for Japan. Ezirim, et al (2012) investigated the interdependencies between exchange rates and inflation rates behavior in Nigeria. Using autoregressive distributed lag analytical framework, they found that exchange rates movements and inflation spiral are cointegrated, associating both in the short run and in the long run.

Relationship between Exchange Rates and Stock Prices
Although theories suggest causal relations between stock prices and exchange rates, existing evidence on a micro level provides mixed results. Jorion (1990, 1991), Bodnar and Gentry (1993), and Bartov and Bodnar (1994) all fail to find a significant relation between simultaneous dollar movements and stock returns for U.S. firms. He and Ng (1998) find that only about 25 percent of their sample of 171 Japanese multinationals has significant exchange rate exposure on stock returns. Griffin and Stulz's (2001) empirical results show that weekly exchange rate shocks have a negligible impact on the value of industry indexes across the world. However, Chamberlain, Howe, and Popper (1997) find that the U.S. banking stock returns are very sensitive to exchange rate movements, but not for Japanese banking firms.

Relationship between Inflation and Stock Markets
The linkage between stock market performance and macroeconomic variables has attracted a great deal of research interest in the past, with the growing literature revealing strong influence of macroeconomic variables on stock market indices particularly for industrialized countries. In a past survey, Cohn and Lessard (1980) established that stock prices in many industrialized countries to be negatively related to nominal interest rates and inflation. Contrary to previous studies, Poitra (2004) argued that he found no significant evidence on the impact of announcements in macroeconomic fundamentals on the stock prices.

Relationship between Inflation and Stock Returns
Recent studies have provided a glimpse of the behavior of inflation and stock returns in emerging markets. Kwon, Shin, and Bacon (1997) find that nominal variables such as inflation and nominal interest rates are mostly insignificant for the South Korean case. Lee (1998) rejects the Proxy Hypothesis for Hong Kong, Singapore, South Korea, and Taiwan. Adrangi, Chatrath, and Raffiee (1999) reject the Proxy Hypothesis in the short-run for Mexico and South Korea. Finally, Henry (2001) investigates the reaction of 25 emerging markets to 81 inflation stabilization plans, and concludes that stabilizing high inflation yields a significant market increase, while the results of stabilizing moderate inflation are economically weak and statistically insignificant.

Statement of the Problem
There exists an extensive research on understanding the relationship between inflation and stock returns. However, the results are mixed. Few of the studies argue that inflation has negative impact on stock returns and on the other hand few studies report a positive association between inflation and stock returns. Similar kind of prior research is found with regard to

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relation between exchange rates and stock returns. The exchange rates have varied influence on companies those are export oriented and those are import oriented. There is a need to conduct an extensive study to understand the relation between inflation, exchange rates and stock prices. There is also need to know the intensity of these economic variables on companies and industries. Do all the companies and industries have similar impact or is there any variation.

Significance of the Study
To the best of my knowledge there is little research on understanding the relationship among inflation, exchange rates, and stock returns. This study aims to fill that gap by relating inflation and exchange rates to stock returns. Furthermore, the study is more focused on company level and industry level analysis. To the best of my knowledge no one carried out such study. This study also investigates the combined impact of inflation and exchange rates on stock prices. It also examines among the two macro economic variables (inflation, exchange rate) which will have more influence on stock prices.

Scope of the Study
Scope of the current study is limited to 30 blue chip and highly liquid stocks and 10 major industries which are part of Bombay Stock Exchange Sensitive Index (BSE, India). These 30 stocks represent 64 percent of total market capitalization of BSE.

Objectives
The main objectives are as follows:
1. To examine the relationship between Inflation and stock returns of sample stocks
2. To scrutinize the relation between inflation and sample industries
3. To understand the relationship between inflation and exchange rates
4. To investigate the empirical relationship between exchange rates and stock prices
5. To test the causal relationship among inflation, exchange rates and stock prices

Methodology
Sample for this study includes 30 highly liquid blue chip companies representing 10 major industries in India. The main reason for choosing this sample is, combined market capitalization of these companies are near to 64 percent of all the companies listed in Bombay Stock Exchange. The maximum market capitalization of Sensex was 4,98,897.82 crores. The S&P BSE SENSEX is India's most tracked bellwether index. It is designed to measure the performance of the 30 largest, most liquid and financially sound companies across 10 key sectors of the Indian economy that are listed at BSE Ltd. Figure 1 depicts the sector wise breakdown of BSE Sensex Stock. The period of this study is between 2005 – 2006 and 2014 -15. Monthly values of Inflation, Exchange rate and stock prices were collected for 10 years. All the data is sourced from official sources of Government of India. Information pertaining to companies was collected from company websites and their local offices located in Hyderabad.

Figure 1: Sector wise breakdown of BSE SENSEX stocks.
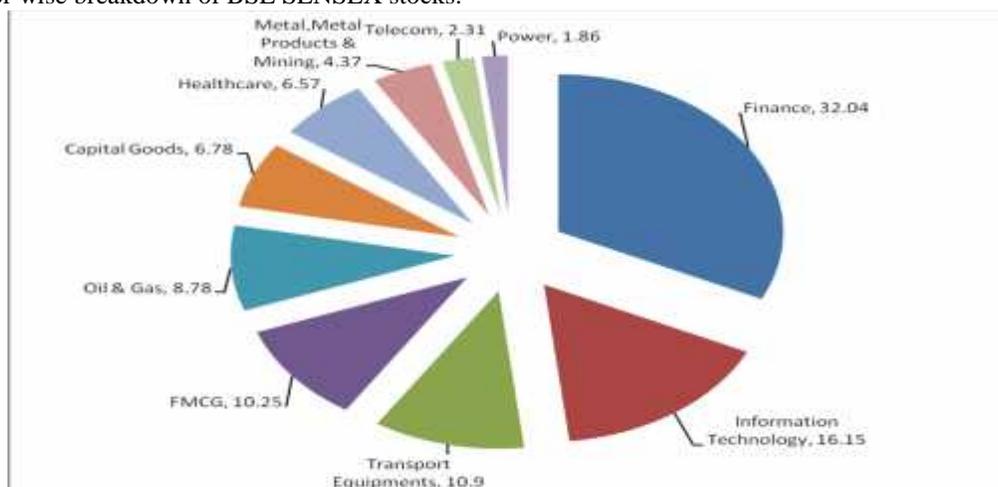
(Sector wise breakdown of BSE Sensex Stock. Source: Author)

Table 1: Stocks listed in BSE SENSEX

S.No	Company	Sector
1	*Bharat Heavy Electricals Ltd*	*Capital Goods*
2	*Larsen & Toubro Ltd*	*Capital Goods*
3	*Reliance Industries Ltd*	*Capital Goods*
4	Axis Bank Ltd	Finance
5	HDFC Bank Ltd	Finance
6	Housing Development Finance Corp	Finance
7	ICICI Bank Ltd	Finance
8	State Bank of India	Finance
9	*Hindustan Unilever Ltd*	*FMCG*
10	*ITC Ltd*	*FMCG*
11	Cipla Ltd/India	Healthcare
12	Dr Reddy's Laboratories Ltd	Healthcare
13	Sun Pharmaceutical Industries Ltd	Healthcare
14	*Infosys Ltd*	*Information Technology*
15	*Tata Consultancy Services Ltd*	*Information Technology*
16	*Wipro Ltd*	*Information Technology*
17	Coal India Ltd	Metal & Mining
18	Hindalco Industries Ltd	Metal & Mining
19	Sesa Sterlite Ltd	Metal & Mining
20	Tata Steel Ltd	Metal & Mining
21	*Gail India Ltd*	*Oil & Gas*
22	*Oil & Natural Gas Corp Ltd*	*Oil & Gas*
23	NTPC Ltd	Power
24	Tata Power Co Ltd	Power
25	*Bharti Airtel Ltd*	*Telecom*
26	Bajaj Auto Ltd	Transport Equipment
27	Hero MotoCorp Ltd	Transport Equipment
28	Mahindra & Mahindra Ltd	Transport Equipment
29	Maruti Suzuki India Ltd	Transport Equipment
30	Tata Motors Ltd	Transport Equipment

(Source: Bombay Stock Exchange of India)

Analytical tools

I sourced the data of sample stocks for a period of 10 years. For four stocks 10 years data was not available, so I removed those stocks from the study. The final sample consists of 26 stocks representing 10 industries. As the data belongs to a decade long period, there may be stock splits, bonus issues, and rights issues etc. To know this information, initially I plotted the data of each company on graph using MS-Excel. Except two stocks all other stocks have either stock splits or bonus issues. Using appropriate methodology I adjusted the stock prices for splits and bonus shares. Data analysis is carried out on split adjusted stock prices. First, I calculated the descriptive statistics (Average Price, Volatility, Skewness, and Kurtosis), of all the stocks, Inflation, and Exchange Rates on yearly basis and also for a ten year period. Second, descriptive statistics is carried out on 10 industries for yearly and ten year combined data. Hypotheses testing are carried out using regression and ANOVA analysis. For each company first I considered Inflation as independent variable and second exchange rates as independent variable and stock price as dependent variable. For each stock I carried out 22 regression analyses (one for each year data (10 years) and one for ten years data). This analysis is carried out to measure the casual relation when the independent variable is high or low. Finally, I tested the hypotheses on industry wise.

Hypothesis

H1: In this study I hypothesize that inflation will have significant negative relation with stock returns.

H2: There exists a significant negative relation between inflation and sample industries

H3: Exchange rates have casual effect on inflation of the economy.

H4: Exchange rates are positively related to stock prices of companies whose majority of revenues is through foreign markets.

H5: Exchange rates are negatively related to stock prices of companies those are import oriented.

H6: Together both inflation and exchange rates have significant casual impact on stock prices.

Limitations
This study has certain limitations. One limitation of the study is consideration of Monthly data points. Earlier research have both supportive and against results for monthly data. As the duration is too long, it is forced to consider monthly data. Second, the data was not transformed. As I don't wish to lose the core attributes of the data set, I thought it is appropriate to retain the original closing prices. Third, the sample size (companies) is small but, represents the majority of the stocks.

Findings
In this study it is hypothesized that inflation will have negative impact on stock prices. The results were mixed. With regard to few stocks, especially those in capital goods, FMCG, and Oil and Gas I found negative relationship whereas stocks in other industries do not report such association. Furthermore, I didn't find any significant relationship during high and low inflation conditions.

Next, exchanges rates have significant relation between finance, oil and gas, metal and mining industries. Exchanges rates also have profound impact on Information Technology stock. This impact can be attributed to revenues from foreign countries.

The study also finds that the impact of Inflation and Exchanges are not akin to all the companies and industries. At the same time, for the same company / industry the intensity varied from year to year.

Suggestions
- Investment in equity shares fetches higher returns associated with higher risk. In this study, it is found annualized returns as high as 180% and as low as -150%. No other investment will yield such a phenomenal return on investments. As a general tendency, investors will look at only positive side of the returns and invest their money in stock markets. Very few of individual investors understand the potential risks in investing in equity shares.
- There are multitude of factors those influence the performance of stock returns. First and foremost is the financial performance of the company followed by investors' expectations about future financial performance. Next, financial performance of the company depends of both internal and external factors. Internal factors include operational efficiency, technology, cost of debt, product portfolio, availability of raw materials etc. On the other hand external factors like Inflation, Government policies, exchange rates, infrastructure etc.
- Inflation is the one factor that impacts the financial performance of companies both directly and indirectly. Direct impact of inflation will be in the form of reduced consumption from customers end. As we know, inflation is the state of economy where prices of products are in rise, to sustain the increased prices, consumers will buy less. As they buy less the sales of companies will decrease which in turn leads to decrease in revenues and profits.
- Inflation will also have indirect impact on the performance of companies. As inflation increases the price of input costs like increase in prices of raw materials, transportation, electricity etc., the cost of production will increase. Companies may not be in a position to transfer this increased costs to customers in fear of decrease in sales and revenues. The selling prices remains constant and cost price increases will hit the profit margins of the companies. This again will influence the financial performance of the companies.
- From the perspective of companies it is suggested that, they should always keep an on the inflation rates, GDP, and per capita consumption. As inflation is directly related to financial performance, the companies should have plans for hedging. They also need to control the costs by using techniques like EOQ, and improve the efficiency of production by having QC checks, and adopting newer technologies. During the times of higher inflation, employees of the companies expect salary hikes to meet their consumptions. The companies should be able to convince the employees and extract more work from them, so that the revenues will increase and the companies can pay them higher salaries. The companies also need to expand their markets, into new markets and should try to have foot prints in foreign markets.
- For individual investors, it is suggested that, inflation directly hits the financial performance of the companies and in turn influence the stock returns. There are few industries on which the impact of inflation is minimal. For example companies those supply raw materials like, Mines, minerals, power, banking etc. are less effected by inflation. So, investors can consider these companies in these industries for investment. There are few companies like, HUL, ONGC, etc, which have little influence of inflation, these companies may be considered for investment.

Conclusion
The returns on stock prices were calculated on monthly and then annualized. It is observed that many companies gave good returns on investments to their investors. There were returns as high as 180 % per year. However, the volatility is also high.

In the next level of analysis, to test the hypotheses of the study, the correlation analysis was carried out to find out whether there exists any relationship between inflation and stock returns. For majority of the companies the study found significant correlations all these correlations are linear. The correlations were both positive and negative. With regard to BHEL, L&T, Axis Bank, Infosys we find significant inverse relationship between inflation and stock returns. On the other hand RIL, HDFC, Cipla etc had no impact of inflation. Overall, the results of the study support our hypotheses that, inflation will have negative impact on stock returns. When the hypotheses were tested the impact of inflation on industries, the results showed a significant negative relationship for all industries except, Metal & Mining, and Power Industry. Capital goods industry, Information Technology industry, FMCG, and Banking industries are highly susceptible to inflation.

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