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An Analytical Study of the Effect of Inflation on Stock Market Returns

Dr. S. Sathyanarayana[1#], Prof. Sudhindra Gargesa[1]
[1]Professor, MP Birla Institute of Management, Bangalore, India.

[#]corresponding author.
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ABSTRACT

Inflation means a persistent change in the price level of goods and services in an economy. It is generally measured in the consumer price index (CPI) or retail price index (RPI). Inflation reduces the purchasing power of a country's currency, as we need more units of currency over time to buy the same goods and services. The current empirical paper entitled "relationship between inflation and stock market evidence from selected global stock markets" have been undertaken with an intention to investigate the relationship between inflation and stock returns of the chosen economies. In order to realise the stated objectives the researchers have collected the monthly data 2000 to 2017 for selected indices. In the first phase log returns were computed and it has been tested for the existence of unit root in the distribution. In the second phase we ran Pearson correlation coefficient for the collected data to find out the association between the inflation and stock returns. Majority of the chosen indices recorded a negative coefficient with the dependent variable. For India, Austria, Belgium, Canada, Chile, China, France, Ireland we found a negative coefficient. However, Brazil Indonesia, Japanese, Mexico, Spanish and Turkey reported a positive coefficient. Current study clearly throws light on the effect of inflation on the stock market returns therefore; it can help the market participants such as traders, fund managers and investors to make good portfolio decisions based on the information about expected inflation and unexpected inflation. The study confirms that there exists a significant relationship between the stock returns and inflation for Australian, Belgium, Canadian, Chilean, Chinese, French and Irish stock benchmark indices. Firms can take this one has a clue to adjust their reported profits by raising the prices. The policy makers can employ contractionary policy to reduce the supply of money by offering low interest rate on t bills, increasing the interest rates (bank rate policy) and increasing the cash reserve ratios which in turn reduces the lending capacity of the banks.

Keywords: Inflation, CPI, WPI, Real returns, Serial Correlation, ADF stats.

I INTRODUCTION

There is no universally accepted definition for inflation. Inflation is the persistent change in general price level for goods and services on a year-on year basis. In any economy inflation crops up when the amount of purchasing power is greater than the amount of goods and services. Generally inflation may be a boost in the volume of currency that causes the increase in prices. From the consumer's perspective, a low inflation is always better than high inflation, because their spending on necessities is not surging faster than their incomes. On the other hand, high inflation introduces uncertainty. Depending on the depth of inflation, the economists have classified inflation into different types, namely. (i) Creeping Inflation (weak) (ii) Galloping Inflation (faster than creeping inflation) (iii) Hyperinflation (a very high rate of inflation) (iv) stagflation (inflation and recession occur together) and (v) deflation is the reverse of inflation (decline in the general price level). The major threat from inflation is that it erodes the purchasing power of currency. It discourages investment, reduces the value of savings, high inflation leads to fall in real wages. Apart from it inflation has a regressive effect on lower- income strata and senior citizens of the society. Real interest rate on bank deposits may be negative. Higher borrowing cost for business and industry borrowers. An economy with high inflation rate, makes it exports less competitive in global markets, reduces the exports, less job or no job creation, increase the business uncertainty and adverse effect on balance of payment. There are different ways to measure inflation.

Generally, on the basis of target population, the inflation indices are generated to record the price level changes for example, end users, manufactures, wholesalers, retailers etc. These indices may be CPI (Consumer Price Index), (PPI) Producer Price Index, (WPI) Wholesale Price index etc. However, in India inflation is measured over two major indices, WPI and CPI. Most of the developing nations use CPI as the measure to understand the levels of inflation. According to PIMCO, if economic growth stimulate very rapidly, demand grows even faster and service providers and manufactures rises prices continually. This is called hyperinflation, this phenomenon occurs when consumers spending exceeds the production of goods and services. This results in the decline in the purchasing power of the currency. On the other hand, when economic activity begins to slow, demand decreases and the supply of goods and services exceeds the demand. At this time, the inflation rate falls. This phenomenon is called disinflation. The extended weak demand can lead to deflation or recession or even trade depression. In the words of Schofman and Schweitzer (2000) increasing inflation is one of the major concern for investors because it decreases the real return on their investments.

History has demonstrated that high inflation can affect the economy in so many ways: for example high inflation creates uncertainty and high level of volatility in stock market. It may slow down the economic activities in the economy. Therefore, investigating the impact of inflation on stock market performance has implications for market participants and policy makers. The remainder of this paper is organized as follows. Section two discuses a review of previous empirical papers from the proposed title. Section three deals with the research methodology employed for the study. In section Four the empirical results are discussed and in the closing section discussion and conclusion have been drawn and the empirical findings are compared with the available evidence.

II. LITERATURE REVIEW

The efficiency of major global stock markets has been investigated through many empirical studies. According to these studies volatility in stock markets are caused by various macro-economic factors such as GNP (Wongbampo and Sharma (2002)), inflation (Geske and Roll (1983); DeFina (1991); Naka (1994), Geetha et al. (2011); Aggarwal (1981), Soenen and Hennigar (1988), money supply (Urich and Wachtel (1981) Chaudhuri and Smiles (2004); Ibrahim (2000) (Ahmed & Osman (2007) (Tivoli and Bulmash (1996) Roley (1985); Toda and Yamamoto (1995)), Jain (1988) Cheng (1995) interest rates (Pan et al. (2007); Asperm (1989); Nissim and Penman (2003) Bohl et al. (2007)), interest rate (Bhattacharya and Mukherjee (2002); Ahmed (2008)), and exchange rate (Robert (2008)) Fang and Miller (2002) Akinnifesi (1987) Hennigan (1988), Bahmani and Sohrabian (1992) money supply , 91 day T-bill rate, interest rate GDP (Pilinkus (2009)) and industrial production index. currency demonetisation (Sathyanarayana (2017), real GDP Schwert (1990) or industrial production, exchange rates Robert Johnson (2010); Agrawal (1981), Oil prices (Robert (2008)); Bacon and Kojima (2008), Umut (2010) Kaul (1996)); devaluation in currency Granger, Husang and Young's (2008); Currency depreciation (Heinz Herrmann et al. (2006)); Real economic activity (Abdullah and Hayworth 1993, , Fama 1981, Huang and Kracaw (1984); returns and long- term bonds (Fama and French, 1989), budget deficits (Darrat, 1990a;) BREXIT referendum (Sathyanarayana (2017) (Sathyanarayana (2016)) etc. when it comes inflation, majority of the studies focused on two types of inflation. They are expected inflation and unexpected inflation. According to economic theory, the expected inflation is not a risk for stock returns and only the unexpected inflation is a major threat for stock returns. Financial market participants are always ardent about the relationship between inflation and other macroeconomic factors such as economic growth for example Fischer (1993) empirically documented that growth rate and inflation share inverse relationship; Barro (1995) supported the view of Fischer. However, Bruno and Easterly (1996) examined the relationship between inflation and growth conclude that this relationship is temporary and the inverse relationship documented by Fischer (1993) exists only when there are high inflation rate Sarel (1997) supported this view. Even Rangarajan (1998), argued that inflation has negative impact on growth rate of an economy because of its destructive effects on productivity and efficiency. However, empirical studies conducted by Tun Wai, (1959); Paul, Kearney and Chowdhury (1997) did not find any evidence between these two variables. Cordon (1990) in his empirical study documented that low inflation is significantly related with high growth rate. Another group of researchers tried to investigate the relationship between the Inflation and GDP Ghosh and Phillips (1998) and they documented a negative coefficient between the two variables. Boyd, Levine and Smith (1996), investigated the relationship between inflation and financial system. The study revealed that and concluded that inflation shares negatively correlated with financial markets. Yet another study was conducted by English (1999) to assess the relationship between inflation and financial development found a positive relationship, similar studies were conducted by Haslag, J. and Koo (1999) Michelle Barnes (2000) Boyd, Levine, and smith (2001), Rousseau and Wachtel (2001).

The relationship between stock returns and rate of inflation has been examined extensively in the literature. However, the findings of these empirical studies were mixed. Fisher (1930) in his empirical investigation found a positive relationship between the stock returns and inflation and suggested that equities shares should be used as a hedge against inflation. Bodie (1976) provide evidence in favour of this argument. Later most of the studies documented the same evidence for example, Lintner, 1975; Jaffe and Mandelker, 1976; Gultekin, 1983; Choudhry, 2001 Feldstein (1980); Kessel (1956); Samarakoon (1996) Akmal (2007) found a positive relationship between stock prices and higher inflation rate. Similar findings were documented by Fama (1981); Boudhouch and Richarson, (1993). Further, in an empirical study by Fama and Schwert (1977) documented an inverse relationship between expected and unexpected inflation and stock returns. They argued that increase in the development activities, results in the shrinkage of inflation. This results in increase in the equity prices.

Similar findings were documented by Nelson (1976); Jaffe and Mandelker (1977); Yeh and Chi (2009) David A. Marshall (1992). Firth, (1979) investigated this relationship in United Kingdom stock market and demonstrated a positive relationship between these two variables. However, another stream of researcher found an inverse relationship between the inflation and stock returns. For example Ioannides et al, (2005); Spyrou, (2001) documented a negative relationship between these two variables.

Zhao (1999) in his empirical study conducted in China documented a significant negative relationship between inflation and stock market. Bethlehem (1972) investigated the relationship between inflation and stock market returns in JSE on a sample of 20 listed stocks. He concluded that stocks were very good hedges against inflation. In a study by Bakshi and Chen (1996) documented a negative correlation between inflation and stock prices. In an empirical study by Spyrou (2001) tried to investigate the relationship between these two variables in Greece found a negative and statistically insignificant relationship. Rao and Bhole (1990) investigated the impact of inflation on equity market returns in Indian stock market. For examining this, they estimated nominal and found a negative relationship between inflation and stocks returns and positive return for long run. Munene (2007), in an investigation found an inverse relationship between expected inflation and a direct relationship between actual inflation and stock prices.

The literature review on the proposed topic has demonstrated that stock return and inflation are interlinked. There is no unanimity on whether the relationship that exists between inflation and stock returns are positive or negative or neutral. Empirical evidence regarding this relationship in Indian stock market and other developing stock markets seems scarce in the literature. It is in the light of this that the relationship between the stock market returns and inflation is being undertaken.

III RESEARCH DESIGN

Data for the Purpose of the Study: As the current study was analytical, quantitative and historical in nature, the data collected for the study purpose was chiefly from secondary sources. For the current empirical study the data was collected from various data bases such as capital line, yahoo finance and other web sources. For the purpose of the study the major index from the selected nation has been selected for example India (Sensex), Austria (ATX), Belgium (BEL20), Brazil (Bo Vespa), Canada (GSPTSE), Chile (IPSA), China (SSEC), France (FCHI), Indonesia (JKSE), Ireland (ISEQ), Japan (Nikkei), Mexico (MXX), Spain (IBEX) and Turkey (XU100.ES) the adjusted closing price for the chosen indices have been collected.

Specification of the Model

The following linear regression model has been used to test the theoretical relation between stock return and inflation rate

$Y = a + b_1 X_1 + Є$

Where Y = Dependent variable (Stock returns)

a = constant intercept term of the model

b_1 = coefficients of the estimated model

Є = error component

Objectives of the study

1. To analyse the relationship between stock returns and inflation.
2. To investigate the impact of inflation on stock index.
3. To offer suggestions based on this empirical study to the policymakers and market participants.

Hypothesis of the Study

H0: there is no significant relationship between independent variable (Inflation) and stock returns.

H1: there is a significant relationship between independent variable (Inflation) and stock returns.

Plan of Analysis

To investigate the impact of inflation on the chosen indices the following methodology has been employed. In the first phase the collected data has been tested for unit root by employing ADF test(Dickey and Fuller 1979). In the second phase, Descriptive statistics have been run to understand the data distribution and to eliminate the outliers from the data. In the third phase a linear regression model has been run to test the proposed relationship between the variables. In the last phase, residual diagnostics such as B-G Serial correlation LM test, Breusch-Pagan-Godfrey heteroskedasticity test and CUSUM test have been run to assess the strength of the constructed regression model. However, for Sensex and Inflation in India, we ran Johansen cointegration test to investigate the association between the dependent and independent variable. Later VECM and Wald stats have been run to assess the short run association. Finally the results have been compared with the possible evidence.

IV DATA ANALYSIS

TABLE NO 4.1 TABLE SHOWING DESCRIPTIVE STATISTICS (INFLATION)

	India	*Austria*	*Belgium*	*Brazil*	*Canada*	*Chile*	*China*
Mean	6.666	1.939	1.996493	6.801823	1.917	3.368	2.255
SE	0.212	0.060	0.087604	0.185098	0.064	0.141	0.149
SD	3.027	0.858	1.254301	2.643733	0.919	2.025	2.122
Variance	9.165	0.737	1.573271	6.989323	0.845	4.100	4.502
Kurtosis	-0.026	-0.389	0.938212	4.62134	0.883	1.981	0.444
Skewness	0.753	0.118	0.058331	1.913294	0.038	0.686	0.687
Count	204	204	205	204	204	205	204
	France	***Indonesia***	***Ireland***	***Japan***	***Mexico***	***Spain***	***Turkey***
Mean	3.223	7.242	2.027	0.0279	4.467	2.212	15.981
SE	0.155	0.248	0.189	0.0742	0.101	0.115	1.156
SD	3.129	3.551	2.696	1.0600	1.447	1.646	16.547
Variance	9.792	12.613	7.269	1.1236	2.093	2.710	273.810
Kurtosis	5.897	0.907	0.921	2.3695	3.025	-0.759	2.998
Skewness	2.200	1.087	-0.845	1.1947	1.566	-0.626	2.049
Count	410	205	204	204	205	204	205

The role of descriptive statistics is to describe the patterns, trends and summarises the given data set in a meaningful way. It is evident from the above table that Inflation rate in India has a mean score of 6.666, with a variance of 9.165 (which is considered to be very high) for 204 data points. For Austria the mean Inflation rate documented was 1.939 with a variance of 0.737 for 204 data points. For Belgium the recorded inflation mean of inflation was 1.996 with a variance of 1.573, followed by Brazil 6.802 with a variance of 6.989 which is very high, Canada with a reported mean of 1.917 with a variance of 0.845 (the least variance among the chosen sample). Chile has recorded a mean inflation rate of 3.368 with a variance of 4.100. For China the reported average inflation was 2.255 with a variance of 4.502. France's mean inflation rate stood at 3.223 with a variance of 9.792. Indonesia has reported a mean inflation rate of 7.242 for the study period with a variance of 12.613 (significantly very high variance). Ireland has documented 2.027 mean of inflation rate with a variance of 7.269. Japan recorded the least mean inflation rate among the chosen sample with 0.0279 with a variance of 1.1236. Mexico has recorded the mean inflation of 4.467 with a variance of 2.093. However, Spain has documented a mean inflation rate of 2.212 with a variance of 2.710. Turkey has recorded a mean inflation rate of 15.981 with the highest variance of 273.810. Based on the above analysis we can infer that majority of the developing nations have the high mean inflation rate and high degree of volatility in inflation rate.

IV DATA ANALYSIS

TABLE NO 4.2 TABLE SHOWING DESCRIPTIVE STATISTICS (STOCK INDICES)

	India	*Austria*	*Belgium*	*Brazil*	*Canada*	*Chile*	*China*
Mean	0.009069	0.004884	0.00157	0.007045	0.002506	0.007872	0.002512
SE	0.004697	0.004286	0.003433	0.005045	0.00285	0.003242	0.00563
SD	0.067257	0.061362	0.049033	0.072057	0.040703	0.043731	0.080209
Variance	0.004523	0.003765	0.002404	0.005192	0.001657	0.001912	0.006434
Kurtosis	1.891357	5.342254	4.200621	0.684019	3.191606	0.377591	1.676233
Skewness	-0.50021	-1.45066	-1.40123	-0.39176	-1.15616	0.153116	-0.53295
Count	205	205	204	204	204	204	203
	France	***Indonesia***	***Ireland***	***Japan***	***Mexico***	***Spain***	***Turkey***
Mean	-0.00097	0.012447	0.001188	0.000964	0.009823	-0.00033	0.007819
SE	0.003635	0.00451	0.004103	0.003996	0.003643	0.004086	0.007214
SD	0.05192	0.064262	0.058595	0.057068	0.052038	0.058357	0.103032

Variance	0.002696	0.00413	0.003433	0.003257	0.002708	0.003406	0.010616
Kurtosis	0.872622	6.063164	2.005335	1.702961	1.306025	0.738521	2.627566
Skewness	-0.642	-1.20394	-0.98771	-0.76517	-0.50636	-0.46476	-0.19399
Count	204	203	204	204	204	204	204

It is evident from the above table that the monthly mean returns for Sensex for the study period was 0.009069 with a variance of 0.004523. For Austria the mean Index returns were 0.004884 with a variance of 0.003765 for 205 data points. For Belgium the recorded mean returns were0.00157 with a variance of 0.002404, followed by Brazil 0.007045 with a variance of 0.005192. Canadian Index has reported a mean returns of 0.002506 with a variance of 0.845. Chile has recorded a mean returns of 0.007872 with a variance of 0.001912. China the reported a mean return of 0.002512 with a variance of 0.006434. However France has reported a mean returns of -0.00097 with a variance of 0.002696. Indonesia has reported a mean of 0.012447 for the study period with a variance of 0.00413.Whereas, Ireland has documented 0.001188 mean with a variance of 0.003433. Japan recorded the mean returns of 0.000964 with a variance of 0.003257. Mexico has recorded the mean returns of 0.009823 with a variance of 0.002708. However, Spain has documented a mean returns of 0.00033 with a variance of 0.003406. Turkey has recorded a mean returns of 0.007819 with the highest variance of 0.010616. It is evident from the above analysis that Indonesian Index market has recorded that highest mean returns, followed by Mexico and India. However France Stock Index recorded the least the negative mean returns for the study period, Spain occupied the penultimate position with -0.00033, whereas Japan stood twelfth position with 0.000964. However, in case of variance, Turkey's stock market was reported to have a high degree of volatility, followed by China with 0.006434 and Brazil with 0.005192. However, Canadian stock markets reported the least volatility with 0.001657, Chile with 0.001912 and Belgium with 0.002404 the least risky stock markets for the study period.

ADF test has been applied to determine the existence of the unit root in the time series data. For this purpose the test has been conducted at unit root in Level, 1st difference and 2nd difference. For this purpose intercept, trend and intercept and none included in test equation. The results of ADF test is presented in the following table.

TABLE No. 4.3

TABLE SHOWING ADF STATS FOR THE CHOSEN INDICES

Indices	**t-Statistic**	**Prob.***	**Indices**	**t-Statistic**	**Prob.***
Sensex	-13.07354	0.0000	FCHI	-12.84361	0.0000
ATX	-10.38700	0.0000	JKSE	-11.24974	0.0000
BEL20	-10.87328	0.0000	ISEQ	-11.56764	0.0000
Bo Vespa	-12.63258	0.0000	Nikkei	-12.28044	0.0000
GSPTSE	-11.33152	0.0000	MXX	-13.71305	0.0000
IPSA	-13.47032	0.0000	IBEX	-13.71305	0.0000
SSEC	-12.69487	0.0000	XU100.ES	-16.24456	0.0000

It is evident from the above table that from the ADF test results we can reject the null hypothesis that there is a unit root in the time series data.

TABLE No. 4.4

TABLE SHOWING ADF STATS FOR THE INFLATION RATE

Country	**t-Statistic**	**Prob.***	**Country**	**t-Statistic**	**Prob.***
India	-12.14910	0.0000	France	-13.82685	0.0000
Austria	-12.54701	0.0000	Indonesia	-11.45282	0.0000
Belgium	-7.275503	0.0000	Ireland	-4.917515	0.0000
Brazil	-6.152875	0.0000	Japan	-5.788445	0.0000
Canada	-6.941310	0.0000	Mexico	-4.258922	0.0000
Chile	-6.077898	0.0000	Spain	-9.081267	0.0000
China	-6.133870	0.0000	Turkey	-4.479842	0.0003

However, in case of inflation we found unit root at level. When we 1st differenced and 2nd differenced the time series data they became stationary. Because of space constraint only first differenced results were shown.

TABLE No. 4.5

CORRELATION COEFFICIENT BETWEEN INFLATION AND INDEX RETURNS

	Inflation	**Prob.***	**Country**	**t-Statistic**	**Prob.***
Sensex	-0.024	.727	FCHI	-0.1785*	.011
ATX	-0.2649**	.000	JKSE	-0.0178*	.011
BEL20	-0.2841**	.000	ISEQ	-.078	.265
Bo Vespa	0.0667	.343	Nikkei	-.173*	.013
GSPTSE	-0.1861**	.008	MXX	-.013	.856
IPSA	-0.1705*	.021	IBEX	-.083	.238
SSEC	-0.1971**	0.005	XU100.ES	-.095	.177
Pearson Correlation **. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).					

In order to assess the relationship between the independent variable (Inflation) and dependent variable (Stock Index return) a correlation matrix has been constructed. The correlation between Sensex and Inflation was negative (-0.024) and statistically not significant. However, between ATX and inflation was negative (-0.2649**) and significant. Between BEL20 and inflation was -0.2841** and statistically significant. However in case of Brazil the relationship was positive 0.0667 and statistically not significant. In Canada both stocks and inflation share a significant relationship with a Pearson correlation coefficient of -0.1861**. In case of Chile, the correlation coefficient was -0.1705* which is statistically significant. Chinese stock market was also share a negative relationship with inflation with a correlation coefficient of -0.1971**. However, between FTHI and inflation the correlation coefficient was negative -0.1785* and significant. When it comes Indonesia it was significant and negative to -0.0178*. In case of Ireland (ISEQ) the correlation coefficient was negative and not significant with a Pearson correlation coefficient of -.078. The correlation between Nikkei and Inflation was negative (-.173*) and statistically significant. In case of Mexico, the correlation coefficient was -.013 which is not statistically significant. Spain (IBEX) has recorded a negative correlation -.083 which is not statistically significant. Turkey has reported a negative correlation -.095 which is not statistically significant. All the chosen indices reported a negative relationship with inflation except France.

Table No 4.6

TABLE SHOWING REGRESSION RESULTS

Austria				
	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	0.041205845	0.010281706	4.007685558	8.621E-05
Inflation	-0.018933687	0.0048499	-3.90393316	0.000128954
R^2	0.070155797		Durbin-Watson	1.852
Belgium				
	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	0.023599217	0.006199	3.806963603	0.000186518
Inflation	-0.011078822	0.002631	-4.211657634	0.000000
R^2	0.080723658		Durbin-Watson	1.786
Brazil				
	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	-0.005349193	0.01395921	-0.38320171	0.701973
Inflation	0.001817627	0.00191348	0.949906213	0.343295
R^2	0.004447075		Durbin-Watson	1.783034
Canada				
	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	0.018283935	0.006502887	2.811664261	0.005414335

Inflation	-0.00823508	0.003059306	-2.691811951	0.007702487
R^2	0.034628		Durbin-Watson	1.622395
Chile				
	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	0.019446272	0.005919856	3.284923255	0.001224817
Inflation	-0.003491624	0.001499631	-2.328322482	0.021000035
R^2	0.029080		Durbin-Watson	1.796285
China				
	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	0.019187038	0.008047169	2.384321459	0.018036166
Inflation	-0.007398949	0.00260178	-2.843802524	0.00491628
R^2	0.038495		Durbin-Watson	1.852157
France				
	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	0.0143009	0.00696835	2.052264931	0.041433513
Inflation	-0.010723356	0.004159691	-2.577921159	0.010651356
R^2	0.031851		Durbin-Watson	1.856372
Indonesia				
	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	0.022660654	0.010220153	2.21725187	0.027720757
Inflation	-0.001415768	0.001265406	-1.118825104	0.264543454
R^2	0.006159		Durbin-Watson	1.545740
Ireland				
	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	0.008667964	0.005068738	1.710083042	0.08878596
Inflation	-0.003762867	0.00150508	-2.500110924	0.013211111
R^2	0.030015		Durbin-Watson	1.634812
Japan				
	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	0.000811317	0.004002959	0.202679203	0.839589776
Inflation	-0.000688074	0.00378418	-0.18182913	0.855899155
R^2	0.000164		Durbin-Watson	1.713962
Mexico				
	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	0.023039101	0.011782162	1.955422173	0.051905675
Inflation	-0.002968821	0.002509446	-1.183058241	0.238169737
R^2	0.006848		Durbin-Watson	1.925535
Spain				
	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	0.006988155	0.006837791	1.021990063	0.308007984
inflation	-0.003362056	0.002481788	-1.354690812	0.177029299
R^2	0.009003		Durbin-Watson	1.887351
Turkey				
	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	0.01731645	0.010004476	1.730870271	0.085002
inflation	-0.000612613	0.000434663	-1.409397748	0.160255
R^2	0.009738		Durbin-Watson	2.081110

Analysis: Intercept is α in the set equation. Standard error measures the variability in approximation of the coefficient and lower standard error means coefficient is closer to the true value of coefficient. R square represents the percentage movement of the dependent variable which is captured by the intercept and the independent variable. Above obtained results explain 00.0600% of the variation in Index return was captured by independent variable (Inflation). Where Durbin-Watson score is 1.847.

Test of Hypothesis

Austria
Result shows that independent variable (Inflation)share negative coefficient with the dependent variable meaning that inflation shares an inverse relationship with the dependent variable (stock returns). Inflation is statistically significant at 0.01 level with a p value of 0.000128954 therefore we can reject the Null hypothesis. With an R square value of 7.02% and Where Durbin-Watson value of 1.852.

Belgium
Result shows that independent variable (Inflation)share negative coefficient with the dependent variable meaning that it shares an inverse relationship with the dependent variable (stock returns). Inflation is statistically significant at 0.01 level with a p value of 0.000000 therefore we can reject the Null hypothesis. With an R square value of 7.02% and Where Durbin-Watson value of 1.852.

Brazil
Regression result shows that independent variable (Inflation)share positive coefficient with the dependent variable meaning that it shares an direct relationship with the dependent variable (stock returns). Inflation is statistically not significant at 0.05 level with a p value of 0.343295 therefore we cannot reject the Null hypothesis. Where R square value of 0.445% and Where Durbin-Watson value of 1.783034.

Canada
Result shows that the predictor (Inflation)share negative coefficient with the dependent variable meaning that it shares an inverse relationship with the dependent variable (stock returns). Inflation is statistically significant at 0.01 level with a p value of 0.007702487 therefore we can reject the Null hypothesis. With an R square value of 0.770% and Where Durbin-Watson value of 1.622395.

Chile
Result shows that the predictor (Inflation)share negative coefficient with the dependent variable meaning that it shares an inverse relationship with the dependent variable (stock returns). Inflation is statistically significant at 0.05 level with a p value of 0.021000035 therefore we can reject the Null hypothesis. With an R square value of 2.908% and Where Durbin-Watson value of 1.796285.

China
Result shows that the predictor (Inflation)share negative coefficient with the dependent variable meaning that it shares an inverse relationship with the dependent variable (stock returns). Inflation is statistically significant at 0.01 level with a p value of 0.00491628 therefore we can reject the Null hypothesis. With an R square value of 3.850% and Where Durbin-Watson value of 1.852157.

France
Result shows that the predictor (Inflation)share negative coefficient with the dependent variable meaning that it shares an inverse relationship with the dependent variable (stock returns). Inflation is statistically significant at 0.05 level with a p value of 0.010651356 therefore we can reject the Null hypothesis. With an R square value of 3.185% and Where Durbin-Watson value of 1.856372.

Indonesia
Regression result shows that independent variable (Inflation)share positive coefficient with the dependent variable meaning that it shares an direct relationship with the dependent variable (stock returns). Inflation is statistically not significant at 0.05 level with a p value of 0.264543454 therefore we cannot reject the Null hypothesis. Where R square value of 0.616% and Where Durbin-Watson value of 1.545740.

Ireland
Result shows that the predictor (Inflation)share negative coefficient with the dependent variable meaning that it shares an inverse relationship with the dependent variable (stock returns). Inflation is statistically significant at 0.05 level with a p value of 0.013211111 therefore we can reject the Null hypothesis. With an R square value of 3.002% and Where Durbin-Watson value of 1.634812.

Japan
Regression result shows that independent variable (Inflation)share positive coefficient with the dependent variable meaning that it shares an direct relationship with the dependent variable (stock returns). Inflation is

statistically not significant at 0.05 level with a p value of 0.855899155 therefore we cannot reject the Null hypothesis. Where R square value of 0.0164% and Where Durbin-Watson value of 1.713962.

Mexico

Regression result shows that independent variable (Inflation)share positive coefficient with the dependent variable meaning that it shares an direct relationship with the dependent variable (stock returns). Inflation is statistically not significant at 0.05 level with a p value of 0.238169737 therefore we cannot reject the Null hypothesis. Where R square value of 0.6848% and Where Durbin-Watson value of 1.925535.

Spain

Regression result shows that independent variable (Inflation)share positive coefficient with the dependent variable meaning that it shares an direct relationship with the dependent variable (stock returns). Inflation is statistically not significant at 0.05 level with a p value of 0.177029299 therefore we cannot reject the Null hypothesis. Where R square value of 0.900% and Where Durbin-Watson value of 1.887351.

Turkey

Regression result shows that independent variable (Inflation)share positive coefficient with the dependent variable meaning that it shares an direct relationship with the dependent variable (stock returns). Inflation is statistically not significant at 0.05 level with a p value of 0.160255 therefore we cannot reject the Null hypothesis. Where R square value of 0.974% and Where Durbin-Watson value of 2.081110.

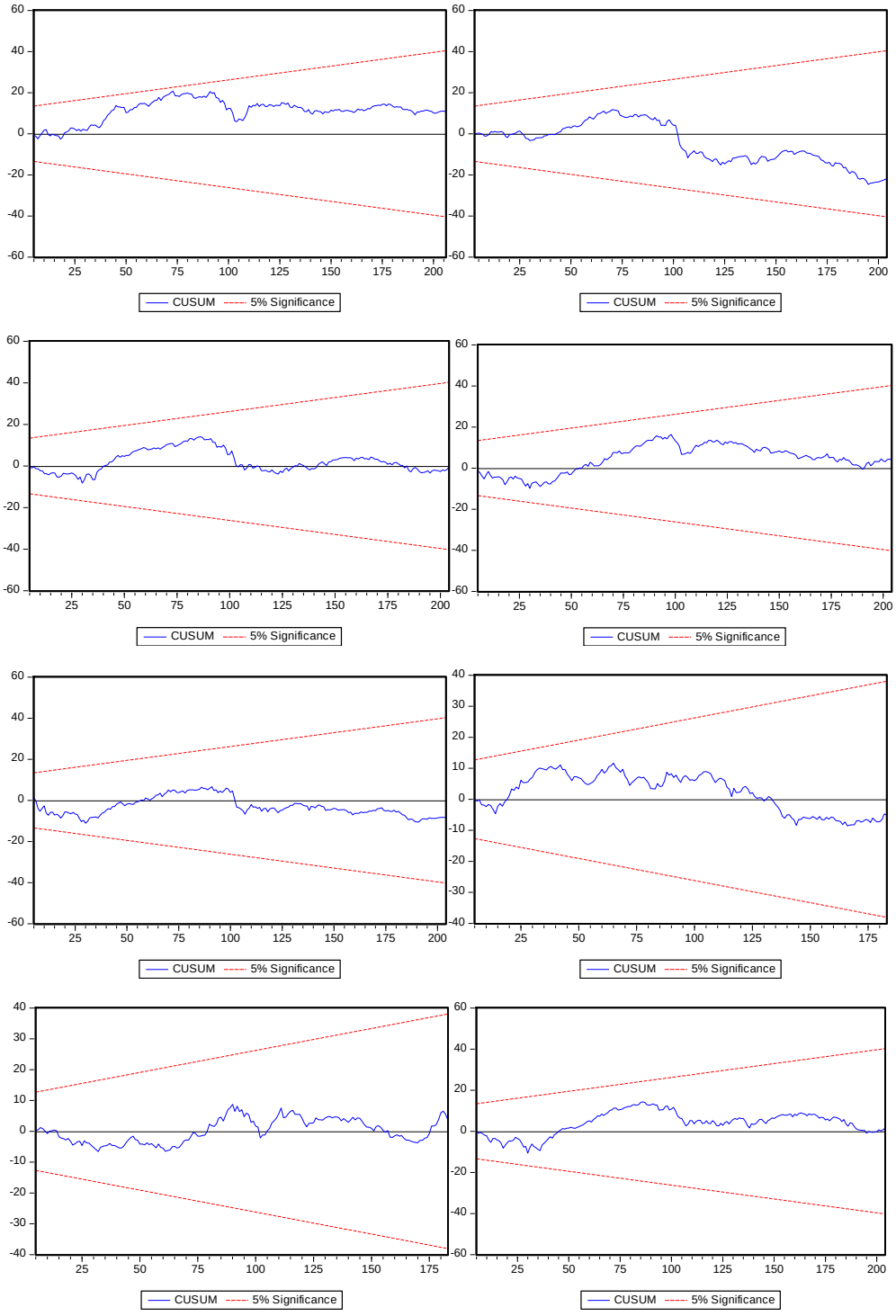
RESIDUAL DIAGNOSTICS

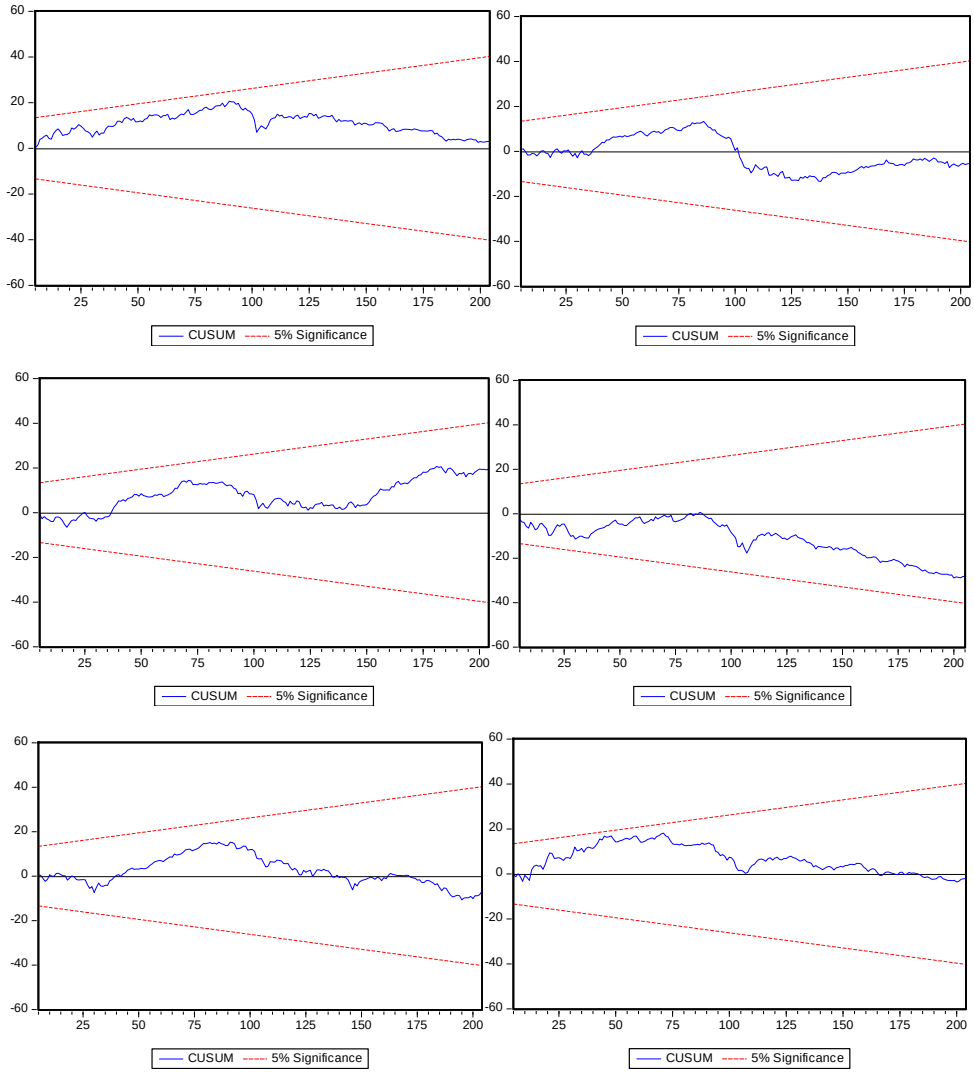
Table No 4.7

Breusch-Godfrey Serial Correlation LM Test				**Heteroskedasticity Test: Breusch-Pagan-Godfrey**			
F-statistic	Prob. F	Obs*R-Sq	Prob.	F-statistic	Prob. F	Obs*R-square	Prob.
0.195741	0.8224	0.400485	0.8185	0.143455	0.8664	0.290759	0.8647
0.282054	0.7545	0.576710	0.7495	0.243461	0.6694	0.340369	0.7664
1.505278	0.2245	3.040352	0.2187	1.163613	0.3717	2.241414	0.3116
1.083646	0.3404	2.197964	0.3332	2.076946	0.1280	4.130413	0.1268
0.800580	0.4505	1.628424	0.4430	1.066603	0.3464	2.143413	0.3424
0.998833	0.3704	2.031174	0.3622	0.241454	0.7163	0.391219	0.7131
1.409628	0.2470	2.853446	0.2401	2.790496	0.0641	5.502953	0.0638
0.829119	0.4379	1.685993	0.4304	0.797145	0.3913	1.557191	0.5816
0.580782	0.5604	1.183951	0.5532	1.897523	0.0719	5.039181	0.0719
0.686938	0.5043	1.398863	0.4969	0.815838	0.4437	1.642749	0.4398
0.545497	0.5804	1.112414	0.5734	0.899631	0.43180	4.113811	0.4051
0.832315	0.4365	1.692300	0.4291	0.732326	0.4171	1.793310	0.3962
1.650056	0.1947	3.327981	0.1894	1.553021	0.1743	3.417582	0.1793
0.270908	0.7630	0.553982	0.7581	0.371901	0.7210	0.573081	0.7234

In order to investigate the existence of serial correlation in the time series data, B-G Serial correlation LM test has been conducted. It is evident from the above table that the there is no serial correlation in the time series data. In the second phase, we conducted Breusch-Pagan-Godfrey heteroskedasticity test It is evident from the above table that there is no Heteroskedasticity in the time series data.

Exhibit 4.1
CUSUM test





CUSUM test is based on the cumulative sum of the equation errors in regression. Views graphically represents the cumulative sum of errors together with critical lines of 5%. The equation parameters are not treated stable if the whole sum of recursive errors goes beyond the two critical bands. It is evident from the above Exhibit 1 that the stability of the regression model was good.

TABLE No. 4.8
JOHANSEN COINTEGRATION TEST (SENSEX)

India				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.141878	33.70920	15.49471	0.0000
At most 1	0.014591	2.954346	3.841466	0.0856
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.141878	30.75486	14.26460	0.0001
At most 1	0.014591	2.954346	3.841466	0.0856
Normalized cointegrating coefficients				
Coefficient	-0.000133		Standard Error	(0.00205)

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level * denotes rejection of the hypothesis at the 0.05 level

Analysis: In the last phase we conducted Johansen Cointegration test to identify any possible equilibrium between inflation and Index return (India). The above table No.4.8 presents the results for trace test and maximum Eigenvalue test. Trace statistics states that there is at least one co integrated equation or the variables were co integrated. Maximum eigenvalue test results indicate at most one co integrated equation or the variables were co integrated. The test results indicate that the monthly data chosen for the purpose of the study there exists a long term association between inflation rate and stock returns.The results indicates that there is a co integration between the two variables – meaning that there is one error term in the model. Both Trace and Max Eigen value are telling that there is a long run association ship.
Now we can run the VECM because the variables are cointegrated.

Table No 4.9
Table showing Error Correction Model

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.859270	0.153505	-5.597648	0.0000
C(2)	-0.053169	0.142947	-0.371952	0.7103
C(3)	-0.063038	0.132533	-0.475641	0.6349
C(4)	0.022921	0.117209	0.195560	0.8452
C(5)	0.096955	0.097590	0.993488	0.3217
C(6)	0.061986	0.071539	0.866462	0.3873
C(7)	-0.004540	0.006015	-0.754750	0.4513
C(8)	-0.007654	0.006042	-1.266779	0.2068
C(9)	0.006237	0.006092	1.023817	0.3072
C(10)	0.002351	0.006057	0.388067	0.6984
C(11)	-0.005729	0.005430	-1.055065	0.2927
C(12)	0.000501	0.004753	0.105328	0.9162

C(1) is the residual of the 1 period lag residual of the cointegrating vector between Inflation and Index returns that means between the Index returns (dependent) and inflation is the independent variable. In this case, the C (1) is negative and p value is also significant. Error correction term is significant and sign is minus it means that Inflation has a long run causality from inflation to index returns.
In order to assess the short run relationship or the short run causality from inflation to index returns. For this purpose we have used the chi square value of Wald statistics to check the short run causality here inflation

Table 4. 10
Wald Test

Test Statistic	Value	df	Probability
F-statistic	0.946630	(5, 188)	0.4521
Chi-square	4.733149	5	0.4493

It is evident from the above table that there is no short rum causality model from inflation to index returns.
Conclusion: There is a long run causality model from Inflation to index returns, however, there is no short run causality Inflation to index returns based on Wald statistics.

Model specification

Table No. 4.11
1. Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.629303	Prob. F(2,186)	0.5341
Obs*R-squared	1.344244	Prob. Chi-Square(2)	0.5106

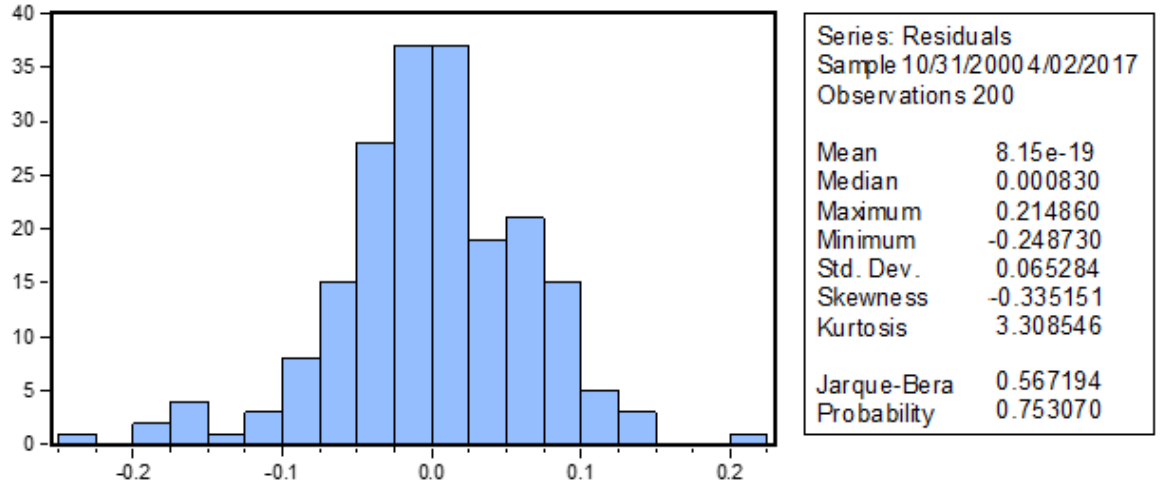
In order to investigate the serial correlation in the constructed model, B-G Serial correlation LM test has been conducted with the following hypothesis $H_{0:}\ \rho = 0$. It is clear from the above table that there is no serial correlation in the constructed model.

Table No. 4.12
Heteroskedasticity Test: ARCH

F-statistic	0.209272	Prob. F(2,195)	0.8114
Obs*R-squared	0.424072	Prob. Chi-Square(2)	0.8089

One of the major assumption of time series distribution is that there is heteroskedasticity in the data. It means that if the variance of e_i is same for all the data points in the time series data then it is said to be Homoskedastic distribution. Therefore, we have conducted Breusch-Pagan-Godfrey test for the existence of heteroskedasticity in the distribution. It is clear from the above table that there is no heteroskedasticity in the computed model.

Table No. 4.13
3. NORMALITY TEST



In order to investigate the normality of the distribution Jarque-Bera test for normality has been conducted. It is evident from the above table that the data is normally distributed.

V. DISCUSSION AND CONCLUSION

The current paper entitled "relationship between inflation and stock market evidence from selected global stock markets" have been undertaken with an intention to investigate the relationship between inflation and stock returns of the chosen economies. In order to realise the stated objectives the researchers have collected the monthly data from 1.3.2000 to 31-03-2017. In the first phase we conducted ADF test to investigate the existence of unit root in the distribution. In the second phase we ran Pearson correlation coefficient for the collected data to find out the association between the inflation and stock returns. We found a significant relationship between inflation and stock returns for Austrian index (ATX), Belgium Index (BEL20), Canadian Index (GSPTSE), Chile Index (IPSA), Chinese Index (SSEC), France Index (FTHI), Indonesian Index (JKSE) and Japanese Index (Nikkei) with negative relationship. However, for Ireland (ISEQ), Mexico (MXX), Spain (IBEX) and Turkey (XU100.ES) we found a negative correlation coefficient without any statistically significant relationship. For Brazilian Index (Bo Vespa) we found a positive correlation coefficient and statically insignificant relationship. In the next phase we ran linear regression and found the following findings: For Austria, inflation was statistically significant at one percent with negative coefficient. For Belgium we found a negative coefficient and it was statistically significant at one percent level. However, Brazil had a positive coefficient with the dependent variable and Inflation was statistically not significant. For Canada the predictor was sharing negative coefficient and was statistically significant at one percent level. For Chile Inflation shares negative coefficient and was statistically significant at five percent. In China the predictor has shared a negative coefficient and was statistically significant at one percent level. However, France the predictor shared a negative coefficient with the dependent variable (stock returns). Inflation was statistically significant at five percent level. In Indonesian economy the independent variable (Inflation) shared positive coefficient with the dependent variable. Inflation was statistically not significant at five percent level. For Ireland the Inflation shared a negative coefficient with the dependent variable and it was statistically significant at five percent level. In Japanese economy the independent variable had a positive coefficient with the dependent variable however, Inflation is statistically not significant at conventional level. Mexico has reported a positive coefficient and was statistically not significant whereas, we found a positive coefficient in Spanish economy and it was statistically not significant. For Turkey, we found a positive coefficient with the dependent variable and it was not statistically not significant at

conventional level. For Indian benchmark index, we found a long run causality model from Inflation to index returns, however, there is no short run causality Inflation to index returns based on Wald statistics.

History has demonstrated that high inflation can affect the economy in so many ways for example, it erodes the purchasing power of currency. It discourages investment, reduces the value of savings, high inflation leads to fall in real wages. It affects all the segments of the nation. Our results are in line with the literature for example, Zhao (1999); Bethlehem (1972); Bakshi and Chen (1996); Spyrou (2001); Rao and Bhole (1990) etc.

Current study clearly throws light on the effect of inflation on the stock market returns therefore, it can help the market participants such as traders, fund managers, financial market regulators and investors to make good portfolio decisions based on the information about expected inflation and unexpected inflation. The study confirms that there exists an inverse relationship between the stock market returns and inflation firms can take this one has a clue to adjust their reported profits by raising the prices.

Even the policy makers can also take the current findings has a clue to frame prudent monetary policies to regulate the inflationary trends in the economy. It is suggested to the policy makers to have a contractionary policy to reduce the supply of money by offering low interest rate on t bills, increasing the interest rates (bank rate policy) and increasing the cash reserve ratios which in turn reduces the lending capacity of the banks. In the process, it freezes the further acceleration in prices to the extent it is created by banks credit to the public. From the above policy, one can effectively control the inflation. For any economy this is vital because, reducing spending is during inflationary trends regulates the rate of inflation.

As for as economics is concerned, inflation is an outcome of mismatch in demand and supply sides meaning that failure of aggregate supply to match the escalation in aggregate demand. Therefore, inflation can be regulated by increasing the supply of necessary goods and services. Most of the time the monetary policy of the state alone, may not be effective in regulating inflation, for example if it is due to cost-push factors. In general monetary policy can check the inflation due to demand-pull factors. The economists suggest that a nation can achieve higher growth by regulating the rate of inflation and raising public investment. To achieve the growth and maintain lower inflation, the state needs to control budget deficits.

Yet another important measure to regulate inflation is currency demonetisation especially higher denominations. This is a very effective measure only when there is myriad of black money in the economy. Monetary policy alone is inadequate of regulating inflation. It should, therefore, be strengthened by proactive fiscal policy. In this case inflation can be regulated by controlling the unnecessary government and public expenditure. This can be achieved through, effective taxing policy by providing incentive to those who save and penalising the evaders by imposing fines. In the background of the current empirical study, the statistical relationship between the rate of inflation and its impact on stock market depending on the nation's monetary and fiscal policy, the methodology and the basket of commodities and services used and the period of study among other factors. The findings of the study confirms the theory that inflation in an economy has a negative impact on the performance of stock market. Through, effective monetary and fiscal policies the government can check the rate of inflation and thus creating investors' confidence in the capital market. Further, there is a great need to identify factors such as growth rate, GDP, inflation, interest rate, oil shocks etc. that have significant effect on stock market performance. This will facilitate investors and capital market regulators to make rational decisions.

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