

CHAPTER-2

Review of Literature, Scope and Plan of the Study

CHAPTER-2

2.1 Review of Literature:

The relationship between stock prices and macroeconomic variables has been a widely debated topic for academic researchers and practitioners for the last few decades. In the initial phase of research on the issue, the literature is overwhelmingly consists of studies involving developed economies rather than developing and underdeveloped economies. More specifically, most of the related researches attempted to address the empirical link between the stock market and the real economy measured either by gross domestic production(GDP) proxied by industrial production along with some macroeconomic variables considering only the US economy or a group of several high-income economies (Chen et al. 1986; Cheng, 1995; Fama, 1981; Geske and Roll, 1983; Hamao, 1988; Lee, 1992; Maysami and Koh, 2000; Maysami et al. 2004; Mukherjee and Naka, 1995; Poon and Taylor, 1991; Ta and Teo, 1985; Abdullah and Hayworth, 1993; Schwert, 1990; Aspren, 1989; Binswanger, 2001; Cheung and Ng, 1998; Choi et al. 1999; El-Wassal, 2005; Lin et al. 2007; Peiro, 1996; Siliverstovs and Doung, 2006; Wasserfallen, 1989). Gradually attention of the scholars is now found to be increasingly shifting towards emerging economies; the economies which are, in general, identified as being completely or at least partially segmented from global economies (Bilson et al. 1999; Hussain and Mahmood, 2001; Bhattacharya and Mukherjee, 2003; Ray, 2007; Barnor, 2014; Talla, 2013; Bernardelli and Castro, 2020).

Chen, Roll and Ross (1986) investigated the existence of long run relationship among equity prices and industrial production, inflation, risk premium, market return, oil prices, term structure and consumption for US; the researchers found that industrial production, risk premium, yield curve, and unanticipated inflation can explain expected returns during periods

of high volatility. Chan, Chen and Hsieh (1985), Burnmeister and Wall (1986), Beenstock and Chan (1988), Chang and Pinegar (1990), Kryzanowski and Zhang (1992), Chen and Jordan (1993), Sauer (1994), Rahman, Coggin and Lee (1998) also explored the relationship among industrial production and equity market returns and found mixed results.

Kaul (1990) studied the relationship according to the “proxy hypothesis” of Fama (1981) and found that expected inflation is negatively correlated with anticipated real economic activity, which in turn is positively related to returns on the stock market. Campbell (1987) considered the relationship between the yield spread and stock market returns. He argued that the same variables that used to predict excess returns in the term structure can also predict excess stock returns and suggested that a simultaneous analysis of the returns on bills, bonds and stock should be beneficial. His results support the effectiveness of the term structure of interest rates in predicting excess returns on the U.S. stock market.

Mukherjee and Naka (1995) applied Johansen’s (1988) vector error correction model to analyze the relationship between the Japanese stock market and exchange rate, inflation, money supply, real economic activity, long-term government bond rate, and call money rate. They concluded that a cointegration relation indeed existed and the stock price contributed to this relation. Maysami and Koh (2000) examined the relationship considering data from Singapore and found that inflation, money supply growth, changes in short and long-term interest rate and variations in exchange rate formed a cointegrating relation with changes in Singapore’s stock market levels. Islam and Watanapalachaikul (2005) found a strong and significant long-run relationship between stock prices and macroeconomic factors like, interest rate, bonds price, foreign exchange rate, price-earning ratio, market capitalisation and consumer price index during 1992-2001 in Thailand.

Zhou (1996) also studied the relationship between interest rates and US stock return using regression analysis over the period 1926-1994. He found that interest rates have an important impact on stock returns, especially in long-term investment horizons, but the hypothesis that expected stock returns move one-for-one with ex ante interest rates is rejected. In addition, his results showed that long-term interest rate explains a major part of the variation in price-dividend ratios. Besides, he suggests that the high volatility of the stock market is related to the high volatility of long-term bond yields and may be accounted for by changing forecasts of discount rates.

Paul and Mallik (2001) explored the long run relationship among macroeconomic factors and equity prices in Australian banking and finance sector by using quarterly data for the period 1980-98. Multivariate cointegration analysis is performed to investigate the causal and dynamic relationship among consumer price index, interest rates, and seasonally adjusted GDP and ASX including Banking and Finance Index by using autoregressive distributed lag (ARDL) model proposed by Pesaran and Shin (1995). The researchers reported that interest rate has a significant negative effect on equity prices and GDP growth has a significant positive effect on the equity prices of banking and finance sector. However, no significant effect of inflation is observed on equity prices.

Maysami and Sim (2001a, 2001b, 2002) employed Hendry's (1986) approach to analyze the influence of interest rates, inflation, money supply, exchange rate and real activity, along with a dummy variable to capture the impact of the 1997 Asian financial crisis. The results confirmed the influence of macroeconomic variables on the stock market indices in Hong Kong and Singapore, Malaysia and Thailand, Japan and South Korea, though the type and magnitude of the associations differed depending on the country's financial structure.

Hussain and Mahmood (2001) analyzed the causal relationship between stock prices and macro variables like consumption expenditure, investment spending, and economic activity (measured by GDP) in Pakistan. Using annual data from 1959-60 to 1998-99 and applying cointegration and error correction analysis, the paper indicated the presence of long-run relationship between stock prices and macro variables. Regarding the cause and effect relationship, the analysis indicated a one-way causation from macro variables to stock prices, implying that in Pakistan fluctuations in macro variables cause changes in stock prices. The findings also suggest that the stock market in Pakistan is not developed enough to play its due role in influencing aggregate demand. A disturbing feature of the stock market in Pakistan is that it cannot be characterized as the leading indicator of economic activity. In the absence of other strong indicators, shooting up of stock prices may indicate a speculative bubble. Hussain (2006) again examined the relationship to investigate the stochastic properties of the variables by considering the shifts as a result of economic liberalization and found unidirectional causality between the real sector and equity prices. No significant change in patterns is observed.

Arango et al. (2002) found that some evidence of the nonlinear and inverse relationship between the share prices on the Bogota stock market and the interest rate measured as the interbank loan interest rate, which is to some extent affected by monetary policy. The model captures the stylized fact on this market of high dependence of returns in short periods. These findings do not support any efficiency on the main stock market in Colombia.

Maysami et al. (2004) examined the long run relationship among macroeconomic variables and STI and sectorial indices like the property index, finance index and the hotel index and found that STI and the property index have long term relationship with industrial production, inflation, exchange rate, changes in the short and long-term interest rates and money supply. Theoretical and empirical research on relationship between inflation and equity prices

showed mixed results. Literature supports the evidence of positive relationship between nominal stock returns and inflation over the long horizons. Kessal (1956) posited that unexpected inflation increases the firm's equity value if the firm is net debtor. Some more studies that found positive relationship between inflation and equity prices include Firth (1979), Gultekin and Gultekin (1983), Boudoukh and Richardson (1993). The neo-liberalists suggest that there exist a positive relationship between interest rate and the rate of equity return. But empirical literature also offers evidence about existence of negative relationship between nominal equity prices and inflation in long run. Fama (1981) found that there is negative association between equity market returns and inflation. Spyrou (2001) found evidence about presence of negative correlation between equity market returns and the inflation in Greece for the period 1990 -1995. Similarly, some studies established mixed results about the relationship between stock market returns and inflation. Amidhud (1996) reported the presence of negative correlations between equity prices and inflation in short run which is followed by positive association in the long run.

Bhattacharya and Mukherjee (2003) investigated the nature of the causal relationship between stock prices and macroeconomic aggregates of the foreign sector in India. Using monthly data for the period 1990-91 to 2000-01, they suggested that demand for money affects interest rate.

Hsing (2004) adopted a structural VAR model that allows for the simultaneous determination of several endogenous variables such as, output, real interest rate, exchange rate, the stock market index and found that in Brazil there is an inverse relationship between stock prices and interest rate.

Doong et al. (2005) investigated the dynamic relationship between stocks and exchange rates for six Asian countries (Indonesia, Malaysia, Philippines, South Korea, Thailand, and

Taiwan) over the period 1989-2003. According to their study, these financial variables are not cointegrated. The result of Granger causality test showed that bidirectional causality can be detected in Indonesia, Korea, Malaysia, and Thailand. Also, there was a significantly negative relation between the stock returns and the contemporaneous change in the exchange rates for all countries except Thailand.

Wong, Khan and Du (2005) examined the long- run equilibrium relationships between the major stock indices of Singapore and the United States and selected macroeconomic variables by means of time series data for the period January 1982 to December 2002. The results of various cointegration tests suggested that Singapore's stock prices generally display a long-run equilibrium relationship with interest rate and narrow money supply (M1) but the same was not valid good for the United States. To capture the short-run dynamics of the evolving relationship between stock indices and macroeconomic variables, the researchers have applied the same methodology for different subsets of data covering shorter time periods. They observed that before the Asian Crisis of 1997, stock markets in Singapore moved in tandem with interest rate and money supply, but this pattern was not observed after the crisis. In the United States, stock prices were strongly cointegrated with macroeconomic variables before the 1987 equity crisis but the relationship was impaired thereafter and eventually disappeared with the onset of 1997 Asian Crisis. Finally, the results of Granger causality tests uncovered some systematic causal relationships implying that stock market performance might be a good gauge for Central Bank's monetary policy adjustment.

Jain and Bhanumurthy (2005) examined the issue of integration of financial markets in India in the post-1991 period by using monthly data on call money rates, 91 day Treasury Bill rates, Indian Rupee/US dollar exchange rates, and the London Inter Bank Offered Rate (LIBOR).The study found that there was a strong integration of the domestic call money market with the LIBOR and a long-term co-movement, although not robust, between

domestic foreign exchange market and LIBOR. They suggested that, more policy measures are necessary to increase integration of financial markets which would help in reducing the arbitrage advantage in some specific segment of the Indian financial markets. Rowe et al.,(1986),studied the term structure of the interest rates based on the expectation theory and found positive and statistically significant relation amongst T-Bills yields, CD, CP and Call rates(represented by LIBOR).

Singh (2005) tried to examine the effect of significant macroeconomic variables; inflation and exchange rate on the inflows of Foreign Institutional Investment in India. The author had tried to develop a theoretical framework to analyze the inter-relation between Foreign Institutional Investment, inflation and exchange rate. He found significant impact of the huge volume of capital flows on domestic financial markets; and suggested that clear understanding of the determinants of these flows becomes imperative as the economy moves towards full capital account convertibility.

Ologunde, Elumilade and Asaolu (2006) examined the relationships between stock market capitalization rate and interest rate in Nigeria. Time series data obtained from Central Bank of Nigeria (CBN) and Nigeria Stock Exchange (NSE) were analyzed using regression. Results showed that the prevailing interest rate exerted positive influence on stock market capitalization rate. Government development stock rate exerted negative influence on stock market capitalization rate and prevailing interest rate exerts negative influence on government development stock rate. They recommended that the operators of the Nigerian capital market should raise the level of awareness so that investors will be abreast with the happenings in the market.

Kurihara (2006) found that Japan stock market capitalization rate was significantly influenced by the macroeconomic environment factors such as gross domestic product, exchange rates, interest rates, current account and money supply.

Akmal (2007) investigated the relationship between stock returns and inflation for the Pakistani equity market for the period 1971-2006 by employing autoregressive distribution lag approach. Findings of study indicated that stocks were hedges against inflationary pressures (inflation) in long run and the relationship was statistically significant at $\alpha=0.10$. Chan, Chen and Hsieh (1985), Chen, Roll and Ross (1986), Burnmeister and Wall (1986), Burmeister and MacElroy (1988), Chang and Pinegar (1990), Defina (1991) Kryzanowski and Zhang (1992), Chen and Jordan (1993), Sauer(1994), Rahman, Coggin and Lee (1998) also explored the relationship among inflation and equity market returns. Similarly, Beenstock and Chan (1988), Sauer (1994) explored the relationship among money supply and equity market returns and found no significant different relationship.

Ray (2007) assessed the relationship between index of industrial production (IIP), whole sale price index (WPI), money supply (M3), yields on 91-days treasury bills (YTB) and yields on long-term (10-years) government bonds (YLGB) and the stock exchange index (Index) of India. He also used Granger-Causality Test to assess the predictive causalty of the variables. Ray concluded that only the growth in the Index of Industrial Production maintained a weak but statistically significant and positive relationship with the aggregate stock market return when considered individually as well as jointly with the other variables. The other macroeconomic variables considered in the study have little or no impact on stock market activities in India. The causality ran from aggregate stock market return to growth in Index of Industrial Production. He precisely indicated that the stock market influenced growth in Indian industrial activities and the sustained growth of capital market can only ensure faster growth of industrial economy of India.

Hasan and Nasir (2008) examined the relationship among the inflation, industrial production, oil prices, short term interest rate, exchange rates, foreign portfolio investment, money supply and equity prices of Pakistan for the period 6/98 to 6/2008 by the employing bounds testing procedure proposed by Pesaran et al. (2001). Autoregressive distributed lag approach has been applied as yields consistent estimates of the long-run coefficients that are asymptotically normal irrespective of whether the underlying regressors are $I(0)$ or $I(1)$. Data has been tested to examine econometric problems like serial correlation, functional form, normality, heteroscedasticity and unit root by using LM test, Ramsey Reset test, skewness and kurtosis test, white test and ADF Test and Phillip Parren Test respectively but no potential econometric problem has been observed. Results revealed that Industrial production, oil prices and inflation were not statistically significant in determining equity prices in long run while interest rates, exchange rates and money supply had significant long run effect on equity prices. The error correction model based upon ARDL approach captured the short term dynamics of prices and confirmed that changes in industrial production, oil prices and inflation are not statistically significantly in short run while changes in interest rates, exchange rates, and money supply have significant short term effect. However, foreign portfolio investment had significant short term effect and no long term effect in long horizon. ECM term suggested that adjustment process was quite fast. Results of CUSUM and CUSUMSQ tests were well within the critical bounds of 5%. The study facilitated the investors in taking effective investment decisions as by estimating the expected trends in exchange rates, money supply and interest they can estimate the future direction of equity prices and can allocate their resources more efficiently. Similarly, they advised architects of monetary policy should be careful in revision of interest rates as stock market responds negatively to such decisions. Similarly, bank should also consider the impact of money supply on stock market as it has a significant relationship with the dynamics of equity returns.

Efficient market hypothesis provides that capital markets respond to arrival of new information so macroeconomic policies should be designed keeping in view the response of the capital market.

Kazi (2008) recognized that intuitively a clear understanding about security market pricing procedures from both long and short-run viewpoints are important to an astute investor. An attempt was made by him to identify the efficient method of empirical study in asset pricing which are relevant under the integrated global market system. Accordingly, he has briefly reviewed recent studies in asset pricing that are particularly important from a security market standpoint under the prevailing global economic and financial market system. His survey concluded that one can efficiently analyze the long-run relationship between apriori variables that are considered as a proxy for systematic risk factors and security market prices from the perspective of any nation within the globe by the cointegration analysis.

Pilinkus (2009) analyzed relationships between a group of macroeconomic variables and the Lithuanian stock market index, i.e. OMX Vilnius index. The objective was to investigate whether stock prices serve as a leading indicator for macroeconomic variables within the Lithuanian economy or a group of macroeconomic variables serve as a leading indicator for stock returns in Lithuania. Granger causality tests was employed to estimate the relationship between the OMXV index and 40 macroeconomic variables depicting the health of Lithuanian economy from December 1999 to March 2008. The research revealed that some macroeconomic variables (e.g., GDP deflator, net export, foreign direct investment, etc.) led Lithuanian stock market returns, some macroeconomic variables (e.g., GDP, material investment, construction volume index, etc.) are led by the OMXV index and, finally, some macroeconomic indices (e.g., money supply, payment balance, etc.) and the stock market returns Granger-cause each other.

Aydemir and Demirhan (2009) studied the causal relationship between stock prices and exchange rates in Turkey, using data from 23 February 2001 to 11 January 2008. Their empirical research found bidirectional causal relationship between exchange rate and all stock market indices. While the negative causality exists from national 100 services, financial and industrial indices to exchange rate. There existed a positive causal relationship from technology sector indices to exchange rate. On the other hand, negative causal relationship from exchange rate to all stock market indices was also found.

Khrawish, H. A., Siam, W. Z. and Jaradat, M. (2010) examined the effect of interest rates on the stock market capitalization rate in Amman Stock Exchange (ASE) over the period 1999-2008. Based on the multiple linear regression model and simple regression model, the time series analysis revealed that there was a significant and positive relationship between government prevailing interest rate and stock market capitalization rate. The study showed that Government development stock rate exerted negative influence on stock market capitalization rate. They found a significant negative relationship between government prevailing interest rate and Government development stock rate. Finally, the study stressed upon the importance of government intervention to encourage investment in ASE by reducing rate of personal taxation thus granting incentive for creation of wealth; controlling interest rate so as to aid the growth of the stock market and improving the regulatory environment and decreasing red tape.

Chakraborty, L. S. (2012) examined whether there were any evidence of fiscal deficit determining interest rate in India, by using the high frequency macro data of financially deregulated regime from the period of 2006-07 to 2011. Quite contrary to the debates in the policy circles, using the asymmetric vector autoregressive model, the author found that increase in fiscal deficit does not cause the rise in interest rates. The long-term and short-term

interest rates were studied to determine the occurrence of financial crowding out, but fiscal deficit did not appear to be causing both short and long term rates.

Makan et al. (2012) performed necessary analyses to answer the research question of whether some of the identified macroeconomic factors can influence the Indian stock market. The macroeconomic variables considered by the authors viz., the industrial production index, consumer price index, interest rate (call rate), exchange rate, gold price, oil price, foreign institutional investment. Indian stock market was represented by BSE SENSEX. The paper also performed sectoral analysis of five sectors (metal, auto, capital goods, FMCG, consumer durables). Monthly data for a time span of 7 years (from April 2005 – March 2012) was considered. The paper employed Granger causality test, regression analysis and correlation analysis to examine such relationships. The results were interesting and useful in understanding the Indian stock market pricing mechanism as well as its return generating process. On the basis of overall analysis and sectoral analysis they concluded that three out of seven variables were relatively more significant and likely to influence the Indian stock market. The variables were exchange rate, foreign institutional investment and call rate. A positive relation between FII and Sensex, call rate and Sensex were reported whereas exchange rate and Sensex showed a negative relation. The result had been concluded on the basis of the granger causality test in which call rate had been seen as affecting BSE in almost all the sectors (except FMCG sector) and regression analysis in which exchange rate and FII were affecting all the sectors. Then resultant conclusion was that in long term the Indian stock market would be more driven by domestic macroeconomic factors rather than global factors.

Paramati and Gupta (2013) investigated the relationship between call money rates, exchange rates and stock returns of India using monthly data for the time span of April 1992 to March 2011. The variables under their consideration were call money rates (monthly weighted

average), exchange rates (monthly US Dollar average against Indian rupee) and monthly closing price indices of BSE SENSEX 30 and NSE-S&P CNX Nifty. They reported that call money rates were $I(0)$ and exchange rates and the stock returns were $I(1)$ at log-level. Results from Granger causality test evidenced bidirectional relationship between call money rates and exchange rates and virtually no causation at less than five percent level of significance. To explore lead-lag interaction among the variables, VAR model was used and the results suggested no evidence of lead-lag causation from stock returns to call money and exchange rates.

Talla T. Joseph (2013) made an investigation to study the impact of changes in selected macroeconomic variables on stock prices of the Stockholm Stock Exchange (OMXS30). The time period examined was 1993-2012 and all the tests were conducted based on monthly data. Based on estimated regression coefficients and t-statistics, it was found that inflation and currency depreciation had a significant negative influence on stock prices. In addition, interest rate was negatively related to stock price change, but was not significant in the model. On the other hand, money supply was positively associated to stock prices although not significant. No unidirectional Granger Causality was found between stock prices and all the predictor variables under study except one unidirectional causal relation from stock prices to inflation.

Barnor (2014), found variations in macroeconomic variables affect the performance of the stock markets in Ghana. Data was collected from the Bank of Ghana bulletins, the Ghana Statistical Service website, and the GSE website. Time-series analysis was used to determine whether there was a statistically significant relationship between stock market returns and inflation rate, exchange rate, interest rate, and money supply. The findings revealed that interest rates and money supply had a significant inverse impact on stock market returns and exchange rates had a significant positive effect on stock market returns. Moreover, inflation

rate, with positive relation with stock market had not significantly affected stock market returns in Ghana. The author hoped that more knowledge about the effects of macroeconomic variables on stock returns could guide policy makers and household agents to improve investment decisions and thus increase the net worth of the economic agents.

In the context of China, Yu and Liao (2017), attempted to measure the mean spill over effect and volatility spill over effect using daily data for the period June, 2000 to December 2016, taking stock, money (represented by call rates) and foreign exchange market. They used VAR (7)-GARCH (1,1)- BEKK model. The results of the mean spill over test show yields of foreign exchange market influenced the stock prices but stock market had no influence on foreign exchange market and asymmetrical bidirectional mean spill over between stock and money market and money and foreign exchange market. The results of the volatility spillover tests showed bidirectional spill over of the volatility from foreign exchange market to money market and unidirectional from stock market to money market and money market to foreign exchange market .

Abbas et al. (2017) examined the relationship between stock market (KSE-100), money market (M2 and 180 days T-bill rate), and foreign exchange market (ER: PKR/USD) in Pakistan. They used monthly data covering the period from 2000:M1 to 2015:M12. The study investigated long-run equilibrium relationship among three financial markets by Johansen and Juselius cointegration tests, Granger causality in vector error correction model (VECM) framework and pair wise Granger causality tests. They found all the variables under their study were I(1), one cointegrating relation in trace test and no integration in lamda –max test. They claimed long-term significant relationship was present among stock market, money market and foreign exchange market and no significant relation in the two sub-periods studied. They also reported positive relation between stock and money market and negative relation between stock and treasury bills and exchange rates. It is very interesting to note that

they found positive relation with one component of the money market and negative in another. In pair wise causality , they found unidirectional causality flows from treasury bills to stock and money supply, foreign exchange to money supply and treasury bills and no causal relation between stock and both the and money supply and foreign exchange. In VECM set up, causality flows from treasury bills, money supply and foreign exchange to stock market. The results are puzzling. According to the CUSUM test, they found no structural break in their system studied. The major problems with their paper are, (i) lack of clarity in the selection of the optimum lag order (ii) significance of the variables in the cointegrating space, (iii) non-reporting or estimating the impulse response analysis to attest the results of granger causality test quantitatively, and variance decomposition analysis to assess the future flexibility and integration among markets.

Machado et al. (2017), examined the relationship between index of Brazilian Stock Exchange i.e, Ibovespa and interest, exchange rate, long term economic activity, money supply and imports. They used monthly data from the period January, 1999 to June, 2017 and used Marcov-Switching model. The researchers found that the interest rate and exchange rate were positively related with the stock market index and no significant relation between Ibovespa and inflation.

Noriller, and Silva,(2019), assessed the Impact Of Macroeconomic Variables on The Components Of Financial Statements of Latin American Public Companies and found positive relation between stock and foreign exchange rate.

Keswani, and Wadhwa (2019), while evaluating the Impact of Macroeconomic Variable on Indian Stock Market, reported negative relation between interest and stock market.

Gopinathan and Durai (2019), tried to extract new evidences from the Indian stock market and macroeconomic variables reported the evidence of nonlinearity in relationship which,

according to the authors, evidenced the presence of noise traders, arbitragers and speculators in the Indian market,

Bernardelli and Castro (2020) examined the relationship between the Brazilian stock market and Selic (that is, short run interest), exports, GDP, exchange as a percentage of GDP, index of Dow Jones for the period of January, 2003 to March, 2019. They had also used monthly data and according to the ADF and PP test ,they found Brazilian stock index Ibovespa GDP and exchange rate were $I(0)$ and , Dow Jones index were $I(1)$. They used OLS method and found negative relation between stock market and exchange rates and short run interests and positive relation with the GDP.

There are other schools of studies negating the existence of any significant relationships between stock market performance and macroeconomic variables (Culter et al. 1989; Martinez and Rubio, 1989; Gjerde and Saettem, 1999; Schwert, 1989; Fung and Lie, 1990; Richards, 1996; Allen and Jagtianti, 1997). Pearce (1983) noticed that the stock market previously generated ‘false signals’ about the economy and should not be relied on as an economic indicator. The stock market crash could be an example in which stock prices falsely predicted the direction of the economy instead of entering into a recession which many were expecting, the economy continued to grow for several years (Pearce, 1983).

2.2 Gap in the Literature and Scope of the study:

The link between the macroeconomic variables and stock market return is one of the most debated topics of economics and finance. At the early stage of the studies, most of the researchers attempted to estimate the relationship considering only the developed countries. Now, several scholars are attempting to study the direction of the link in the developed and developing/emerging countries. But the absence of convergence of opinions and observations relegates the topic to be open for further deliberations. Unfortunately, India, the most

promising and developing economy which attracts the attention of the investors across the world, has escaped the due and wide attention of the scholars. There are few studies based on Indian experiences but all the exercises are subject to criticism on the count that either the studies have relied on orthodox methodology, dealt with a short horizon, applied questionable methodology, not reported the status of the variables in the co-integration space, not quantitatively attested the Granger causal results by Innovation Accounting etc. Furthermore, fractured findings suggest that we have little or no information about the macroeconomic link to Indian stock market, especially across the regimes. Any objective answer about the form and direction of the link between stock market and fundamental macroeconomic factors is important in the sense that it may help to assess the level of efficiency of asset market, monitor and manage financial risk, price derivatives, find more exact solutions to the problems of optimal portfolio selection and develop a better understanding about the potential macroeconomic determinants of systematic financial risk for the benefit of the investors and policy makers. Hence, there is ample scope for further research to unveil the intricate relationship between the select macroeconomic variables and stock market covering both the pre and post liberalisation periods.

2.3 Objectives of the Study:

Several policy measures initiated by the Indian authorities attempted to transform the economy from an extremely shackled one to free economy and drastically reform the real and financial sector by integrating the segments of financial markets; especially the capital, money and foreign exchange market to usher a healthy growth and development. Unlike the only bank based controlled economy, in the ‘free regime’, Indian financial markets appeared as the major player of the Indian financial system along with the public and private sector

banks. All the development traits can be envisaged well by the macroeconomic variables and obviously by the indices of stock exchange. The specific objectives of the study are:

- i) To assess the relationship amongst the select macroeconomic variables and stock market, or, in other words, whether the select macroeconomic variables and stock market are cointegrated.
- ii) To assess the influence, if any, of the past values of the sample macroeconomic variables on the future values of stock market.
- iii) To assess the future flexibility of the sample Indian macroeconomic variables and stock market under the study.
- iv) To analyse the results of integration, if any, amongst the stock market and select macroeconomic variables in the pre-liberalization and post-liberalization period.

2.4 Research Questions:

According to the objectives of the research the present study attempts to find the answer to the following questions:

- i) Is there any link between stock market and select macro-economic variables in the Pre-liberalization period?
- ii) Is there any link between stock market and select macro-economic variables in the Post-liberalization period?
- iii) Is there any difference in the dynamic link amongst the stock market and select macro-variables in the pre-liberalization and post-liberalization period?

2.5 Hypotheses of this Study:

Hypotheses of this study are:

- (A) H_0 : Indian stock market and select macro-economic variables in the pre-liberalization period are not integrated.

- (B) H_0 : Indian stock market and select macro-economic variables in the post-liberalization period are not integrated.
- (C) H_0 : Past values of none of the select Indian macroeconomic variables under the study influence the future values of Indian stock market and vice versa.
- (D) H_0 : All the select Indian macroeconomic variables and Indian stock market would remain rigid over the future periods of time.
- (E) H_0 : The link and relation between select macroeconomic variables and stock market would remain unchanged across the regimes in India.

2.6 Data, Time Period and Methodology:

2.6.1 Data:

Primary focus of the present study is to evaluate the nature of the inter-linkage amongst select macroeconomic variables and stock market in India covering pre and post liberalisation periods. For our empirical investigation, we used secondary data and that are collected from the official publications and websites of the Reserve Bank of India, Bombay Stock Exchange, etc.

The variables selected under this study are, Index of Industrial Production(IIP), Whole Sale Price Index(WPI), Yields on 91-days Treasury Bills(YTB), Yields on Long-term (10-years) Government Bonds(YLGB) and rupee-dollar nominal rate (FX) to study the influence of macroeconomic variables on aggregate stock prices (BSE SENSEX 30, SNX) of India.

Out of the six variables, the data on IIP are published on monthly basis and so we have collected and used monthly data series for all the variables under this study from January, 1966 to December, 2019, at log level. Furthermore, the monthly data provides a short- run insight and at the same time captures more macro-economic relationship than daily data (Dimitrova, 2005).The normal econometric practice has been to take the first difference of

the level data of the series but the technique imposes too many unit roots which virtually filters out the important information regarding long term relationship between the variables (Eun and Shim, 1989). The magnitude of the fluctuations in the time series under this study appeared to go roughly linearly with the level of the series. Hence, to tackle the problems of seasonality and trend, we have taken log of the original series at level and transformed the series where trend and seasonality are eliminated without losing any further information (Brockwell and Davis, 2016).

2.6.2 Time Period:

We would study monthly data series for all the select variables from January, 1966 to December, 2019(approximately 54 years). The entire period is primarily subdivided in to two periods – i) pre liberalisation period and ii) post- liberalisation period. Again, the post liberalisation period is subdivided in to two periods. Exactly we assessed the relationship dividing the entire period into three sub-periods- i) from January, 1966 to April,1991 under the pre liberalisation period, ii)from December,1996 to November,2009 under post liberalisation period, and iii) from December, 2009 to December,2019 under post liberalisation period, on the basis of break point test suggested by Brown, Durbin and Evans (1975) , Quandt (1958,1960), Andrews (1993), Andrews and Ploberger(1994) and Bai and Perron(1998,2003)and economic intuition based on the economic history of India (see Chapter-1).

Economic policy measures implemented by the government are reflected by several macroeconomic variables which, in general, move very slowly and Indian economy is no exception. Scholars found that it takes at least three quarters to reflect the monetary policies (Joseph et al. 2009). According to Bai and Perron (1998), the tests for structural break help a lot to validate the economic event date. Thus, the study used structural break tests to identify the break dates, if any, along with the end point of the ‘control regime’, and, accordingly, sub

grouped the whole study period. It also helped the study to avoid spurious or misleading inferences due to the possible shifts in the parameters.

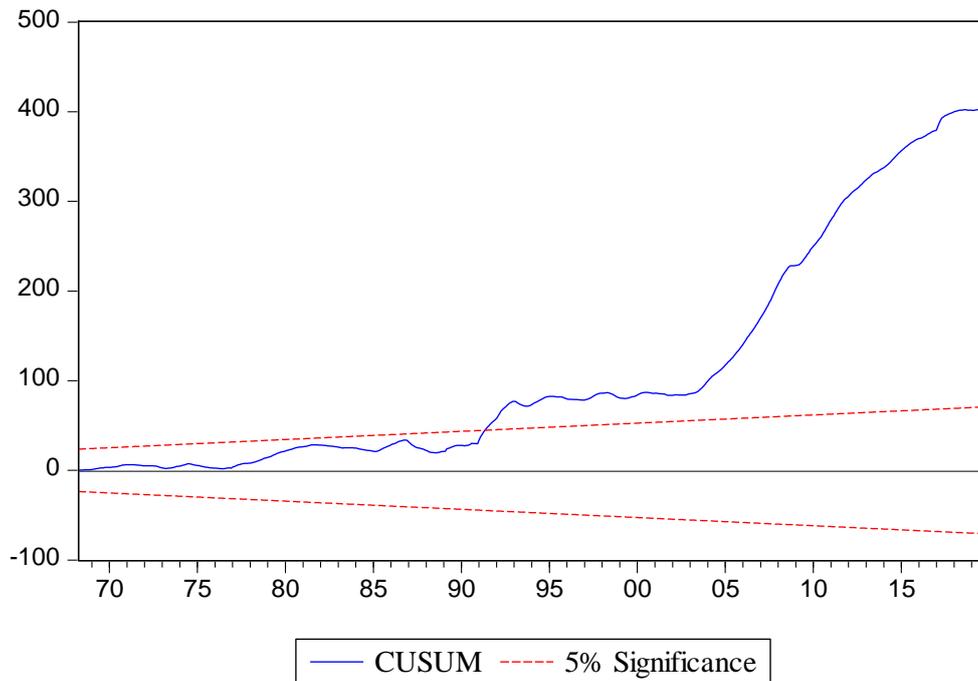
Structural breakpoints, if any, are searched by CUSUM test (Brown, Durbin and Evans, 1975) Quandt-Andrews tests (Quandt, 1958, 1960; Andrews, 1993; Andrews and Ploberger, 1994) and Bai- Perron test (1998, 2003). We, firstly, applied all the tests on the whole data set (1966 to 2019) with all the variables assuming a linear relationship among the variables. Results of the CUSUM (Figure 2.1), suggests the break date on April 1991, the time when India has experienced severe balance of payments crisis, devaluated their currency and has pledged 46.91 tonnes of gold with the Bank of England and the Bank of Japan to raise \$400 million, and approximately points to the end of control regime. Quandt-Andrews test (Table-2.1), points the break date on August, 2003 which is far behind beyond the date of implementation of the new economic policy and cannot be considered as a endpoint of pre liberalization era. Bai- Perron test (1998,2003) (Table-2.2), indicates January, 1987 and August, 2003 as the break dates when searched for two break points on the whole data. Scholars argue that in 1987 Indian economy was almost a 'closed' and at the same time a 'bank-based' one which helped the economy to evade the adverse impacts of the global crisis of 1987. Again, August, 2003 is not considered as it is far far beyond the date of implementation of the new economic policy.

Considering all the results and economic events, we selected the period January, 1966 to April, 1991 as the period to study the relationship between macroeconomic variables and stock market under pre-liberalisation period.

In our next step, we repeated process to search the structural stability of the residual period (May, 1991 to December, 2019). The results (Figure-2.2, Table-2.3 and Table-2.4) primarily point to two break dates, that is, November, 1995 and November, 2009. In the year 1995, several important events taken place in India, like, establishment of National Stock Exchange

(NSE), starting screen based trading in Bombay Stock Exchange, positive attempts to convert capital accounts fully, etc. Although, the process of financial reform in India has started from the early 1990's, the full-fledged reform, especially in the exchange market and related areas, has come to operate only after 1995 (Bhattacharyya and Mukherjee, 2003; Patnaik, 2004; Ray, 2008). The impact of the sub-prime crisis is felt by the Indian economy in the year 2009, real effective exchange rate had depreciated steeply during 2008-09 (Joseph et al. 2009). Result of the CUSUM test is not considered as the break period does not match with any known major economic events of India and the period is small (11-2009 to 05-2011) which can be ignored in further processing and analysis of the data in the study (Maddala and Kim, 2004). Some scholars even argue that ignoring rather than modelling small breaks may lead to more accurate forecasts (Stock and Watson, 1996; Pesran and Timmermann, 2005; Boot and Pick, 2017). Finally, the relationship between macroeconomic variables and stock market under post-liberalisation period is assessed by considering two periods spanning over December, 1995, to November, 2009 and December, 2009 to December, 2019, although, Bai and Perron (1998) suggested to study the recent period only.

Figure-2.1
Plots of the CUSUM Test
(Full Sample: 01/01/1966 to 01/12/2019)



Break Date: 1991/04

Table-2.1
Structural Stability Test for Break Point
(within 15% trimmed data, Quandt-Andrews Test,1994)

	Statistic	Value	Hansen'(1997) Probability
	Maximum LR F-statistic (01/08/2003)	213.6066	0.0000
Ma	Maximum Wald F-statistic (01/08/2003)	1281.639	0.0000
LR	Exp F-statistic	101.5739	0.0000
	Exp Wald F-statistic	634.7405	0.0000
LR	Ave F-statistic	44.43155	0.0000
	Ave Wald F-statistic	266.5893	0.0000

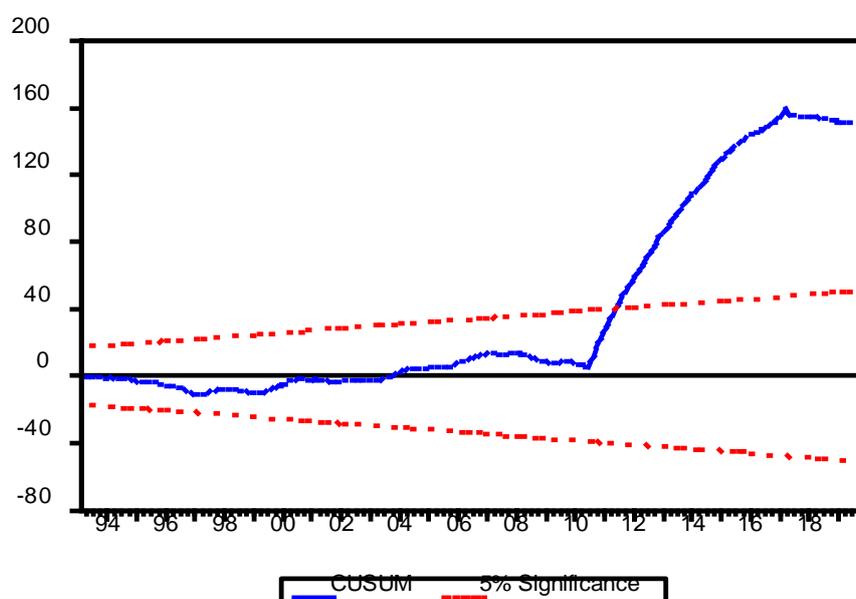
Table-2.2
Structural Stability Test for Break Point
(within 15% trimmed data ,Bai-Perron Test,2003)

Break Test	F-statistic	Scaled F-statistic	Bai-Perron (2303) Critical Value**
0 vs. 1 *	213.6066	1281.639	20.08
1 vs. 2 *	68.49186	410.9512	22.11

Note:

1. * Significant at the 0.05 level
2. Break dates: 01/1987 and 08/2003

Figure-2.2
Plots of the CUSUM Test
(Post-liberalisation Sample: 01/05/1991 to 01/12/2019)



Break date 05/2011

Table-2.3
Structural Stability Test for Break Point
(within 15% trimmed data ,Quandt-Andrews Test,1994)

Statistic		Value	Hansen's (197) Probability
Maximum LR F-statistic (01/11/2009)		592.0989	0.0000
Maximum Wald F-statistic (01/11/2009)		3552.593	0.0000
E	Exp LR F-statistic	291.5539	0.0000
Ex	Exp Wald F-statistic	1771.043	0.0000
LR	Ave F-statistic	181.6544	0.0000
Ave Wald F-statistic		1089.927	0.0000

Table-2.4
Structural Stability Test for Break Point
(within 15% trimmed data ,Bai-Perron Test,2003)

Break Test	F-statistic	Scaled F-statistic	Bai-Perron (2003) Critical Value**
0 vs. 1 *	592.0989	3552.593	20.08
1 vs. 2 *	17.62574	105.7545	22.11

Note:

1. * Significant at the 0.05 level.
2. Break dates: 11/1995 and 11/2009

2.6.3 Methodology:

For the empirical methodology, this study would follow the statistical and econometric tools that are widely used in the literature to estimate the relationships. The econometric techniques followed are detailed in Chapter-3.

2.7 Significance of the research:

Any objective answer about the form and direction of the link between stock market and fundamental macroeconomic factors across regimes is important in the sense that it may help to assess the level of efficiency of asset market, monitor and manage financial risk, price derivatives, find more exact solutions to problems of optimal portfolio selection and develop a better understanding about the potential macroeconomic determinants of systematic financial risk. This empirical study is expected to be significant in providing an objective understanding to unveil the intricate cross-regime relationship between the select macroeconomic variables and stock market in India.

2.8 Chapters:

The entire study is presented within five chapters as below:

Chapter –1: Introduction

Chapter –2: Review of Literature, Scope and Plan of the Study

Chapter – 3: Empirical Methodology

Chapter – 4: Relation between Select Macroeconomic Variables and Stock Market in Pre and Post-liberalisation Periods

Chapter – 5: Summary of the Findings, Limitations and Scope of the Future Study

2.9 Conclusion:

The literature on the relationship between macroeconomic variables and stock market is very rich. The studies we surveyed, unveil the fact that the issue is still a debatable one and the

fractured findings suggest that there is ample scope for further research to unveil the intricate relationship amongst the Indian stock market and select macroeconomic variables which must be settled on the basis of robust and objective investigation considering a long horizon. The objectives of the study, very specifically, are: i) To assess the relationship amongst the select macroeconomic variables and stock market, in other words, whether the select macroeconomic variables and stock market are cointegrated, ii) To assess the influence, if any, of the past values of the sample macroeconomic variables on the future values of the Indian stock market, iii) To assess the future flexibility of the sample Indian macroeconomic variables and stock market under the study, and iv) To analyse the results of integration, if any, amongst the the Indian stock market and select macro-variables in the pre-liberalization and post-liberalization period. This study framed some hypotheses on the basis of the objectives and attempted to attain the objectives by using some widely used but robust statistical and econometric tools on the data collected for 54 years (1966-2019) to assess the cross-regime relationship between the stock market and Select macro-variables. The 1st chapter of this thesis introduces macroeconomic variables selected, their theoretical relation with stock market and a brief description of the major policy measures to track the transform the economy from controlled to a free economy. This chapter, that is, Chapter-2, outlines the objectives, research questions and hypotheses along with the brief review of literature. Methodology used in the study is described in chapter-3. Hypotheses of the study are assessed by econometric tools in chapter-4. The last chapter, i.e., chapter-5 summarised the findings, counted the limitations and suggested some scope of future studies.

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