MULTIFACETED RELATIONSHIP BETWEEN MACROECONOMIC VARIABLES AND CAPITAL MARKET IN INDIA WITH SPECIAL REFERENCE TO BOMBAY STOCK EXCHANGE

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Abstract

The study aims at examining how macroeconomic indicators affect the performance of stock markets by using the Indian Stock Exchange. This paper strikes up correlation among the variable and its relationship with each other with the help of ADF, Akaike Information criterion and Schwarz Bayesian criterion contemporaneous cross correlation analysis, and path analysis. It show that changes in Indian stock market index (Sensex) do perform a relationship between flow of money supply (M1 and M2), interest rate, exchange rate, reserve and industrial production index (PPI and PMI), Inflation (CPI), GDP, Unemployment rate, FDI and Balance of payment. With the help of analysis conclude that Indian stock market is partially fluctuate with macroeconomic variable. Furthermore, based on the variance decomposition analysis, this paper highlights that BSE has stronger dynamic interaction with M1, M2, Exchange rate and consumer price index.

Key Words: Macroeconomic variable, Stock Market – BSE, Path Analysis

I. INTRODUCTION

In 2008, global financial crisis has brought and seriously affected to the world stock market, somehow it also affected to the Indian economic specially BSE and NSE. There are many reasons for this crisis are excessive financial innovation and lack of supervision and other speculation but another supportive factor are macroeconomic variables (Wiggins, G. P., Wiggins, G., & McTighe, J. (2005)).

The Main Macroscopic Factors influence the Stock Price

A. The Influence of Money Supply

As per theory, there is relationship between stock price and money supply:

a. How the Money Supply Influences the Stock Price - Expected Effect, Investment Combination Effect and Stock Intrinsic Value Growth Effect. It indicates that there is a positive relationship between money supply movement directly affect the stock price movement.

b. There is another relationship between stock price movement and money supply. And their relationship like wealth effect, contract effect, asset portfolio effect and substitute have unfavourable effect on share price. So, share price influence on money supply is uncertain.

B. The Influence of Economic Growth

There is a strong relationship between stock market price and growth of the Indian economic with the help of theory and investigating study. There are several studies are conducted by author and prove that influence of stock price to influence and output effect of US for a relatively long period of time, and there is no favourable relationship stock and economic effect.

C. The Influence of Price Index

There is a strong relationship between demand and supply of stock influence the stock price and they are positively highly affected. There is also negative relationship between stock price and inflation and it influence wealth decision and substitute effect. Majority time stock price influence by demand and supply.

D. The Influence of Exchange Rate

There are a strong relationship impact of exchange rate and stock market and country performance. There are several studies conducted on this relationship between stock price and exchange rate and explore their relationship between stock price influence and their movement. there are three exposure conducted by exchange rate change transaction, translational and operational and there is also positive relationship between exchange rate movement and economic growth. If exchange rate appreciates nation growth also be done and vica versa.

E. The Influence of PMI

Due to the released and formulated attribution, PMI is highly correlation with many data index, especially GDP. In addition, the subentry indexes of PMI, which represents the demand and supply information of the industry, are closely linked to production, and will affect the enterprise's strategy decision (Zaiqiang, H. U. O., &Jinnan, Y. I. N. (2014)).

II. LITERATURE REVIEW

Authors	Findings
Hendry's (1986)	According to study, there is a short run relationship between macroeconomic variable and stock market. There is long run relationship between interest rate, inflation, money supply exchange rate and stock market movement. there is also dummy variable impact on Asian financial crises which is occur in 1997.

Bilson, Brailsford, and Hooper (1999)	With the help research, author found that macroeconomic variable and local risk sources. To find relationship between degree of commodity in exposure and stock market return, also apply principal components approach, and found favourable evidence of commonality and emerging commodity market. Commodity market existence at regional level.
Ibrahim (1999)	As per author investigate that relationship between KLSE composite Index and other 7 macroeconomic variables are industrial production index, money supply M1 and M2, consumer price index, and forex reserve and stock market indices are considered) and exchange rate movement. As per Malaysia market study, it is found that its stock market movement is inefficient and its direction are also unpredictable.
Islam (2003)	Author conclusions that there existed statistically significant short-run (dynamic) and long-run (equilibrium) relationships among the macroeconomic variables and the KLSE stock returns. There are also a positive raltionship between stock market return and other relevant variables are money market supply and its flow, inflation, exchange rate movement, foerex reserve and company performance. There are several studies are conducted in different country with respect to stock market return and macroeconomic variable effect.
Chong and Koh's (2003)	Author investigate stock prices, economic activities, real interest rates and real money balances in Malaysia were linked in the long run both in the pre- and post-capital control sub periods.
Islam and Watanapalachaikul (2003)	There is a strong, significant long-run relationship between stock prices and macroeconomic factors (interest rate, bonds price, foreign exchange rate, price-earning ratio, market capitalization, and consumer price index) during 1992-2001 in Thailand.
Hassan (2003)	One more research study conducted in Persian gulf region, with respect to multivariate cointegration test on share price movement with macroeconomic variable. Also apply vector error correlationship model, and author found that short term dynamic relationship between stock price and variable.
Omran (2003)	Author focused on examining the relationship with real interest rate is a key variable in the egyptial stock market, with respect to market activity and liquidity activities. The cointegration analysis through error correction mechanisms (ECM) indicated significant long-run and short-run relationships between the variables, implying that real interest rates had an impact upon stock market performance.
Vuyyuri (2005)	In this paper investigated the cointegrating relationship and the causality between the financial and the real sectors of the Indian

economy using monthly observations from 1992 through December 2002. The financial variables used were interest rates, inflation rate, exchange rate, stock return, and real sector was proxied by industrial productivity.

Research Gap

In past many studied done on the bases of relationship between stock price movement and macroeconomic variable but none of the draw a deterministic conclusion with path method with reference to BSE Index. In view of this situation, this article tries to make some innovation about the research methods and idea, hoping to draw a of relative certainty conclusion

III. DATA PRELIMINARIES AND METHOD OF ANALYSIS

A. Aim of the study

To conduct an empirical investigation of multifaceted relationship between macroeconomic variables and capital market in India– with special reference to Bombay Stock Exchange

During study follow descriptive research method is adopted to find out the degree of relationship between the dependent variable and independent variable in respective condition model.

In research follow Unit root test – for check normality, then after follow correction to check the relationship of the data and scrutinize irrelevant variable then after apply Path method.

B. Significance of Study

A. Improve the performance of the portfolio – Properly understand the relationship between the BSE return and macroeconomics, (Take buying and selling decision) (Nunan, D. (1992)).

B. To find out success possibility in investment prospects - From the perspective of optional time, researching the influence of macroeconomic trends to the stock market is indispensable (Myers, S. C., &Majluf, N. S. (1984)).

C. There is complex relationship between BSE and macro-economic variables and it's very hard to understand the relationship between then but this paper draw a conclusion with the help of SEM (path model) (Cohen, B., Smith, B., & Mitchell, R. (2008)).

C. Data Collection Method

- Secondary data collection method is used.
- Time duration: Monthly August 2009 to June 2018
- Tools are used for data analysis are, excel and Path Method (Amos).

D. Limitation of Study

In this study, it is very hard to incorporate each and every aspect of variable which explain the stock market movement. so limitation of this paper is selection on macroeconomic variables.

Here data are employed Sensex and Nifty for Indian stock market, **money supply (M1 and M2), interest rate (Treasury Bills), exchange rate, reserves and industrial production index (PPI and PMI), Inflation rate(CPI), GDP, Unemployment rate, FDI and Balance of payment**; all of which are standard variables in the literature. Data selection takes into consideration the availability of data and their consistency within the accessible time frame.

<Table: 1>

At the first examine the nature of the data, primary inspection of the above data first make it log data then after graphical presentation of the data in table2 indicated that data are stationary or nonstationary of the selected macroeconomic variable. For this apply unit root test.

Then after follow unit root testing by employing the augmented Dickey Fuller (ADF) test, then after cross verification apply the Phillips Perron test and Kwiatkowski–Phillips–Schmidt–Shin test.

<Table: 2>

As per above table 2 value of the ADF test, will most certainly not reject the null (except CPI, FDI, GDP, PMI, Unemployment rate and Repo rate)of a unit root for any reasonable significant levels. On the other hand, the null of the KPSS test is stationary but statistic is in the rejection region, so reject the null of the stationary (except FDI, PMI, Unemployment rate and Repo rate) so accept that series has a unit root.

<Table: 3>

As per correlation table found that there is a strong correlation ship between money movement with and stock market here found 0.920 and .921 are strongly related with M1 and M2 with BSE. Respectively 0.925 and 0.925 are strongly

associated with NSE. Another strong relationship found with exchange rate and PPI index.

IV. METHOD AND MODEL

A. Method and Analysis Procedure of Structural Equation Model

The economists Wright first put forward the concept of "path analysis" in 1921. KarlgJoreskog, the Swedish statisticians and psychologists, put forward the Structure Equation Model (SEM for short) in 1973 (Hendry, 1986). Since then, path analysis was gradually shifted to LISREL, AMOS and SEM software, which is called the path analysis oriented in the structure equation model.

The main tool of Path analysis is the path diagram (Wu, 2009), it uses a arrow line (single arrow representative causal relationship between variables, the double arrow representative correlation relationship between variables) representative the present relationship between variables, the arrow indicates the relationship between variables is linear, and the direction of arrow representative the direction of causal relationship.

This paper uses AMOS software to analyze the complex relationship between the macro economic variables and stock price.

Model estimation is the most important part of SEM, and we can't come to the correct results if we choose the inappropriate model estimation. Hoyle and Pinter did a special study and presented suggestions as follows (Huang, 2005): We suggest that the author should routinely report ML estimation results. If the characteristic of the data makes it inappropriate to estimate using ML, we would better use other estimate methods and list the results in the comments. In this paper, I use the ML estimation method firstly, and then use the ADF and GLS estimate methods, if the latter results are significant different from the former, I would present it in this article.

The debugging process of SEM is somewhat similar to that of multiple regressions. Firstly, we need to test the single path coefficient, if all the single path coefficients are significant; we need to test the whole model's adaptation. There are three widely used tests to test the whole model's significance: Chi-square test value, GFI and AGFI tests. The closer the value of $\chi 2/df$ is to 1, the better of the fitting results. GFI and AGFI revealed the extent of the whole adapter, most of the scholars suggested that it's better when GFI and AGFI value are greater than 0.9.

<Figure: 1>

<Table: 4>

B. Model Estimation and Debugging

According to the study, estimated the path coefficients using the SEM path model

Firstly, make a path diagram as per figure 1 and test the result of parameter hypothesis, then after estimate the path coefficients using the method of ML and test the results of parameter hypothesis, table 2 and table 3 is the test of the whole model.

<Table: 5>

According to the model study of chapter three, we estimated the path coefficients using the method of ML firstly, and got the path diagram (see Figure 1). Table 1 is the test results of parameter hypothesis, Table 2 and Table 3 is the test of the whole model. GFI- Goodness-of-fit index is a measure of the relative amount of variance and covariance in S that is jointly explained by reproduced matrices sigma. This indicates range from zero to 1.00 with values close to 1.00 being indicative of good fit.

AGFI – higher the value better it is

RMSEA – most observed measure. It is badness of fit. RMSEA tells us howwell the model with unknown but optimally chosen parameter estimates would fit the population covariance matrix (Byrne, 1998). (1996) authors have used 0.01, 0.05 and 0.08 to indicate excellent, good and mediocre.

<Table: 6>

V. THE EMPIRICAL RESULTS AND ANALYSIS

Path analysis is mainly used to reveal the interaction relationship between variables, and these relationships can be reflected through the path coefficient in the model.

<Table: 7> and <Table: 8>

VI. CONCLUSION

In this paper, we did the theory research on the relationship of stock price and the macro-economic firstly; then, we introduced the model using in the paper; at last, we designed the model based on the theory research and model research and estimated the path coefficient. After analysis, we think the casual relationships as followed can be accepted: Firstly, the year-on-year increase of M1 will cause the rise of Indian index. Secondly, the year-on-year increase of PPI will cause the decrease of Sensex index. Thirdly, the year-on-year increase of M2 will cause the decrease of Sensex index. Fourthly, the appreciation of the RMB will cause the

increase of Sensex index at last. Finally, the year-on-year increase of CPI will cause the rise of Sensex index.

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APPENDIX

Table: 1 Source of data and formation of date from August 2009 to June 2018

Acronym	Definitions of Variables	Source
M2	Logarithm of the month-end M2 money supply of India	RBI
M1	Logarithm of the month-end M1 money supply of India	RBI
CPI	Logarithm of quarter month ended Consumer Price Index	RBI
PPI	Logarithm of month ended Producer Price Index (PPI)	Trading Economic
PMI	Logarithm of month ended Purchasing Managers' Index (PMI)	Trading Economic
GDP	Logarithm of quarter month ended Exchange rate	Indian Economic
Ex	Logarithm of month ended Exchange rate	RBI
FDI	Logarithm of month ended Foreign Direct Investment	Indian Capital Market
BOP	Logarithm of month ended balance of Payment	RBI
ReP	Logarithm of twice month ended Repo rate	RBI
UER	Logarithm of year ended unemployment rate	Trading Economic
BSE	Logarithm of the index of market-value weighted average of month-end closing prices for selected shares listed on Sensex	Yahoo Finance
NSE	Logarithm of the index of market-value weighted average of month-end closing prices for selected shares listed on Nifty	Yahoo Finance

Table: 2 ADF (Augmented Dickey-Fuller test) , PP (Phillips-Perron) and KPSS(Kwiatkowski–Phillips–Schmidt–Shin) test for unit root.

	ADF	1% Level	5% Level	10% Level	P-Value	PP	1% Level	5% Level	10% Level	Prob	KPSS	1% Level	5% Level	10% Level
BSE	-0.661	-3.493	-2.889	-2.582	0.851	-0.450	-3.493	-2.888	-2.582	0.895	1.088	0.739	0.463	0.347
CPI	-7.447	-3.506	-2.894	-2.584	0.000	-7.658	-3.506	-2.894	-2.584	0.000	0.952	0.739	0.463	0.347
Exchange Rate	-0.732	-3.493	-2.889	-2.581	0.833	-0.616	-3.493	-2.889	-2.581	0.861	1.055	0.739	0.463	0.347
FDI	-9.340	-3.494	-2.889	-2.582	0.000	-9.342	-3.494	-2.889	-2.582	-9.342	-3.494	-2.889	-2.582	0.000
GDP	-3.101	-3.493	-2.889	-2.584	0.030	-3.192	-3.493	-2.889	-2.581	0.023	0.200	0.739	0.463	0.347
M1	-0.489	-3.496	-2.890	-2.582	0.888	-0.331	-3.494	-2.889	-2.582	0.915	1.285	0.739	0.463	0.347
M2	-0.814	-3.494	-2.889	-2.582	0.811	-0.355	-3.493	-2.889	-2.581	0.912	1.182	0.739	0.463	0.347
NSE	-0.722	-3.493	-2.889	-2.581	0.836	-0.519	-3.493	-2.889	-2.581	0.882	1.097	0.739	0.463	0.347
PMI	-4.498	-3.520	-2.901	-2.588	0.001	-4.500	-3.520	-2.901	-2.588	0.001	0.227	0.739	0.463	0.347
PPI	-2.644	-3.494	-2.889	-2.582	0.088	-3.903	-3.493	-2.889	-2.581	0.003	0.930	0.739	0.463	0.347
Unemployment Rate	-3.153	-3.497	-2.891	-2.582	0.026	-3.155	-3.497	-2.891	-2.582	0.026	0.495	0.739	0.463	0.347
Repo Rate	-2.514	-3.495	-2.890	-2.582	0.115	-2.138	-3.493	-2.889	-2.581	0.231	0.249	0.739	0.463	0.347

Table: 3 Correlation

	M2	*M1*	*CPI*	*PPI*	*EX*	*PMI*	*GDP*	*UER*	*FDI*	*Rep*	*BSE*	*NSE*
M2	1.000											
M1	0.993	1.000										
CPI	0.448	0.441	1.000									
PPI	0.841	0.836	0.494	1.000								
EX	0.897	0.887	0.500	0.866	1.000							
PMI	-0.160	-0.189	-0.246	-0.571	-0.389	1.000						
GDP	-0.176	-0.178	0.018	-0.399	-0.267	-0.130	1.000					
UER	-0.455	-0.452	-0.316	-0.634	-0.467	0.368	0.055	1.000				
FDI	0.098	0.093	-0.464	0.023	0.087	0.032	0.077	-0.029	1.000			
Rep	0.022	0.018	-0.279	0.470	0.108	0.153	-0.378	-0.423	-0.079	1.000		
BSE	0.920	0.921	0.413	0.728	0.799	-0.259	-0.037	-0.430	0.135	-0.136	1.000	
NSE	0.925	0.925	0.408	0.726	0.799	-0.242	-0.048	-0.414	0.134	-0.142	0.999	1.000

Table: 4 Non-Standardized Coefficient and Statistical Test
Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
CPI	<---	M2	.055	.920	.059	***	
BSE	<---	M2	.545	.329	1.656	***	
PPI	<---	M2	.045	.161	.278	***	
CPI	<---	M1	.049	.905	.055	***	
BSE	<---	M1	.489	.324	1.510	***	
PPI	<---	M1	.082	.158	.520	***	
CPI	<---	Ex	.955	.385	2.477	.013	
BSE	<---	Ex	-.211	.138	-1.531	.126	
PPI	<---	Ex	.369	.067	5.472	***	

Table: 5 Crucial measures from the output of AMOS

Measures	**Threshold**	**Result**
Chi-squre/ df (CMIN / df)	<3 good; <5 sometime permissible	1.770
p-value for the model	>0.05	0.150
CFI	>0.95 great; 0.90 traditional; 0.80 sometimes permissible	0. .998
GFI	>0.95	0.998
AGFI	>0.80	0.977
RMSEA	<0.05	0.085
PCLOSE	>0.05	0.242

Table: 6 CMIN,RMSEA and Baseline Comparisons
CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	24	5.311	3	.150	1.770
Saturated model	27	.000	0		
Independence model	6	1022.400	21	.000	48.686

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.085	.000	.202	.242
Independence model	.671	.636	.706	.000

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.995	.964	.998	.984	.998
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

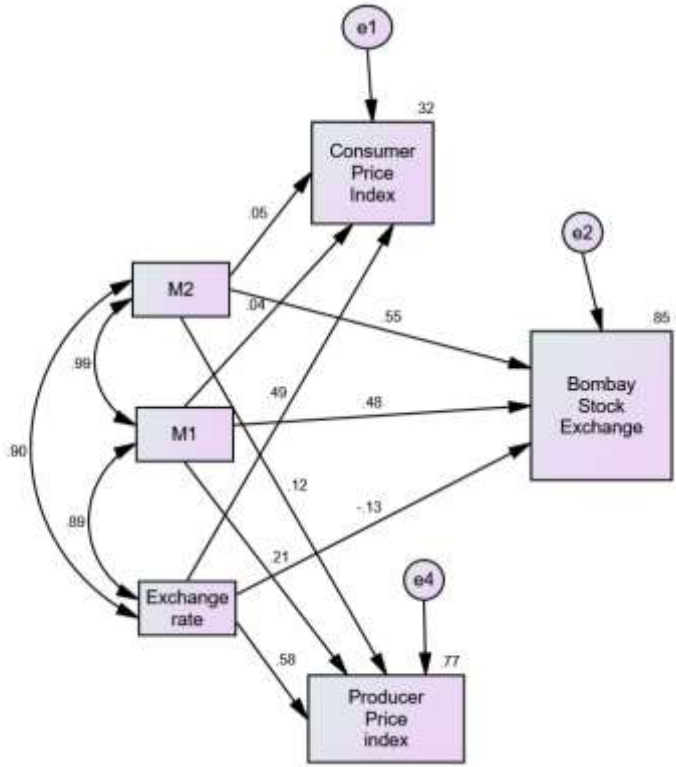
Table: 7 Correlations: (Group number 1 - Default model)

			Estimate
M2	<-->	M1	.993
M1	<-->	Ex	.887
M2	<-->	Ex	.897

Table: 8 Variances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
M2	.012	.002	7.280	***	
M1	.011	.001	7.280	***	
Ex	.004	.001	7.280	***	
e1	.011	.002	6.677	***	
e2	.002	.000	7.280	***	
e4	.000	.000	7.280	***	

Figure 1 Standardized Path Diagram and Path Coefficients



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