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   INTRODUCTION

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   NEED/IMPORTANCE OF THE STUDY

   STATEMENT OF THE PROBLEM

   OBJECTIVES

   HYPOTHESES

   RESEARCH METHODOLOGY

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- Sharma T., Kwatra, G. (2008) Effectiveness of Social Advertising: A Study of Selected Campaigns, Corporate Social Responsibility, Edited by David Crowther & Nicholas Capaldi, Ashgate Research Companion to Corporate Social Responsibility, Chapter 15, pp 287-303.

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- Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

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- Garg, Sambhav (2011): "Business Ethics" Paper presented at the Annual International Conference for the All India Management Association, New Delhi, India, 19–22 June.

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- Kumar S. (2011): "Customer Value: A Comparative Study of Rural and Urban Customers," Thesis, Kurukshetra University, Kurukshetra.

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WEBSITE

- Garg, Bhavet (2011): Towards a New Natural Gas Policy, Political Weekly, Viewed on January 01, 2012 http://epw.in/user/viewabstract.jsp

A STUDY OF THE IMPACT OF MACROECONOMIC VARIABLES ON STOCK PRICE MOVEMENTS FOR THE PERIOD 1993- 2010

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ABSTRACT

This paper is a fresh attempt to unravel the relationship between the real economic variables and the capital market in Indian context. The paper considers the monthly data of several economic variables like the national output, fiscal deficit, interest rate, inflation, exchange rate, foreign institutional investment in Indian markets between 1994 and 2010, and tries to reveal the relative influence of these variables on the sensitive index of the Bombay stock exchange (BSE). I have applied linear regression model to identify the relationship between BSE stock price movement and macro-economic variables. The finding shows that certain variables like the interest rate, output, money supply, inflation rate and the exchange rate has considerable influence in the stock market movement in the considered period, while the other variables have very negligible impact on the stock market.

KEYWORDS

Bombay Stock Exchange (BSE), Macroeconomic variables, Stock Price Movement.

INTRODUCTION

Indian capital market has undergone tremendous changes since 1991, after the government introduced liberalization and globalization more seriously than ever before. As a result, there can be little doubt about the growing importance of the stock market from the point of view of the aggregate economy. Indian capital markets have evolved as a major source of raising resources for Indian corporate. The total market capitalization of Bombay Stock Exchange's (BSE) has magnified significantly. The huge influx of capital through FIIs has made India a favourite avenue of investment for global investors.

Not only has the stock market activity increased relative to the real economy, but also it appears that the inter-relationship between them has strengthened. The various macroeconomic factors seem to be having a significant impact on the stock price movements.

Keeping all these factors in mind, it becomes necessary to test the link between the real economy and stock market. This research paper attempts to study the relationship between stock prices and certain real economic variables like index of industrial production (IIP), inflation through Wholesale Price Index (WPI), interest rate (IR), fiscal deficit (FD), foreign institutional investment (FII) in the capital market, foreign exchange rate of rupee (ER) etc. using multiple regression techniques.

REVIEW OF LITERATURE

An increasing amount of empirical evidence noticed by several researchers leads to the conclusion that a range of financial and macroeconomic variables can predict stock market returns (for a selection of recent studies see e.g. Campbell, 1987, French, Schwert and Stambaugh, 1987, Fama and French, 1989, Balvers, Cosimano and McDonald, 1990, Been, Glosten and Jaganathan, 1990, Cochrane, 1991, Campbell and Hamao, 1992, Ferson and Harvey, 1993, Glosten, Jaganathan and Runkie, 1993 and Pesaran and Timmerman, 1995, 2000). Also I have referred to the study done by Ray, Prantik and Vani, Vina "What Moves Indian Stock Market: A Study on the Linkage with Real Economy in the Post-Reform Era ". Standard stock valuation models predict that stock prices an affected by the discounted value of expected cash flows. Chen et al (1986) and Fama (1990) have shown real economic activity, interest rate and stock returns to be correlated. However, most of these earlier studies focus upon the short-run relationship between stock market and financial and macro-economic variables, which may remove important information contained in the permanent component of economic activity concerning the evolution of short-run movements.

In comparison to the above, long-run relationship between stock market and the economic variables has received little attention of researchers except in Mukherjee, Naka, (1995), Chung & Ng (1998), Maysami and Koh (2000) and Nasseh and Strauss (2000). By using the concept of co integration, first introduced by Eangle and Granger (1987), we can investigate the empirical long run relationships between stock market indices and both measures of economic activity and financial variables. Co integration between stock prices and economic activity can be seen to be consistent with both internal & theoretical consumption and production-based asset pricing models. These models suggest that stock prices are related to expected future production through effect on the discounted value of changes in cash flows and dividends (Cochrane).

Recently several researchers like Baestaens et. al. (1995), Kaastra Ibeling and others (1996), Katsurelis (1998), Kamath (1999 and 2002) recommend the use of Artificial Neural Network (ANN) for investigating the co integrating relationship as well as forecasting in capital markets, which has tremendous promise in terms of methodology.

There have been several studies on this in Indian context. Sharma Kennedy (1977) and Sharma (1983) test the weak-form efficiency of the BSE. Both of these studies with the former covering the 1963-1973 period and the later encompassing the 1973-1971 period, conclude that Indian stocks generally conformed to random-walk behaviour in that successive period changes were independent. Poterba & Summers (1988), however, find evidence of mean reversion in Indian stock prices, suggesting a deviation from random-walk behaviour. Darat & Mukherjee (1987) apply a vector auto regression model (VAR) along with Akaike's final prediction ever on the Indian data over 1948- 1984 and find that a significant causal relationship (in the sense of Granger, 1969) exists between stock returns and selected macro-economic variables.

Naka, Mukherjee and Tufte (1996) have analyzed relationship among selected macro-economic variables and the Indian stock market. By employing a vector error correction model, they find that domestic inflation and domestic output are the two most prominent factors influencing stock prices. In a recent study under NSE Research Initiative Kamath (2002, paper no. 10) uses Artificial Neural Network (ANN) to examine the relationship of macro-economic factors to the returns of individual assets. The BSE SENSEX as well as some individual stock has been examined. More recent studies like Bhattacharya & Mukherjee (2002), Rao & Rajeswari (2000), Pethe & Karnik (2000) use advanced methods in econometrics to study the same relationship. Bhattacharya and Mukherjee (2002) test the causal relationships between the BSE SENSEX and five macroeconomic variables applying the techniques of unit-root tests, co integration and long-run Granger non-causality test proposed by Toda and Yamamoto (1995). Their major findings are that there are no causal linkage between the stock prices and money supply, national income and interest rate while the index of industrial production leads the stock price and there exists a two-way causation between stock price and rate of inflation.

Rao & Rajeswari (2000) try to explore the role being played by a good number of macro- economic variables in influencing the stock market when reduced into a manageable number of economic factors. They test the risk-return relationship for individual scrip for the 1995-2000 period using the traditional CAPM, three-factor macro-economic factor model and the five-factor APT. Pethe and Karnik (2000) use unit-root, co-integration and error-correction models to test relationship between stock market behavior and some macro-economic variables.

NEED/IMPORTANCE OF THE STUDY

The stock market indices are the barometers of the stock performance of companies/ industries. The stock price movements reflect the directions in which the stock markets are moving. The study will have many advantages for several stakeholders like academicians and practitioners can know the precise macro variables that influence the stock prices and also the nature of the relationship then understanding and predicting stock market behavior would be much simpler with the help of these economic variables. For the policy-makers, it may help in formulating rational policy based on macro economic scenario. Also, managers may make appropriate investment or managerial decisions based on the influence that these macroeconomic factors exert on stock price movement.

STATEMENT OF THE PROBLEM

To study the impact of the given macroeconomic variables like WPI, IIP, FII, FISCAL DEFICIT, EXCHANGE RATE, INTEREST RATE on BSE SENSEX movement.

OBJECTIVE

1. To study the extent of impact of macroeconomic variables like WPI, IIP, FII, FISCAL DEFICIT, EXCHANGE RATE, INTEREST RATE on stock price movements in India
2. To study the nature of impact of macroeconomic variables like WPI, IIP, FII, FISCAL DEFICIT, EXCHANGE RATE, INTEREST RATE on stock price movements in India

HYPOTHESIS

H0: WPI, IIP, FII, FISCAL DEFICIT, EXCHANGE RATE, INTEREST RATE does not significantly impact the BSE SENSEX MOVEMENT
H1: WPI, IIP, FII, FISCAL DEFICIT, EXCHANGE RATE, INTEREST RATE significantly impact the BSE SENSEX MOVEMENT

RESEARCH METHODOLOGY

The objective of the current study is to unravel the linkage between the stock market movement and real economic events in the Indian context in the post reform-era using linear regression techniques like multiple regressions. The period of the study has been chosen as April, 1994-March, 2010. This has been the period where the economic reforms were making an impact on the economy. In an earlier study, Vani & Ray (2003) try to capture the change in the relationship among macro-economic variables and stock prices over the years. The earlier study uses average yearly data for the period 1971-2002 and chosen macroeconomic variables were Interest Rate (Bank rate), Industrial Activity (Index of industrial production), Inflation (Whole sale price index), Fiscal deficit, and GDP. The author found significant causal relationship between the macro economy and the BSE SENSEX movements. The present study is more focused on the post-reform era as it considers the period 1994-2010 and uses monthly data for a larger number of variables from the real economy which should have relationship with the capital market. Not only the domestic economic variables have been considered but the linkage with the external world through the exchange rate movement has also been included in the analysis. The study does not assume any a priori relationship between these variables and the stock market and is open to the possible two-way relationship between them.

SELECTION OF VARIABLES AND DATA COLLECTION

The aim is to detect relationship between real economic variables and the Sensitive Index (SENSEX) Bombay Stock Exchange, India's premier stock exchange for which data is available for a long period. The period I have chosen is April, 1994-March, 2010 as the monthly data of all of the variables are available for this period and we can have normalized reliable data for the same period as many of the indices like Wholesale Price Index or Index of Industrial Production have their base as 1993-94. I have chosen the variables following Chen, Roll & Ross (1986) on what they have described as "simple and intuitive financial theory" as there does not appear to exist any theory that accounts for stock price (BSE) movements as a function of micro- and macro-indices. I have selected seven non-equity-related real economic variables as systematically affecting stock returns (as given in Table 1).

I have taken Index of Industrial Production (IIP) that reflects the industrial growth in India as the proxy for national output. Since it's difficult to find any benchmark interest rate for the entire time period under study, I have taken the SBI Prime Lending Rate (SBIPLR) as the proxy for the interest rate (IR) prevailing in the economy. To account for inflation we have chosen Wholesale Price Index (WPI) with base year as 1993-94. Indian economy has some unique features since Government account has a very prominent role in the economy. To capture this in the model, fiscal deficit (D) has been taken as a macro variable affecting the stock prices. To test the common perception that the FII has been a driver to the stock market in India I have included Foreign Institutional Investment in Indian capital market (FII) as another crucial economic variable. To check the linkage with the external world Rs./$ Exchange Rate (ER) has been taken as another variable. All the data is taken from the Handbook on Statistics (RBI) and Economic Survey (Government of India) and Business Beacon.

TABLE1: VARIABLES USED IN RESEARCH

IIP	Index of Industrial production	Index with base year as 1993-94
FD	Fiscal Deficit of the Central Government	Actual Value
FII	Foreign Institutional Investment in Capital Markets	Actual Value
ER	Monthly Average Rs./$ Exchange Rate	Actual Value (Monthly Average)
BSE	BSE SENSEX	Index with base year as 1978-79 (Monthly Average)
IR	SBI Prime Lending Rate	Percentage
WPI	Wholesale Price Index	Index with base year as 1993-94

Source: Chen, Roll & Ross (1986)

RESULTS & DISCUSSION

1. REGRESSION EQUATION

$Y= -0.017 + 0.045\ X1- 0.029\ X2 + 0.063\ X3 + 0.087\ X4 - 0.226\ X5 - 0.173\ X6$……… (1)

X_1 =PLR
X_2=IIP
X_3=FISCAL DEFICIT
X_4=FII
X_5=EXCHANGE RATE
X_6=WPI

The knowledge that the most influencing variables to the Indian Stock Market during 1994-2010 have been the exchange rate, index of industrial production (IIP), interest rate (IR) and inflation rate (WPI), is not surprising. Economists and financial researchers have long been suspecting that there should be strong linkages between the capital market and the real economy. Studies show that non-linear model better explain the linkages between capital market and macro-economic variables but since we have limited ourselves to linear regression model, it shows a weak result.

2. CORRELATION ANALYSIS

From the Table 2 we can easily find out to what extent one variable is linearly associated with another variable. Here, higher correlation is seen between BSE and WPI showing -.200 which means higher the WPI lower be the SENSEX movement, BSE and FII has .122 which means if FII increases by 1 unit than SENSEX would move by .122 and BSE and exchange rate has -.266 that again shows negative relationship, i.e if exchange rate increases by 1 unit, SENSEX would move down by .266 units. Other variables are showing weak relationships.

TABLE 2: CORRELATION ANALYSIS

		NORMAL of lagbse using RANKIT	NORMAL of lagPLR using RANKIT	NORMAL of lagIIP using RANKIT	NORMAL of lagfiscaldeficit using RANKIT	NORMAL of lagfii using RANKIT	NORMAL of lagexcahngerate using RANKIT	NORMAL of lagwpi using RANKIT
Pearson Correlation	NORMAL of lagbse using RANKIT	1.000	-.004	.030	.054	.122	-.266	-.200
	NORMAL of lagPLR using RANKIT	-.004	1.000	-.075	-.036	-.064	.082	.079
	NORMAL of lagIIP using RANKIT	.030	-.075	1.000	.126	-.093	-.046	-.296
	NORMAL of lagfiscaldeficit using RANKIT	.054	-.036	.126	1.000	-.095	-.049	.051
	NORMAL of lagfii using RANKIT	.122	-.064	-.093	-.095	1.000	-.124	-.058
	NORMAL of lagexcahngerate using RANKIT	-.266	.082	-.046	-.049	-.124	1.000	.145
	NORMAL of lagwpi using RANKIT	-.200	.079	-.296	.051	-.058	.145	1.000
Sig. (1-tailed)	NORMAL of lagbse using RANKIT	.	.480	.354	.254	.066	.000	.006
	NORMAL of lagPLR using RANKIT	.480	.	.177	.329	.215	.155	.166
	NORMAL of lagIIP using RANKIT	.354	.177	.	.060	.124	.285	.000
	NORMAL of lagfiscaldeficit using RANKIT	.254	.329	.060	.	.119	.272	.265
	NORMAL of lagfii using RANKIT	.066	.215	.124	.119	.	.062	.238
	NORMAL of lagexcahngerate using RANKIT	.000	.155	.285	.272	.062	.	.036
	NORMAL of lagwpi using RANKIT	.006	.166	.000	.265	.238	.036	.

*Significant at 95% Confidence Level

Source: results of the panel data run on SPSS

TABLE 3: MODEL SUMMARY

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.682(a)	.465	.408	.9409855	1.423

Source: results of the panel data run on SPSS

As can be inferred from the above Table 3, the adjusted R-square value is 0.428 which means the model explains 40.8 percent of variation. Also, the Durbin Watson test shows that the value is 1.423 , slightly less than 2 showing a slight positive correlation but is otherwise tested and cured from autocorrelation using method of difference (by calculating lag and lead values).

TABLE 4: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	16.197	6	2.699	3.049	.008ª
	Residual	131.047	148	.885		
	Total	147.244	154			

Source: results of the panel data run on SPSS

The ANOVA Table 4 shows that the model is a good fit at the sig. level of 0.008.

TABLE 5: COEFFICIENTS

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.017	.076		-.229	.819		
	NORMAL of lagPLR using RANKIT	.045	.102	.034	.440	.661	.981	1.019
	NORMAL of lagIIP using RANKIT	-.029	.081	-.030	-.362	.718	.880	1.136
	NORMAL of lagfiscaldeficit using RANKIT	.063	.077	.065	.818	.414	.964	1.037
	NORMAL of lagfii using RANKIT	.087	.077	.089	1.119	.265	.959	1.043
	NORMAL of lagexcahngerate using RANKIT	-.226	.078	-.231	-2.911	.004	.957	1.045
	NORMAL of lagwpi using RANKIT	-.173	.081	-.176	-2.135	.034	.880	1.136

*Significant at 95% Confidence Level

Source: results of the panel data run on SPSS

As can be inferred from the above Table 5 that only WPI and EXCHANGE rate have significant less than .05 which means that only WPI and EXCHANGE RATE explains the impact to a significant extent that is standardized beta of -0.176 of WPI shows that if WPI is increased by 1 unit, BSE SENSEX would move down by 0.176. Similarly, if we increase exchange rate by 1 unit, BSE SENSEX would move down by 0.231 units. Rest of the variables does not seem to impact the dependent variable to any significant extent. However, the problem lies in choosing the linear model as the impact of macroeconomic variable is better explained by nonlinear model.

TABLE 6: COLLINEARITY DIAGNOSTICS

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions						
				(Constant)	NORMAL of lagPLR using RANKIT	NORMAL of lagIIP using RANKIT	NORMAL of lagfiscaldeficit using RANKIT	NORMAL of lagfii using RANKIT	NORMAL of lagexcahng erate using RANKIT	NORMAL of lagwpi using RANKIT
1	1	1.409	1.000	.00	.08	.21	.02	.01	.11	.23
	2	1.199	1.084	.00	.02	.11	.18	.38	.09	.00
	3	1.024	1.173	.02	.17	.04	.41	.01	.11	.16
	4	1.000	1.187	.96	.00	.00	.02	.00	.01	.00
	5	.927	1.233	.01	.70	.00	.06	.01	.27	.00
	6	.807	1.322	.00	.03	.05	.17	.56	.36	.00
	7	.634	1.491	.00	.00	.59	.14	.03	.05	.60

Source: results of the panel data run on SPSS

The Table 6 shows the collinearity diagnostics explains the collinearity between different predictor variables used in the model. All the above values seem to be well within range. The condition index is also less than 30 which shows the absence of multicollinearity. The eigenvalue shows the the model is best with upto 4 variables where its value is more than 1.

FINDINGS

The major findings using the linear regression model is that domestic inflation (WPI) and exchange rate are the two most prominent factors influencing stock prices. There are no significant causal linkage between the stock prices and IIP, PLR (interest rate) while the FISCAL DEFICIT and FII leads the stock price slightly.

CONCLUSIONS

The current study aims to find out the linkage between the real economic variables and the movement of the stock market. The variables have been chosen carefully to suit the Indian context, namely, index of industrial production (proxy for national output), wholesale price index (proxy for inflation rate), SBI prime lending rate (proxy for interest rate), Rs/$ Exchange rate, foreign institutional investment in Indian capital market and fiscal deficit. On the basis monthly data between April, 1994 and March, 2007, the study attempts to test the influence of these variables on the sensitive index of Bombay Stock Exchange by applying multiple regression models using SPSS. What we can infer from the above analysis is that only WPI and EXCHANGE RATE explains the impact to a significant extent. Rest of the variables does not seem to impact the dependent variable to any significant extent. However, the problem lies in choosing the linear model as the impact of macroeconomic variable is better explained by nonlinear model.

The study reconfirms the traditional belief that the real economic variables continue to affect the stock market in the post-reform era in India and also highlights the insignificance of certain variables with respect to stock market. This has an important lesson for the national policy makers, researchers, corporate managers and regulators. However further research can be done in this area using higher models like non linear ones, example artificial neural network which better explains the result between macroeconomic variable and stock price movements.

SCOPE OF FURTHER RESEARCH

The study concentrates on the macroeconomic factors that impact the stock price movements. The study can be further enhanced by studying specific macro factors in detail to understand the dynamics. Also, the model can be enhanced by adding micro factors to give a better model which explains the stock market volatility.

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