MACRO ECONOMIC FACTORS AND SHARE PRICE BEHAVIOUR: A STUDY ON SELECTED INDUSTRIES IN INDIA

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ABSTRACT

Share Market Investment has become popular in recent days due to its higher return comparing with other traditional form of investment. However, it is a fact that the market does not pay guaranteed return like in the traditional form of investment. The ups and downs in the return are the phenomena of a share market investment. The fluctuations in the share market are influenced by several set of factors relating to company, industry as well as economy. Hence, the investors should take the note of these factors while investing. The present study is an attempt to find out the relation as well as the effect of macroeconomic factors on the share price of selected industries. The result of the study disclosed that the macroeconomic variables are having significant influence on the share price.

Key Words: Share Price, Macroeconomic factors, Regression analysis

INTRODUCTION

Share market investment has become an interesting option for the investors since its inception in India, particularly after the economic liberalisation. This is one of the major avenues of investment that yields considerable returns to investors. Making profit in the market is a top as well as a tuff game. An investor with an objective of maximising return and minimising risk wants to know when he should invest or when he should divest. To be successful in this game requires the knowledge of the forces that cause ups and downs in the share prices. The available literature suggests that, there are mainly two sets of factors responsible for change in share price. They are micro and macro level factors. The micro factors refer to firm specific factors such as ; dividend, profit, leverage, size of the firm etc. and macro factors refers to the macro economic variables such as; GDP, IIP, Money supply etc. The study on both the categories of factors is important to predict the price change. Due consideration of such factors by investors is also felt while investing their funds, since this would aid them in making wise investment decision. As on march, 2014, equity investment by Indian households is about 7.8% of the total financial savings. The equity culture has spread in our nation, what was the earlier

concern of rich and privileged class is now becoming a matter of interest for millions of middle and low income groups. A well-developed equity market helps in the progress of economy and it provides investors with a range of assets with varying degree of risk, return and liquidity apart from enhancing savings and capital creation. In the view of economic development, it has become imperative to study the relation of stock price movement and the numerous macroeconomic indicators. The macroeconomic events influence investors' psychology and it affects their buying and selling decisions. Hence, in this context, current research is an attempt to examine the influencing power of macroeconomic factors on share price.

REVIEW OF LITERATURES

In the last few decades, numerous studies have been carried out to examine the dynamic relationship between stock market behaviour especially relating to share price and economic activities. Fama (1981) laid foundation stone in this regard to understand the relation of macroeconomic indicators and stock prices. He found a significant relationship between them. Following his study, a number of empirical studies explored this topic. Industrial production was found to be a significant factor for Italy and Netherlands. However, in case of UK, Switzerland and Belgium, the importance of macroeconomic factors did not improve their ability to forecast.

Sen (1996) examined the share price movement in India during 1985–1994 to ascertain the role of foreign capital vis - a - vis internal economic factors such as GDP growth, change in interest rate and exchange rate movements in determination of stock prices. By employing regression model, the result of the study disclosed that both industrial production and foreign exchange reserve are key determinants of stock market performance in India. Further, the study revealed that stock prices received significant support from foreign capital flows.

Ibrahim (1999) investigates the dynamic interactions between seven macroeconomic variables and the stock prices for an emerging market, Malaysia, using co-integration and Granger causality tests. The results strongly suggest informational inefficiency in the Malaysian market. The bi-variate analysis suggests about the co-integration between the stock prices and three macroeconomic variables – consumer prices, credit aggregates and official reserves.

Günsel and Çukur (2007) carried out a study to know the effect of macro-economic factors on the London stock return. It considers seven macro-economic factors such as 1. the term structure of the Interest rate 2. Inflation 3. risk premium 4. Sectoral Industrial Production 5. Exchange rate 6. Money supply and 7. Sectoral dividend yield. The Regression results of the study show that there are big differences among industry portfolios against macroeconomic

variables. Test results indicated that dividend yield is significant and negative at 1% significance level for all the industries namely 1. Food beverage & tobacco 2. Constructions 3. Building materials & Merchants 4. Electronics and electrical equipment 5. Engineering 6. Household goods & Textiles 7. Paper, Packaging & Printing 8. Chemicals 9. Diversified and 10. Oil exploration & production. Current unexpected inflation does not have any effect on the industry returns except Food, Beverage and Tobacco at 10% according to the test results. Risk premium has a positive effect on the return of Construction and Engineering. Effective exchange rate is an important factor to determine the international competitiveness. Our results imply that two sectors, Building Materials & Merchants and Engineering suffer because of the effective exchange rate movements. Current money supply has a positive effect on the return of Building Materials & Merchants, Food, Beverage and Tobacco, and a negative effect on the return of Household Goods and Textiles. One month lagged term structure of interest rate has positive effect on the returns of four industries, Construction, Food, Beverage & Tobacco, Oil Exploration & Production and Electronic & Electrical Equipment. Unexpected Sectoral production figures seem to have negative relation with Food, Beverage and Tobacco industry at 5% significance level.

Gay (2008) has tried to identify by investigating the time series relationship between stock market index and macroeconomic variables like exchange rates and oil prices of BRIC countries. He used the Box Jenkins ARIMA model and studied for 1999-2000. The study result disclosed that there was no significant relationship between respective exchange rate and oil rate on the stock market indices of BRIC countries.

Somoye, Akintoye and Oseni (2009) carried out a research study on the determinants of equity prices in Nigerian capital Market. Considering a sample size of 130 companies, the study disclosed that all the variables have positive correlation to stock price with the exception of lending interest rate and inflation rate.

The study of Hussainey and Ngoc (2009) is based on two important aspects of share price behaviour in the context of Vietnamese stock market where the study disclosed the positive relation of domestic industrial production and US industrial production on the Vietnamese stock price.

Rahman, Sidek and Tafri (2009) in their study they tried to explore the interactions between selected macroeconomic variables such as money supply, exchange rate, reserves and industrial production index and stock prices in Malaysia. The study reveals the linkage of all the variables with stock prices.

Büyüsalvarci (2010) tries to study the impact of macroeconomic variables in ISE-100 index of Turkish Stock Market by using multiple regression model to the monthly data from 2003 to March 2010.

The result of the study indicates that interest rate, industrial production index, oil price, foreign exchange rate have negative effect on ISE-100 index return, while money supply positively influence ISE-100 Index return. However, inflation rate and gold price do not appear to have any significant effect in ISE-100 index return.

The study of Singh, Mehta and Varsha (2011) on Taiwan stock market revealed the effect of exchange rate and GDP on stock return while inflation rate, employment rate and money supply have negative relation with stock return.

Inegbedion (2012) carried out a study on the macroeconomic determinants of stock price in Nigeria. With the time series data from 2001 to 2009, the study discloses the significance of only one variable i.e. exchange rate out of three variables such as interest rate, inflation rate and exchange rate which influences the stock price behaviour in Nigeria.

Darrat and Mukharjee (1986) in their study applied a vector auto regression model (VAR) on Indian data over 1948-1984 to find out the relationship between stock price and important macro economic variables like exchange rate (rupee / dollar), prime lending rate, narrow money supply and index of industrial production. The results of the study reported weak causality runs from IIP to share price index (SENSEX and Nifty) but not the other way round. In other words it holds the view that the state economy affects stocks prices.

The study of Rao and Jose (1996) observed that the coefficient of total small saving with government on current and non current account was found significant at one per cent level followed by other task variables such as index of industrial production, whole sale price index, foreign exchange reserve, aggregate deposits with commercial banks, inter-bank call money rate etc at 5% level of significance.

The results of the study conducted by Pethe and Karnik (2000) disclosed that only index of industrial production affects SENSEX and NIFTY. The study however, found no evidence of casualty between other macroeconomic variables and the stock price indices.

Chakrabarti (2001) in his study investigated the casual relationship between FII and stock market returns. The result of the study disclosed that in the pre Asian crisis period any change in FII had a positive effect on the equity returns. But in post Asian crisis period, the causation was reverse – equity returns rather caused FII.

Panda and Kamaiah (2001) in their study investigated the casual relationship and dynamic interactions among monetary policy, expected inflation, real activity and stock returns in the post liberalisation period using a vector-auto regression model. The study disclosed that, expected inflation and real activity affect stock returns, monetary policy losses its explanatory power for stock returns when expected inflation and real activity are present in the system.

Bhattacharya and Mukherjee (2002) in their study used Toda and Yamamato's long run Granger causality test to examine the casual relationships between SENSEX and five macroeconomic variables viz money supply, index of industrial production, national income, interest rate and rate of inflation using monthly data from 1992-93 to 2000-2001. The study result disclosed that index of industrial production causes SENSEX casuality, while there exists a bi-directional casualty between SENSEX and rate of inflation.

Mukhopadhyay and Sarkar (2003) conducted a systematic analysis of the Indian stock market in the pre and post liberalization period and the influence of macroeconomic factors on stock returns. The study result revealed that specifically for the post liberalization period, the real economic activity, inflation, money supply, FDI and the NASDAQ index were significant in explaining variations in Indian stock returns.

Mishra (2004) investigated the relationship between stock market and foreign exchange employing Granger causality test and vector auto regression tool for the period 1992-2002. The study disclosed that there exists a unidirectional causality between the exchange rate and interest rate and also between the exchange rate return and demand for money. Further, the study revealed that there is no Granger causality between exchange rate return and stock return.

The study of Kumar (2006) explained the market movement using the direction of the funds flow from foreign institutional investors and mutual funds in the Indian stock market. The result of the study revealed that institutional activity had an influence on the stock market and both foreign institutional investors as well as mutual funds had a significant impact on the market's direction. Further, by employing Granger causality test, the study disclosed that Indian Mutual funds are leading the pack and are giving direction to the market and even foreign institutional investors are following their direction.

In Sharma and Singh (2007)'s study, variables like foreign exchange reserve, exchange rate, index of industrial production, money supply and claim on private sector were found to have a considerable influence on the stock market movement. However, a few variables like interest rate and wholesale price index showed a very negligible influence on the stock market.

Sharma and Mahendru (2010) in their study employed multiple regression models to test the effect of a selected number of macroeconomic factors on stock price. The key macro economic variables used in the study were change in exchange rate, foreign exchange reserve, inflation rate and gold price. The study result disclosed that economic variables like exchange rate and gold price had significant effect on stock price as a whole. However, the result of the study disclosed that inflation rate and

foreign exchange reserve had no influence on the stock price.

The findings of the study of Srivastava (2010) conclude that emerging economics like India in the long run are more affected by domestic macroeconomic factors. The main domestic macroeconomic factors affecting the Indian stock market in the long run are industrial production, wholesale price index and interest rate.

The study of Hosseini, Ahmed and Lai (2011) on the relationship between market indices and four macro economic variables namely crude oil price, money supply, industrial production and inflation rate in China and India disclosed that, there exist both long and short term linkages between macro economic variables and stock market indices in each of these two countries.

Tripathy (2011) in her study reported that the Indian stock market is sensitive towards changing behaviour of international market, exchange rate and interest rate of the economy.

Gupta (2011) in his study employed a regression model to identify the significance of domestic and international factors on stock prices in India. He took SENSEX as the dependent variable and index of industrial production, rate of interest, rate of inflation and foreign institutional investment as explanatory variables. The empirical result disclosed that Indian stock market is mainly influenced by international factors such as foreign institutional investment. Domestic macro variables do

not have any significant influence on the stock market.

The study of Kalra (2012) on the impact of macroeconomic variables on Indian stock market is a comprehensive one. Considering explanatory variables such as Forex rate, CRR, Reserve Repo Rate, Gold Price, Wholesale Price Index (WPI), Oil rate, Inflation rate and GDP, the study disclosed the positive association of forex rate, inflation rate and gold price with the movement of Sensex.

The study of Trivedi and Behera (2012) on the determinants of equity prices of India is one of the recent attempt to examine the influencing role of Index of Industrial Production (IIP), Wholesale Price Index (WPI), Interest rate, Money Supply, Foreign Institutional Investor (FII), Morgan Stanley Capital International Index (MSCI) on the equity prices. Cointegration tests demonstrate that equity prices (BSE Sensex) are significantly related to all the macroeconomic variables considered in this study.

RESEARCH METHODOLOGY
Objective of the Study

The broad objective of the study is to identify and quantify the influence of selected macroeconomic factors on the equity share prices in the Indian stock market. Based on the review of empirical studies the prominent macro factors influencing the variations in share price are gross domestic savings (GDS), gross domestic product (GDP), inflation, foreign institutional investment (FII), net resources

mobilized by mutual funds (NRMF), gold rate (GR) and exchange rate (ER). The present study has also made a modest attempt to examine the impact of the above macroeconomic factors on the variations in share price in Indian stock market. For accomplishing the above objective, the study proposes to test the following relations between share price of selected industries and the macroeconomic variables.

1. Gross domestic saving (GDS) is expected to have a positive influence on share price.

2. Gross domestic product (GDP) is expected to have a positive influence on share price.

3. Inflation is expected to have a negative influence on share price.

4. Foreign institutional investment (FII) is expected to have a positive influence on share price.

5. Net resources mobilized by mutual funds (NRMF) is expected to have a positive influence on share price.

6. Gold Rate (GR) is expected to have a negative influence on share price.

7. Exchange rate (ER) is expected to have a negative relationship with the share price.

Hypothesis

For the purpose of the analysis, the following null and alternative hypotheses have been developed.

H_0: Share prices are not affected by any of the macroeconomic determinants.

H_1: Share prices are affected by any of the macroeconomic determinants.

The Model

Basing on the above hypothesis, the following linear equation has been developed for the purpose of the study.

$$SP = \alpha_0 + \alpha_1\, GDP + \alpha_2 GDS + \alpha_3 ER + {} + \alpha_4 IR + \alpha_5 GR + \alpha_6 FII + \alpha_7 NRMMF + U_t$$

Where:

SP = Average Share Price

GDP = Gross Domestic Product

GDS = Gross Domestic Savings

ER = Exchange Rate

IR = Inflation Rate

GR = Gold Rate

FII = Foreign Institutional Investment

NRMMF=Net Resources Mobilised by Mutual Funds

U_t = Error Term

Study Period and Data Collection

The study was carried out by using the data from secondary sources such as the Database on Indian Economy maintained by RBI as well as from the websites of AMFI and SEBI for the purpose of macroeconomic variables. The share price data has been collected from the Prowess database maintained by CMIE. For the purpose of this research the data relating to gross domestic savings (GDS), gross domestic product (GDP), inflation, foreign institutional investment (FII), net resources mobilised by mutual funds (NRMMF), gold rate (GR) and exchange rate (ER) and share price of different companies

belonging to selected industries are collected, processed and analysed using MS Excel and SPSS-14. As such, the sample finally holds only 104 companies for which the much needed financial information were available for the entire study period i.e. from 1997-98 to 2012-13. The classification of sample companies based on industry groups is as follows:

Table-1 Industry Constituents for Sample Size

Industry Group	No. of Sample Companies
Automobile	27
Pharmaceutical	20
Textile	20
Infrastructure	20
Cement	17
TOTAL	**104**

Limitations of the Study:

The study is based on share price data obtained from CMIE Prowess data base for the sample companies. Similarly macroeconomic variables are collected from the database maintained by RBI, AMFI and SEBI. As such, the study possesses all the inherent limitations of the financial data collected from secondary sources. Non availability of the required financial data for the entire study period has restricted the size of the sample. Therefore, the limitations of the small sample are very much prevalent in this study. The presence or absence of auto-correlation problem in the study has been

tested by the DW statistics. However, no attempt has been made in the study to remove them, in case their existence is felt. It is also unlikely that, the multicolinearity among independent variables might give rise to unexpected signs of the estimated coefficients. Further, the step wise procedure used in this study for selecting variables to include in a model is an extreme example of brute empiricism. It also suffers from being overly influenced by the specific characteristics of the variables being examined. Thus while using the findings of the study, one should be careful and use the same judiciously by taking the various limitations into consideration.

ANALYSIS OF DETERMINANTS

Having analysed the impact of micro factors on the share price behaviour, in the last section, this section of the analysis seeks to examine the impact of a selected number of macro factors on the share price behaviour of selected sample industries. Like micro factors, the macro factors have a significant influence on the share price in the market. This is an undeniable truth. The review of literature dealt in the previous section confirms to this fact. In the present analysis, an attempt has been made to quantify the impact of a selected number of macro factors on the share price behaviour of the sample industries, through the extensive use of stepwise regression analysis. It is a time series analysis, covering a time period of 16 years i.e. from 1998 to 2013. The normality assumption of the regression equation has also been

tested by using Normal P-P Plot of the residuals which has been depicted in Fig. no-1 and it is shown at the end of the paper. For the purpose of analysis, regression equation of the following form is estimated to draw inferences.

$$SP = \alpha_0 + \alpha_1 GDP + \alpha_2 GDS + \alpha_3 ER + \alpha_4 IR + \alpha_5 GR + \alpha_6 FII + \alpha_7 NRMMF + U_t$$

Relevant data for estimation of the above model are fed into the computer using SPSS 14 software for drawing inferences.

Results for Automobile Sector:

It is evident from the results of the estimated regression model for the automobile sector that, macro variables namely GDP, GDS and NRMMF have turned out to be the most significant determinants of share price. Other variables namely ER, IR, GR and FII have failed to find place in the estimated equation. The regression coefficients of GDP, GDS and NRMMF have the appropriate positive signs and they together explain around 91% of the variation in share price in auto sector. The estimated regression model is also found to be statistically significant at 1% level, which is well evident from its F value. Moreover, the DW value discloses no autocorrelation problem in the estimated model.

Results for Pharmaceutical Sector:

It is evident from the Table – 1 that, the estimated regression model for pharmaceutical sector is found to be statistically significant at 1% level and explains satisfactorily the share price behaviour in pharmaceutical sector. The regression coefficients of macro variables namely exchange rate (ER), foreign institutional investment (FII) and net resources mobilised by mutual funds (NRMMF) have the hypothesised negative or positive signs. All the above three variables are found to be statistically significant. The value of the coefficients of determination (R^2) is found to be 0.956. This implies that, around 95% of variation in share price in pharmaceutical sector is explained by ER, FII and NRMMF. Moreover, there is no evidence of autocorrelation problem in the estimated equation.

Results for Textile Sector:

In textile sector, the estimated regression model is found to be statistically significant at 1% level and explains satisfactorily the variations in share price (Table-1). It is further observed that, the regression coefficients of the macro variables namely gross domestic product (GDP), exchange Rate (ER) and net resources mobilised by mutual funds (NRMMF) have the appropriate signs. All the above macro variables are found to be statistically significant. The regression coefficients of GDP and NRMMF are found to be significant with their hypothesised positive signs. However, the coefficient of exchange rate (ER) is found to be significant at 1% level with its hypothesised negative sign. The value of the coefficients of determination (R^2) is found to be 0.918.

This states that around 91% of the variation in share price in textile sector is well explained by GDP, ER and NRMMF. Moreover, there is no evidence of autocorrelation problem in the estimated equation.

Results for Infrastructure Sector:

In infrastructure sector, the results of the estimated regression model disclose that GDP, GDS and FII are the three prominent macro factors influencing the variation in share price. Other macro variables considered for analysis namely ER, IR, GR and NRMMF have failed to find place in the estimated equation. The regression coefficients of GDP, GDS and FII have the appropriate positive signs and all of them turned statistically significant. The estimated regression model is found to be statistically significant at 1% level. The value of the coefficient of determination is found to be 0.892. This precisely states that around 89% of variation in share price in infrastructure sector is explained by GDP, GDS and FII together. Moreover, there is no evidence of autocorrelation problem in the estimated equation.

Results for Cement Sector:

It is evident from the regression results disclosed in Table – 1 that, the key macro factors influencing the share price in cement sector are gross domestic savings (GDS), exchange rate (ER) and net resources mobilised by mutual funds (NRMMF). The regression coefficients of all these three macro variables are found to be statistically significant with their hypothesised positive or negative signs. The estimated regression model is found to be statistically significant at 1% level. The value of coefficient of determination (R^2) is found to be 0.973. This implies that, around 97% of variation in share price in cement sector is explained by the estimated regression model.

The above industry wise analysis of stepwise regression tests for macro factors disclose that, the key macro factors influencing the share price behaviour in selected sample industries are gross domestic product (GDP), gross domestic savings (GDS), exchange rate (ER), foreign institutional investment (FII) and net resources mobilised by mutual funds (NRMMF). However, the analysis failed to establish the significance of variables namely inflation rate and gold rate. In none of the industrial sector their impact was felt. It is observed from the regression results that, net resources mobilised by mutual funds (NRMMF) as a key determinant of share price is found in automobile sector, pharmaceutical sector, textile sector and cement sector. The significance of gross domestic savings (GDS) is found prominent in automobile and cement sector. Foreign Institutional Investment (FII) turned out to be a significant determinant of share price in pharmaceutical and infrastructure sector. Gross domestic product (GDP) is found to be a significant determinant of share price in automobile, textile and infrastructure sector. Moreover, the influence of exchange rate (ER) is found prominent in pharmaceutical, cement and textile sector.

Table 1: Industry wise results of Stepwise Regression tests for Macro Factors (1998 - 2013)

$$SP = \alpha_0 + \alpha_1 GDP + \alpha_2 GDS + \alpha_3 ER + \alpha_4 IR + \alpha_5 GR + \alpha_6 FII + \alpha_7 NRMMF + U_t$$

Industry Group	a_0 Constant	a_1	a_2	a_3	a_6	a_7	R^2	Adj R^2	F Ratio	DW
Automobile Sector	- 222.489	0.523* (3.275)	0.427** (2.982)			0.656* (3.723)	0.913	0.907	147.251*	1.825
Pharmaceutical Sector	- 160.278			-.523** (-2.762)	0.457** (2.595)	0.942* (10.555)	0.956	0.923	111.31	1.782
Cement Sector	1099.266		0.926* (8.721)	- 0.157** (-2.793)		0.216* (4.108)	0.973	0.966	167.966*	1.821
Textile Sector	28.868	1.223* (11.146)		-0.453* (- 4.445)		0.261** (2.875)	0.918	0.898	44.855*	1.732
Infrastructure Sector	- 456.277	0.878* (7.251)	0.561* (3.332)		0.598** (2.791)		0.892	0.878	62.122*	1.875

Notes:

The above table discloses the industry wise standardised estimated regression parameters of the "Model of goof fit" only. Other estimated models have been ignored for analysis.

Figures in parentheses denote 't' values

* Significant at 1% level   ** Significant at 5% level

FINDINGS AND CONCLUSION:

Table- 2 Summary Results for Macro Factors

INDUSTRY GROUP/VARIABLES	GDP	GDS	ER	IR	GR	FII	NRMMF
AUTO	S*	S**					S*
PHARMACEUTICAL			-S**			S**	S*
TEX	S*		-S*				S**
INFRA	S*	S*				S*	
CEMENT		S*	-S**				S*
TOTAL	3	3	3	0	0	2	4

Source- Compiled from Table-1
s* - Significant at 1% level
s**- Significant at 5% level

The summery results of industry wise analysis for the macro variables are displayed in the table- 2. From the table it can be found that gross domestic product (GDP), gross domestic savings (GDS), exchange rate (ER), foreign institutional investment (FII) and net resources mobilised by mutual funds (NRMMF) are the key macro factors influencing share price behaviour in the selected sample industries. However, the analysis failed to establish the significance of variables namely inflation rate (IR) and gold Rate (GR) in any one of the sample industries chosen for the study. It is further observed from the regression results that, net resources mobilised by mutual funds (NRMMF) as a key determinant of share price is found in automobile, pharmaceutical, textile and cement sectors. The significance of gross domestic savings (GDS) is found prominent in automobile and cement sector. Foreign institutional investment (FII) turned out to be a significant determinant of share price in pharmaceutical and infrastructure sector. Gross domestic product (GDP) is found to be a significant determinant of share price in automobile, textile and infrastructure sector. Moreover, the influence of exchange rate (ER) is found prominent in pharmaceutical, cement and textile sectors. The result of the study shows the expected signs as discussed in the objective section of this paper. The current study can be extended by analysing more industries for theoretical development.

Fig-1 Normal P-P Plot of Regression Standardised Residuals for Macro Variables (TEXTILE SECTOR)
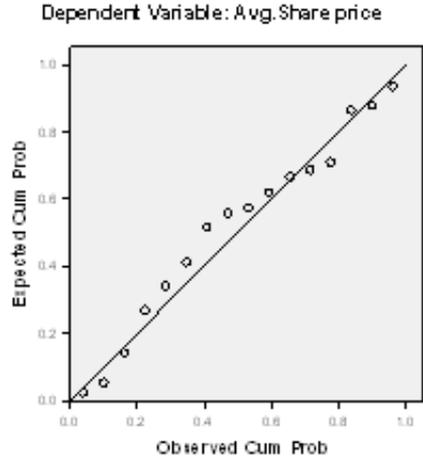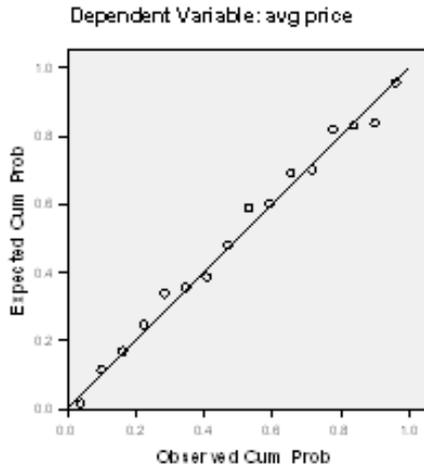

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: avg price
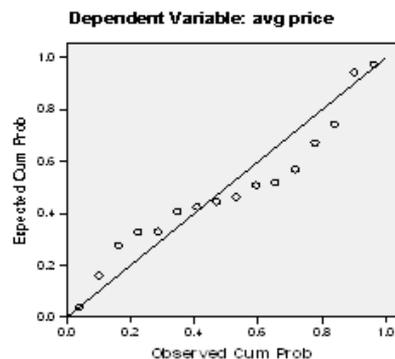
(PHARMACEUTICAL SECTOR)   **(AUTOMOBILE SECTOR)**

Normal P-P Plot of Regression Standardized Residual   Normal P-P Plot of Regression Standardized Residual

Dependent Variable: avg price

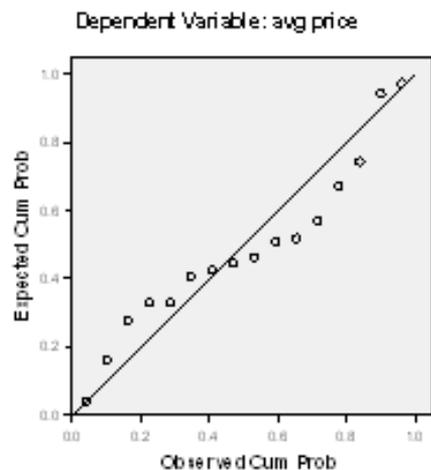Dependent Variable: Avg. Share price
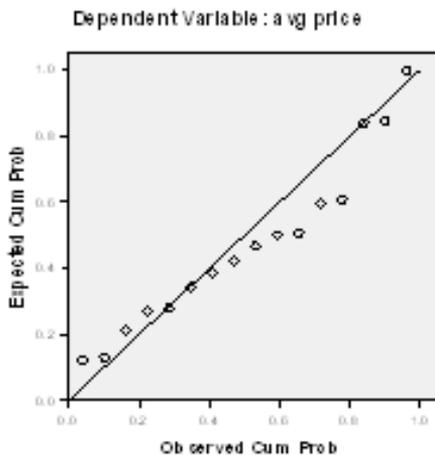
(INFRASTRUCTURE SECTOR)   **(CEMENT SECTOR)**

Normal P-P Plot of Regression Standardized Residual   Normal P-P Plot of Regression Standardized Residual

Dependent Variable : avg price

Dependent Variable: avg price

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