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IMPACT OF EXCHANGE RATE MOVEMENT AND WORLD OIL PRICE ON INDIAN AUTO STOCKS

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ABSTRACT

Stock market is one of the most important metric for the management and shareholders in organisation. They measure and specify the worth the company if it is taken as individual and specify the progress of the nation when taken as whole. The complex composition of the stock market is some time susceptible for the minor change in major macroeconomic variable such as GDP, Interest rate, PPP, exchange rate etc. hence it is very necessary for the researchers to evaluate the change which can impact on stock market by these macroeconomic variables. Foreign exchange return is also important in the context of macroeconomic management of a country meaning to say that if a relationship between the foreign exchange rate and the stock market return is found to exist, then the government has the opportunity to manage the exchange rate and thus the return on the stock market. When taken as sector wise then there may other macroeconomic variables which may influence that sector but no influence on the other sector, such as world oil price which particularly influence the auto sectors. In this study the Indian Auto stocks have been evaluated on the basis of time series Analysis, the major economic variables such as world oil price and exchange rate has been considered as the independent variable which predicted to influence the dependent variable like BSE Auto Stocks. Econometric models have been used such of ARCH and GARCH (1,1) model to investigate the outcomes. Here in this work it has been found both world oil price and exchange rate influence BSE Auto stocks significantly.

KEYWORDS
exchange rate, auto stock, world oil price.

1. INTRODUCTION

Exchange rate volatility is at the centre of the debate on the performance of exchange rate regime. This concern was reinforced by the fluctuations in exchange rates since the move to flexible exchange rate systems in 1973 (Omojimite and Akpokodje 2010). A major concern has the consequence of exchange rate volatility which is a prominent feature of flexible exchange rate systems. Since after the breakdown of the Bretton Woods system in the 1970s, the exchange rate of many countries have been fluctuating considerably over time, a large number of research deals with the implication of Exchange Rate Volatility for the real economy. Today Exchange rate movements are a fundamental factor which greatly impact in the global economy, determining the allocation of resources internationally and affecting the profitability of everyday international transactions. Hence these exchange rate issues are sensitive issues when looked in terms of external transaction with other nation, the concept of nations currency will come into picture which represents the business from nation's side. Stronger the nation's currency better can be the business. But since the currency of India has been depreciating in front of US dollar which caused the main concern in the area of business.

Crude oil has been regarded as one of the important commodities in the world (Hubbard, 1998). It has been observed that crude oil prices are hugely controlled by shocks to the flow of supply of oil and flow demand. While growth in emerging economies has mattered primarily for the latest surge in oil prices; more generally, this is about demand from all countries in the world.

Both the above macroeconomic factors are very crucial for any Auto sector of the nation. Especially in India these two factors are considered as important but it's not sure at what level these two factors affect the Auto sectors. In this research work only world oil price and exchange rate are taken into consideration to estimate the impact of BSE auto stocks.

2. LITERATURE REVIEW

2.1. LITERATURE REVIEW ON EXCHANGE RATE VOLATILITY ON STOCK

The relationship between stock prices and exchange rates has preoccupied the minds of economists since they both play important roles in influencing the development of a country's economy. In the recent years, because of increasing international trade and cross market returns and capital inflow, the scenario of impact of macro variables on stock market has become more important issue for any economist to business analyst. The following research work explains the relation between exchange rate and stock market.

Phylaktis and **Ravazzolo** (2005) investigated the long run and short run dynamics between stock prices and foreign exchange rates and the means through which exogenous shocks impact on a group of pacific Basin countries. The research analyzed the period span ranging from 1980 to 1998 with data collected on a monthly basis by applying the co-integration method and multivariate Granger causality tests. The results suggested that stock markets and foreign exchange markets are positively related and that the United States stock market acts as a conduit for these links, also the financial crises had a temporary effect on the long run movement of these markets.

Kurihara (2006) chose the period March 2001 to September 2005 to investigate the relationship between macroeconomic variables and daily stock prices in Japan. He used the Japanese stock prices, U.S stock prices, the foreign exchange rate (yen/U.S. dollar) the Japanese interest rate. The empirical results showed that domestic interest rate does not influence Japanese stock prices. However, the exchange rate and U.S stock prices affect Japanese stock prices. Consequently, the quantitative easing policy implemented in 2001 has influenced Japanese stock prices.

Yau and **Nieh** (2006) investigate short- and long- term interrelationships among stock prices of Taiwan and Japan, and New Taiwan Dollar/ Yen exchange rates. The study analyzes the period span from January 1991 to July 2005 via applying co-integration and Granger causality tests. The findings include the stock prices of Taiwan and Japan impact each other for short durations. The portfolio approach is supported for the short term and traditional approach is more plausible for the long-term in the Taiwanese financial market, where as the portfolio approach is not suitable for the Japanese stock markets, all with regard to the relationship

between stock prices and foreign exchange rate. The findings also suggested that there appears to be no long term relationship between New Taiwan Dollar/Yen exchange rate and the stock prices of Taiwan and Japan.

Pan et al. (2007) took the data of seven East Asian countries over the period 1988 to 1998 to examine the dynamic linkages between foreign exchange rates and stock prices. The findings of their study revealed that there was a bidirectional causal relation for Hong Kong before the 1997 Asian crisis. Also, there was a unidirectional causal relation from exchange rates and stock prices for Japan, Thailand and Malaysia and from stock prices to exchange rates for Korea and Singapore. During the Asian crises, there was a causal relationship from exchange rates to stock prices for all countries except Malaysia.

Erbaykal and **Okuyan** (2007) investigated the validity of the traditional or portfolio approach in emerging markets in Asia and South America. The study analyzed different periods based on the data availability for the tested countries by applying co integration and Granger causality tests. The Results showed a negative relationship between stock prices and foreign exchange rates in six countries in the long run. There is a causal relationship in eight countries. For five countries, there is a unidirectional causality from stock prices to foreign exchange rates, and for three countries there is a bi directional causality between stock prices and foreign exchange rates.

Pekkaya and **Bayramoglu** (2008) analyze the causality between exchange rate and stock prices of Istanbul Stock Index and S&P 500 in Turkey. The study analyzed the period span from 1990 to 2007 by applying Granger causality tests. The findings implied that there was a Granger cause from Turkey stock prices and S&P 500 to exchange rates for the period 1990 to 2007. The Granger cause between exchange rates and Turkey stock prices was bidirectional. On the other hand, S&P 500 has a unidirectional Granger cause against Turkey stock prices and exchange rates.

Aydemir and **Demirhan** (2009) conducted a research on the relationship between stock prices and exchange rates in Turkey for the period February 23rd 2001 to January 11th 2008. They used the Toda and Yamamoto (1995) method to analyze the data. The results of the empirical study indicated that there was a bidirectional causal relationship between foreign exchange rates and all the stock market indices.

Muhammad and **Rasheed** (2011) conducted a study on the relationship between stock prices and exchange rates in four South Asian countries; Pakistan, India, Bangladesh and Sri- Lanka, for the period January 1994 to December 2000. The study employed cointegration, vector error correction modelling technique and standard Granger causality tests to examine the long-run and short-run association between stock prices and exchange rates. Results of the study showed no short-run association between the variables for all four countries. There was no long-run relationship between stock prices and exchange rates for Pakistan and India as well. However, for Bangladesh and Sri- Lanka, there appeared to be a bi-directional causality between these two financial variables.

Sekmen (2011) examined the effects of exchange rate volatility, using the squared residuals from the autoregressive moving average (ARMA) models, on stock returns for the U.S. for the period 1980 to 2008. The study found that exchange rate volatility negatively affected U.S. stock returns since the availability of hedging instruments could not lessen the negative effect of exchange rate volatility on trade volume. In another study, Olugbenga (2012) examined the long-run and short-run effects of exchange rate on stock market development in Nigeria over 1985:1–2009:4 using the Johansen cointegration tests. Results showed a significant positive stock market performance to exchange rate in the short-run and a significant negative stock market performance to exchange rate in the long-run

Sifunjo and **Mwasaru** (2012) investigated the causal relationship between exchange rates and share prices in Kenya. The empirical results obtained over the period November 1993 to May 1999 indicated that the exchange rates granger causes stock prices in Kenya. The study also found out a unidirectional causality from exchange rates to stock prices. Therefore, the movements in exchange rates exert significant influence on stock price determination in Kenya. They tested for stationary, co-integration and finally used the error correction model to test causality.

Olugbenga (2012) examined the long-run and short-run effects of exchange rate on stock market development in Nigeria over 1985–2009 using the Johansen co-integration tests. A bi-variate model was specified and empirical results show a significant positive stock market performance to exchange rate in the short-run and a significant negative stock market performance to exchange rate in the long-run. The Granger causality test shows strong evidence that the causation runs from exchange rate to stock market performance; implying that variations in the Nigerian stock market is explained by exchange rate volatility.

Subair and **Salihu** (2013) examined exchange rate volatility and the stock market evidenced from Nigerian through the Error Correction model, this study investigated the effects of exchange rate volatility on the Nigeria stock markets. The study found that the exchange rate volatility generated via ARCH process exerts a stronger negative impact on the Nigeria stock markets. However, the rate of inflation and interest rate did not have long run relationship with stock market capitalization since the major participant in the market is government. The study recommended that a coordinated monetary and fiscal policy should be put in place to check mate the fluctuation of exchange rate in order to deepen the depth of the Stock Market.

Mlambo, Maredza and **Sibanda** (2013) assessed the effects of currency volatility on the Johannesburg Stock Exchange. An evaluation of literature on exchange rate volatility and stock markets was conducted resulting into specification of an empirical model. The Generalised Autoregressive Conditional Heteroskedascity (1.1) (GARCH) model was used in establishing the relationship between exchange rate volatility and stock market performance. The study employed monthly South African data for the period 2000–2010. The data frequency selected ensured an adequate number of observations. A very weak relationship between currency volatility and the stock market was confirmed

2.2. LITERATURE REVIEW ON OIL PRICE ON STOCK

A lot of empirical researches have studied the relationship between oil price shocks and macroeconomic variables. However, there is relatively little work on the relationship between oil price shocks and financial markets

Hamilton (1983) provided evidence of correlation between oil price and economic output, and further claimed that oil price was to be blamed for every post-World War II (1948-1972) recessions in the US economy. According to the author, the data (real GNP, unemployment, implicit price deflator for nonfarm, hourly compensation per worker, import prices, and M1) indicated that economic recession preceded an oil price increase after 3-4 quarters, with recovery starting after 6-7 quarters. Gisser and Goodwin (1986), Mork (1989), and Hooker (1996) provided evidence in support of Hamilton's findings.

Jones and **Kaul (1996)** tested whether the reaction of international stock markets to oil shocks can be justified by current and future changes in real cash flows and changes in expected returns. They found that in the postwar period, the reaction of United States and Canadian stock prices to oil shocks can be completely accounted for by the impact of these shocks on real cash flows.

Huang, Masulis, and **Stoll** (1996) examined the link between daily oil future returns and daily United States returns. Their evidence suggested that oil returns do lead some individual oil company stock returns, but oil future returns do not have much impact on general market indices. Using monthly data over the period 1947-1996, Sadorsky (1999) shown that oil price and its volatility both play important roles in affecting real stock returns. Especially, oil price movements after 1986 explained a large fraction of the forecast error variance in real stock returns than did interest rates.

Sadorsky (1999) used monthly data to probe the relationship between oil prices and stock returns for the US from January 1947 to April 1996. The author applied variance decomposition. The findings suggested that oil prices and stock returns have a negative relationship in the short term, meaning higher oil prices lead to lower stock returns.

Papapetrou (2001) applied vector error correction modelling to study the effect of oil prices on stock returns for Greece using daily data and the variance decomposition. The study suggested a negative oil prices effect on stock returns that extended over four months.

Maghyereh (2004) studied the dynamic linkage between oil price and stock returns in 22 emerging economies using the unrestricted Vector Autoregressive (VAR) approach proposed by Sim (1980) with daily data.

Aloui and Jammazi (2009) applied a univariate regime-switching EGARCH model to examine the relationship between crude oil shocks and UK, French and Japanese stock markets. They detected two episodes of series behaviour, one relative to low mean and high variance regime and the other to high mean and low variance regime, and provided evidence that common recessions coincide with the low mean and high variance regime.

Bharn and Nikolova (2010) have also examined the dynamic correlation between stock market and oil prices, in Russia, using a bivariate EGARCH model. They identified three major events (i.e. September 11th, 2001 terrorist attack, war in Iraq 2003 and the civil war in Iraq in 2006) which caused a negative correlation between the Russian stock market and the oil prices.

Cifarelli and Paladino (2010) applied a multivariate CCC-GARCH model and provided evidence that oil price shifts are negatively related to stock price and exchange rate changes.

Furthermore, **Lee and Chiou** (2011) applied a univariate regime-switching GARCH model to examine the relationship between WTI oil prices and S&P500 returns. They concluded that when there are significant fluctuations in oil prices, the resultant unexpected asymmetric price changes lead to negative impacts on S&P 500 returns, but the result does not hold in a regime of lower oil price fluctuations.

3. OBJECTIVES

1. To estimate the impact of exchange rate on Auto stocks of BSE
2. To estimate the impact of world oil price on Auto stocks of BSE

4. RESEARCH METHODOLOGY

Data for the study is obtained from the Bombay Stock Exchange. The study has been conducted from January 2001 to 2015, Exchange rate of Indian Rupee is taken from RBI website and international oil price is considered for the study.

MODEL SPECIFICATION

This research work is fundamentally analytical as it embraces the use of secondary data in examining the effect of exchange rate volatility on the BSE auto stocks. The analytical tools consist of the econometrical tests (i.e Unit Root Test, ARCH and GARCH models). The data for the study was obtained mainly from secondary sources.

The study adopted stationarity test using the Augmented Dickey Fuller Test (ADF). This test is aimed at ascertaining the stationarity properties of the time series in order to avoid spurious regression or random walk in the regression estimates and ensure reliability of estimates and therefore the application of appropriate test statistic for long run relationship/effect. The ADF formula is thus specified as:

$$\Delta P_{it} = \beta_1 + \beta_{2t} + \sigma P_{it-1} + \alpha \sum_{t-1}^{m} \Delta P_{it-1} + \varepsilon_{it}$$

The ARCH model has become a popular method because its variance specification can capture commonly observed features of the time series of financial variables; in particular, it is useful for modelling volatility and especially changes in volatility over time (Hill et al 2008) cited in Arabi (2012). Most economic and financial time series and especially conditional stock market volatility has always been studied using the ARCH and GARCH models introduced by Engle (1982) and Bollerslev (1986) respectively. Assuming linearity, the first and second conditional moments of return series (given its past behaviour) can be jointly estimated by GARCH (p, q) in order to characterize the dependence of future observations on past values.

Therefore, the jointly estimated GARCH (1, 1) model introduced by Bollerslev (1986) is given by;

$$Y_t = X_t^1 \theta + \varepsilon_t$$

$$\alpha_t = \delta_t Z_t,\ Z_t : N(0, 1)$$

$$\delta_t^2 = \omega + \alpha \varepsilon_{t-1}^2 + \beta \delta_{t-1}^2$$

Where, the mean equation given in is written as a function of exogenous variables with an error term $\omega>0$, $\alpha>0$, $\beta\geq 0$, ω is a constant term, ε_{t-1}^2 is news about volatility from the previous period measured as the lag of the squared residual from the mean equation (the ARCH) and δ_{t-1}^2 is the last periods forecast variance (the GARCH term).

GARCH (p, q) is the Generalised ARCH by Bollerslev (1986) models used widely especially in financial time series analysis:

$$\delta_t^2 = \omega + \sum_{t-1}^{p} \alpha_t \varepsilon_{i-1} \sum_{j-1}^{q} \beta_t \delta_{t-i}^2 ;$$

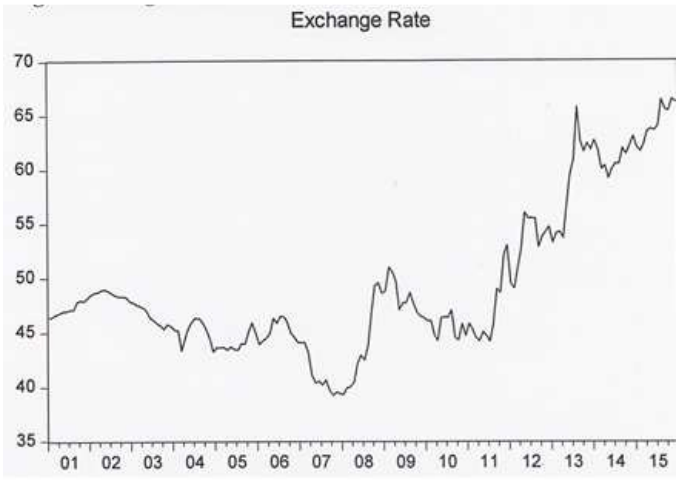
$$\varepsilon_t^2 \sim N(0, 1);\ \omega>0,\ \alpha_i>0,\ \beta_j\geq 0$$

5. FINDING AND ANALYSIS

5.1. An overview of the volatility of Rupee and World Oil Price

5.1.1. Volatility of Indian Rupee against Dollar

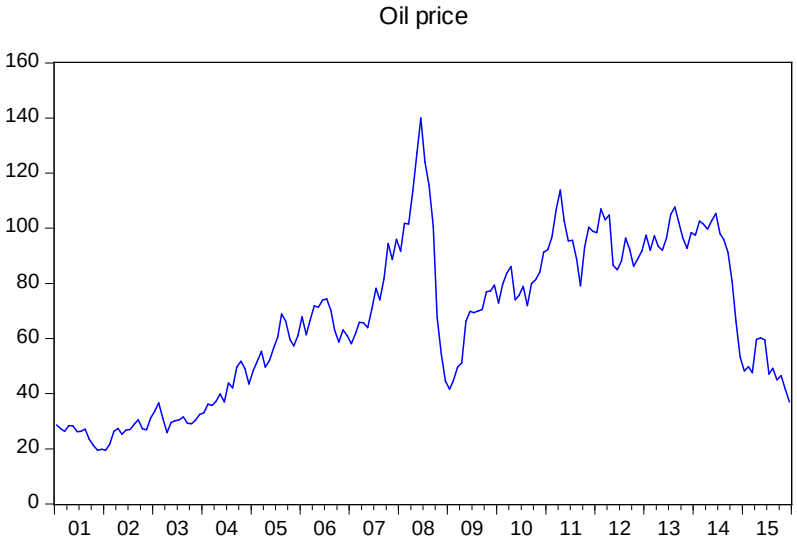
FIG. 1: EXCHANGE RATE OF INR Vs. USD



The graph clearly shows that Indian rupee value favourable in the period of 2007 to 2008. The sudden upsurge in the value of Indian rupee in the closing of the financial year 2006-07, which took most market players by surprise and proved one of the best performing Asian units. On 2007, the rupee quoted its nine year high against the dollar at 41.86. Surprisingly at the end of May 2007, the dollar strengthened quite significantly against almost all currencies, but failed to impress the rupee. Most of the appreciation (11 percent) has occurred since March 2007 (*Sumanjeet, 2008*). The rupee has depreciated more than 20 percent in 2008. On 22 October, the rupee fell as low as 49.50, at which point it was down 20.4 percent in 2008 In 2010 the rupee value has which was 46.78 has come to 45 at the end of the year, and at the year 2011 it again raised to 52 and in 2012 end it again raised to 54.6 and In 2013 May it again raised to 58.9 and June 59.3 and in July it reached 60 per US dollar.

5.1.2. Volatility of World Oil price

FIG 2: WORLD OIL PRICE IN US DOLLAR



Like prices of other commodities, the price of crude oil experiences wide price swings in times of shortage or oversupply. The crude oil price cycle may extend over several years responding to changes in demand as well as OPEC and non-OPEC supply. Throughout much of the twentieth century, the price of U.S. petroleum was heavily regulated through production or price controls. In the post-World War II era, U.S. oil prices at the wellhead averaged $28.52 per barrel adjusted for inflation to 2010 in dollars. In the absence of price controls, the U.S. price would have tracked the world price averaging near $30.54. Over the same post war period, the median for the domestic and the adjusted world price of crude oil was $20.53 in 2010 prices. Adjusted for inflation, from 1947 to 2010 oil prices only exceeded $20.53 per barrel 50 percent of the time. Until March 28, 2000 when OPEC adopted the $22-$28 price band for the OPEC basket of crude, real oil prices only exceeded $30.00 per barrel in response to war or conflict in the Middle East. With limited spare production capacity, OPEC abandoned its price band in 2005 and was powerless to stem a surge in oil prices, which was reminiscent of the late 1970s.

5.2. Data analysis

5.2.1. Descriptive statistics

TABLE 1: DESCRIPTIVE STATISTICS OF 3 VARIABLES

BSE auto		Exchange Rate		Oil price	
Mean	6698.574	Mean	49.32161	Mean	66.34094
Median	5060.830	Median	46.96250	Median	66.47000
Maximum	19985.90	Maximum	66.46200	Maximum	140.0000
Minimum	543.6500	Minimum	39.19500	Minimum	19.44000
Std. Dev.	5313.441	Std. Dev.	6.967497	Std. Dev.	28.17583
Skewness	0.929243	Skewness	1.015493	Skewness	0.062028
Kurtosis	3.029079	Kurtosis	2.969301	Kurtosis	1.956846
Jarque-Bera	25.91111	Jarque-Bera	30.94387	Jarque-Bera	8.276694
Probability	0.000002	Probability	0.000000	Probability	0.015949

JB Value: From the above observation the J-B value of three values deviated from normal distribution.

Skewness and kurtosis: skewness and kurtosis represent the nature of approximately symmetric for oil price and highly skewed for BSE auto and Exchange rate and reflect positive skewness and the value for kurtosis is positive indicating distribution more peaked than a Gaussian distribution

5.2.2. Testing for stationarity

If the mean and variance are constant over time, then the series is stationary. Stationarity is essential for standard econometric theory. Unit root tests were performed; the Augmented Dickey Fuller test showed all three variables are stationary. This indicating that we can conduct ARCH test.

TABLE 2: TEST FOR STATIONARITY: UNIT ROOT TEST – AUGMENTED DICKEY FULLER TEST

TABLE 2.1: VARIABLE WITH INTERCEPT BUT NO TREND AND VARIABLES WITH TREND AND INTERCEPT

Variables	intercept		Trend and Intercept	
	level	1st difference	level	1st difference
BSE - Auto				
Augmented Dickey-Fuller test statistic	0.852810	-12.81255	-1.465839	-12.93745
P – Value	0.9947	0.0000	0.8377	0.0000
Exchange Rate				
Augmented Dickey-Fuller test statistic	0.250644	-12.11582	-1.149309	-12.24955
P – Value	0.9750	0.0000	0.9167	0.0000
Oil price				
Augmented Dickey-Fuller test statistic	-2.115885	-10.10879	-1.877904	-10.17360
P – Value	0.2388	0.0000	0.6618	0.0000

TABLE 2.2: TEST CRITICAL VALUES

	BSE Auto		Exchange rate		Oil price	
Level	**Intercept**	**Trend and intercept**	**Intercept**	**Trend and intercept**	**Intercept**	**Trend and intercept**
1% level	-3.466994	-4.010143	-3.466994	-4.010143	-3.467205	-4.010440
5% level	-2.877544	-3.435125	-2.877544	-3.435125	-2.877636	-3.435269
10% level	-2.575381	-3.141565	-2.575381	-3.141565	-2.575430	-3.141649
First difference	**Intercept**	**Trend and intercept**	**Intercept**	**Trend and intercept**	**Intercept**	**Trend and intercept**
1% level	-3.467205	-4.010440	-3.467205	-4.010440	-3.467205	-4.010440
5% level	-2.877636	-3.435269	-2.877636	-3.435269	-2.877636	-3.435269
10% level	-2.575430	-3.141649	-2.575430	-3.141649	-2.575430	-3.141649

5.2.3. Testing for ARCH effect

Brooks (2008) argues that it is worthwhile first to compute the ARCH test to make sure that this class of models (GARCH) is appropriate for the data. In this regard, the ARCH test was used to test for ARCH effects on the residuals. The results are presented by table below.

TABLE 3: TESTING OF ARCH EFFECT

Heteroskedasticity Test: ARCH

F-statistic	472.4467	Prob. F(1,177)	0.0000
Obs*R-squared	130.2154	Prob. Chi-Square(1)	0.0000

Table 3 shows that the statistic labelled "Obs*R-squared" is the ARCH test of autocorrelation in the squared residuals. The p-value (0.0000) indicates heteroscedasticity in the residuals. In other words, the zero probability value strongly shows the presence of heteroscedasticity in the residuals

5.2.4. Result of test of GARCH effect

Under the normal Gaussian distribution ARCH is significant and we can conduct the GARCH test. Under the distribution GARCH is also significant for exchange rate but not for Oil price. It means that previous days BSE auto stock value can influence todays BSE auto stocks resulting BSE auto stock is influenced by its own ARCH and GARCH. Exchange rate is also significant indicating that fluctuation in exchange rate and oil price are affecting the BSE Auto Stocks. But since oil price showed p value more than 5 percent, hence oil price has negative effect on BSE auto stocks.

TABLE 4: RESULTS FROM GARCH (1,1) MODEL

Dependent Variable: BSE_AUTO
Method: ML - ARCH (Marquardt) - Normal distribution
Included observations: 180
Presample variance: backcast (parameter = 0.7)
GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*GARCH(-1) + C(6)*OIL_PRICE

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-19768.33	1712.111	-11.54617	0.0000
EXCHANGE_RATE	547.0071	33.79285	16.18706	0.0000
Variance Equation				
C	11195310	1772750.	6.315222	0.0000
RESID(-1)^2	0.875078	0.287515	3.043593	0.0023
GARCH(-1)	-0.418897	0.110748	-3.782423	0.0002
OIL_PRICE	-72232.22	7050.119	-10.24553	0.2800

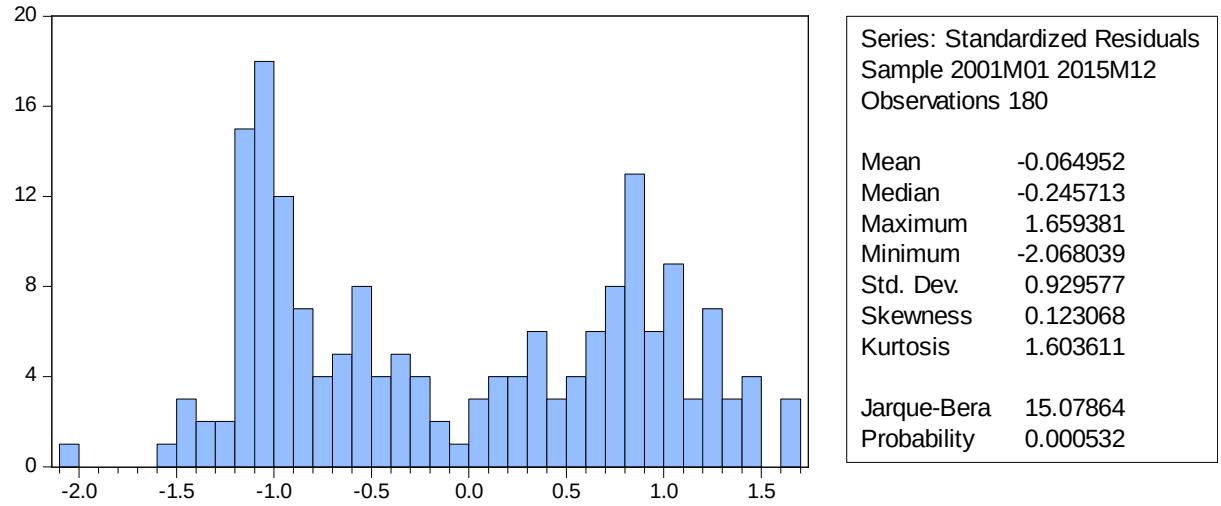
5.3. Diagnostic Test

Gujarati (2004:516) argues that diagnostic tests should be performed so that the model finally chosen is a good model in the sense that all the estimated coefficients have the right signs, they are statistically significant on the basis of the t and F tests. In this regard, this study employs the Histogram and Normality test, Correlogram of Squared Residual Test, and the Heteroscedasticity test as its diagnostic tests. We have three models which are hypothesises as follow:

H0 = there is no serial correlation in the residual or error terms H1 = there is serial correlation	*Correlogram square residual (Q test can be performed)*
H0 = residual are normally distributed H2 = Residuals are not normal	*Jarque-Bera statistics will be used*
H0 = There is no ARCH effect H3 = There is ARCH effect	*ARCH test should be conducted*

5.3.1. Normality test

TABLE 5: NORMALITY TEST



In the above table p value is less than 5% which means we can reject null hypothesis. Results from the Normality test show that the normal GARCH model best reduced the problems of fat tails and volatility clustering. The kurtosis and skewness are smaller under the normal GARCH model (0.12 and 1.6 respectively). In this regard, it can be concluded that the residuals are not normally distributed.

5.3.2. Heteroscedastic test

TABLE 6: HETEROSCEDASTICITY TEST

Heteroscedasticity Test: ARCH

F-statistic	11.99774	Prob. F(1,177)	0.0007
Obs*R-squared	11.36308	Prob. Chi-Square(1)	0.0007

Table 6 presents results for the ARCH test. Engle's LM test indicates that there are ARCH effects. The p value of the Obs*R-squared in not significant; it is greater than 0.05 and this indicates that there is no ARCH present. The p value is 0.0007 and this shows that there is heteroscedasticity in the residual.

5.3.3. Testing for Autocorrelation: Q Statistic test

TABLE 7: Q STATISTIC TEST

	AC	PAC	Q-Stat	Prob
1	0.252	0.252	11.581	0.001
2	0.464	0.427	51.158	0.000
3	0.296	0.159	67.338	0.000
4	0.286	0.048	82.527	0.000
5	0.230	0.017	92.450	0.000
6	0.146	-0.065	96.485	0.000
7	0.134	-0.034	99.863	0.000
8	0.037	-0.081	100.13	0.000
9	0.143	0.104	104.07	0.000
10	0.066	0.065	104.91	0.000
11	-0.008	-0.118	104.93	0.000
12	0.201	0.207	112.79	0.000
13	0.053	0.052	113.35	0.000
14	0.084	-0.096	114.74	0.000
15	0.045	-0.052	115.13	0.000
16	0.043	-0.028	115.51	0.000
17	0.060	0.033	116.22	0.000
18	0.121	0.138	119.16	0.000
19	-0.056	-0.166	119.79	0.000
20	0.017	-0.019	119.84	0.000
21	-0.057	-0.073	120.52	0.000
22	-0.026	-0.057	120.66	0.000
23	-0.107	-0.006	123.03	0.000
24	-0.110	-0.098	125.57	0.000
25	-0.121	-0.036	128.64	0.000
26	-0.165	-0.034	134.40	0.000
27	-0.083	0.016	135.87	0.000
28	-0.060	0.193	136.65	0.000
29	-0.055	0.041	137.30	0.000
30	0.059	0.028	138.05	0.000
31	-0.089	-0.095	139.78	0.000
32	0.091	0.048	141.60	0.000
33	-0.023	0.034	141.72	0.000
34	0.101	0.062	144.02	0.000
35	0.066	0.066	145.02	0.000
36	0.047	-0.003	145.51	0.000

The Q-statistic test was carried out and results showed that the *Q-statistics* were all significant at all lags under the normal GARCH model, indicating that there is no significant serial correlation in the residuals. Table 7 presents results from the Q-statistic Test. In this table all P value are above 5% which means that we cannot reject null hypothesis and GARCH model with normal distribution has no serial correlation

6. CONCLUSION

In an international business there are many macroeconomic variables which can influence nation's economy and also other variables which measure the nations progress, such as stock prices and lively hood of a person. There are many macro-economic variables for which an intense research has undertaken and showed the relationship with one another such as GDP, PPP, Exchange Rate, Inflation, and Interest Rate etc. their relationship has been compared with many other variables such as firm value, stock price of particular firm or one sector. Here in this research the impact of exchange rate and oil price was evaluated. There was a great fluctuation in the exchange rate as per the data concern and when we check the world oil price data which became cheaper in the later years has addressed many researchers to investigate the impact of Oil price on the stock exchange but in this study entire stock prices were not considered but stress given to Auto sector. Hence work was conducted to know the impact. The main objective this study was to examine the impact of Exchange rate volatility on the Auto stock market in India and also impact of Oil price fluctuation on Indian stock market. The analysis of this study reports a there is strong relation between exchange rate and BSE auto stocks and weak relationship between oil price on the BSE Auto stock. Hence we can conclude from this work oil price is independent and wont influence BSE auto stocks in India.

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