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Modeling Stock Market Return Volatility: GARCH Evidence from Nifty Realty Index

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Abstract

Basic objective of study was to examine the effect of ARCH and GARCH model on price volatility of Nifty Realty Index along with that analysing leverage effects and volatility clustering. Volatility shocks were measured bydaily closing data of Realty Index of National Stock Exchange. Descriptive analysis of study explained distribution of daily returns were non- normal showing negative skewness and excess kurtosis. Unit root test confirms presence of stationarity in the data and ARCH-LM test exhibits presence of heteroskedasticity in the residual series, which thereby directs towards application of ARCH and GARCH model.Study concluded that GARCH (1,1) model explained the impact of past volatility due to its influence on current volatility. The data is also supported by volatility persistence which influence the GARCH (1,1) model and leadto increase in volatility and thereby affect its returns.

JEL Code : C01, C12, C33, C52, D53, E17, R3
Keywords : Volatility, ARCH, GARCH, Unit Root test, Stock, Real Estate, NSE, Nifty, India, Heteroskedasticity

I. Introduction

VOLATILITY EXPLAINED AS variation in value of stock prices due to amount of risk or uncertainty. If volatility of data higher in value than fluctuations cover wider area of spread while lower volatility explains less fluctuations with respect to time period.A combination of both internal and external shockwas due to value of index returns leading to increase in volatility (Poon and Granger, 2003). Every market prefers to stay at low volatility as it minimise the unnecessary risk which investors has to borne, and leads to liquidation of asset without larger price fluctuation. A developed

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V. Conclusion

Volatility of Nifty Realty Index series designed for period 2007 to 2018 using ARCH and GARCH model. For detailed empirical analysis, certain points being observed as Nifty realty index series was not normal and heteroskedastic in nature which directs towards application of GARCH models. High kurtosis value proves that data series was leptokurtic in nature. Jarque Bera Statistic and Q-Q plot both justify that return series data show non normal distribution. ARCH model specify significant variance equation with risk of volatility due to past squared residuals. GARCH (1,1) model show significant variance equation along with persistent values specifying unconditional variance where past volatility influenced by related market news. Hence, this study surveys many practical issues with univariate GARCH model and though it is necessary to estimate multivariate GARCH models for better analysis. Further,it can be concluded that increase in volatility in nifty realty index would also increase the risk in returns. All the testing criteria states that GARCH (1,1) model owes highest point in comparison to other models. However, this model can be considered as best fitted for estimating future volatilityand understanding the effect of past volatility based on the squared residuals on current volatility in Nifty realty index.

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Appendix I
ARCH

Dependent Variable: RETURNS
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 03/22/19 Time: 06:08
Sample (adjusted): 4/03/2007 3/28/2018
Included observations: 2724 after adjustments
Convergence achieved after 13 iterations
Presample variance: backcast (parameter = 0.7)
GARCH = C(2) + C(3)*RESID(-1)^2 + C(4)*RESID(-2)^2 + C(5)*RESID(-3)^2
+ C(6)*RESID(-4)^2 + C(7)*RESID(-5)^2

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.000420	0.000427	0.984162	0.3250
		Variance Equation		
C	0.000260	1.30E-05	19.99945	0.0000
RESID(-1)^2	0.181417	0.022276	8.143993	0.0000
RESID(-2)^2	0.146901	0.021004	6.994044	0.0000
RESID(-3)^2	0.125031	0.018835	6.638313	0.0000
RESID(-4)^2	0.124015	0.015691	7.903588	0.0000
RESID(-5)^2	0.127469	0.014352	8.881759	0.0000
R-squared	-0.000708	Mean dependent var		-0.000328
Adjusted R-squared	-0.000708	S.D. dependent var		0.028117
S.E. of regression	0.028127	Akaike info criterion		-4.528770
Sum squared resid	2.154207	Schwarz criterion		-4.513583
Log likelihood	6175.185	Hannan-Quinn criter.		-4.523280
Durbin-Watson stat	1.794218			

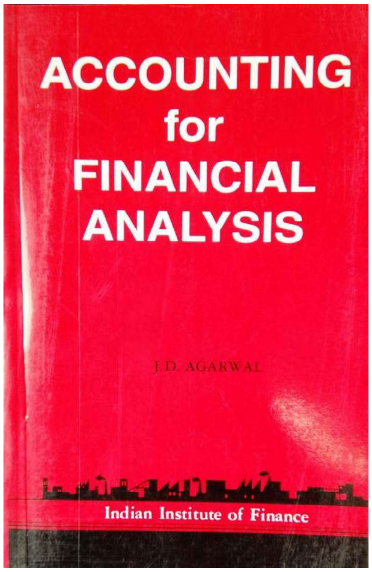
Source : Self Computed

Appendix II
GARCH

Dependent Variable: RETURNS
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 03/22/19 Time: 07:19
Sample (adjusted): 4/03/2007 3/28/2018
Included observations: 2724 after adjustments
Convergence achieved after 16 iterations
Presample variance: backcast (parameter = 0.7)
GARCH = C(2) + C(3)*RESID(-1)^2 + C(4)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.000280	0.000446	0.628566	0.5296
		Variance Equation		
C	1.82E-05	2.19E-06	8.324094	0.0000
RESID(-1)^2	0.087140	0.007614	11.44467	0.0000
GARCH(-1)	0.888141	0.008409	105.6131	0.0000
R-squared	-0.000468	Mean dependent var		-0.000328
Adjusted R-squared	-0.000468	S.D. dependent var		0.028117
S.E. of regression	0.028123	Akaike info criterion		-4.562104
Sum squared resid	2.153691	Schwarz criterion		-4.553425
Log likelihood	6217.585	Hannan-Quinn criter.		-4.558967
Durbin-Watson stat	1.794648			

Source : Self Computed



Contents

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