

Research Project

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The two main models for describing the volatility of data are the GARCH(1,1) process developed by Engle (1982) and Bollerslev (1986) and the GJR-GARCH(1,1) process developed by Glosten, Jagannathan, and Runke (1993). Both of these models assume stationarity. Last semester's research focused, in part, on designing simulations in order to further study GJR-GARCH(1,1) processes. Since conditional variance is stochastic and dependent on the past observations, one of the goals of this project would be to design programs in different statistical software, such as C++ and compare the results. When random variables were generated using the R program that I designed, there sometimes occurred a few excessively large observations. If these large values were treated as outliers, and removed, it could be determined whether or not they effect the conclusions based on statistical tests. It may be possible that the C++ simulations will show an excessive amount of "pseudo" outliers. If this should occur, it may be possible to develop a process by which they can be detected and consequently removed. Furthermore, I plan to develop a process by which it becomes possible to distinguish between the GARCH(1,1) and GJR-GARCH(1,1) process. It may be beneficial to develop tests for $\alpha_2=0$ and compare results. Also, it may be possible to estimate the value of the parameters from the observations. Nelson (1990) found the necessary and sufficient condition for the existence of (y_k, σ_k^2) , $-\infty < k < \infty$. My past research has indicated that altering the values of the parameters greatly influences the values of the σ_k^2 's but does not excessively impact the observations y_1, \dots, y_n . The reasons for this should be further explored. If β in GARCH(1,1) or GJR-GARCH(1,1) changes over time, it has little effect on the y 's. However, drastically changes the volatility (σ_k^2 's). I want to study, if the process is stable (i.e. β does not change during the observation period) against the regime change alternative.

References

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