Assignment 2

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In this assignment, you will model the conditional volatility of a security of your choice. Follow the steps below, document them in a Jupyter notebook, and upload the notebook to Ilias.

1. Use the yfinance package to download historical prices (at least 5 years) for a stock or index of your choice.
2. Construct the log returns (in percent), and plot the ACF and PACF of their squares. Describe your findings. What type of ARCH or GARCH model might be adequate?
3. Use an ARCH-LM test to test for volatility clustering.
4. Find a suitable (G)ARCH / TARCH model. Start from an initial model, and use the ARCH-LM test and/or the correlogram of the squared residuals to determine if there is any volatility clustering left. Extend the model as necessary. Also try if any asymmetric terms are significant.
5. Make a histogram of the standardized residuals of your final model, and test them for normality using the Jarque-Bera test. Adjust your model if necessary.
6. Make a plot of the estimated conditional volatilities generated by your final model. Also plot the estimated news impact curve.
7. Use your model to construct in-sample 1% Value-at-Risk forecasts, and test them for unconditional coverage, independence, and conditional coverage.