Assignment 1

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In this assignment, you will analyze a security of your choice with regards to the efficient market hypothesis. Follow the steps below, document them in a Jupyter notebook, and upload the notebook to Ilias.

1. Use the yfinance package to download daily historical prices (at least 5 years) for a stock or index of your choice.
2. Make a time series plot.
3. Construct the log prices and plot their ACF and PACF. Comment on your findings.
4. Use the ADF test to test if the log prices are integrated.
5. Construct the log returns (in percent). Plot their ACF and PACF, and comment on your findings. Are any autocorrelations significant?
6. Test if the first 10 autocorrelations are significant, using a Q-test.
7. Follow the Box-Jenkins procedure to select an adequate AR/MA/ARMA model; this amounts to making an initial guess for p and/or q, fitting the model, and testing if the residuals are autocorrelated. Rinse and repeat until no significant autocorrelation remains. Note: if you haven't found any significant autocorrelation in Step 5 in the first place, just estimate an ARMA(1, 1) and test its residuals.
8. Summarise your findings in light of the efficient market hypothesis.
9. Use your model to predict both the log return and the log price one day out of sample.