Final Exam Review [1]

Class	Topic	Things to Note
1	Bayesian Updating	Practice how to execute Bayesian updating, same as with class slides and HW1 Do not need to memorize Bayes formula
2	Statistics	Analytical solutions for mean, variance and covariance for linear combination of variables. Know how to convert covariance to correlation
2	Statistics	What is unbiased / efficient estimator, and be able to determine if a basic estimator formula is either
2	Statistics	Starting from PDF, derive CDF and Inverse CDF and work with these functions
2	Statistics	Understand intuitively what high kurtosis and skew mean. No need to memorize formulas
2	Statistics	Know how to conduct simple hypothesis testing

Final Exam Review [2]

Class	Topic	Things to Note
3	Distributions	Be familiar with how distributions 'convert' or how they can combine with each other to get new distributions. Do not need to memorize any pdf or cdf formulas
3	Distributions	Given the pdf or cdf formulas for some distributions, be able to derive mean and variance
3	OLS Preconditions	Appreciate difference between stationary and covariance stationary
3	OLS Preconditions	Recall what are conditions for OLS to be used
3	OLS Preconditions	Recall why we prefer to estimate models on covariance stationary data rather than variables which are not stationary
3	OLS Preconditions	Be able to interpret Python print-outs of selected hypotheses tests, up to and including "what to do" following test results: i. Durbin Watson and BG test ii. GQ test

Final Exam Review [3]

Class	Topic	Things to Note
4	Gauss Markov theorem	Intuitively recall at a high level the implications of the Gauss Markov theorem
4	OLS regression	Be able to interpret printouts of OLS regression results from Python, focusing on: 1. R square / adjusted R square 2. Coefficient estimates and t-statistics 3. F-statistic (for regression) and associated p values 4. DW statistic 5. JB stat and associated p values 6. Skewness 7. Kurtosis **Equations to memorise:** 1. AR(1) mean / auto corr 2. Integration formulas above 3. CAPM
4	Capital Asset Pricing Model (CAPM)	Memorize the CAPM equation, and appreciate how to estimate it using OLS Qualitatively appreciate the differences between low and high beta stocks
5	Autocorrelations	Appreciate qualitatively what is autocorrelation Know how to mathematically compute autocorrelation for some simple data generating processes (i) AR(1) and (ii) MA(1)
5	Time Series Decomposition	Reasons for time series decomposition High level algorithm for classical TS decomposition (role of moving averages, what the various components mean, how to tell if a seasonal pattern is important or not)

Final Exam Review [4]

Class	Topic	Things to Note
5	KPSS test and order of differencing	Interpret printouts of ndiffs, nsdiffs and KPSS test from R. Order of ndiffs and nsdiffs
5	Sources of deterministic variation in the data and data preprocessing	Conceptually appreciate sources of deterministic variation, such as number of days in a month, inflation, population, etc Purpose and use of Box-Cox
5	Goodness of fit statistics	Interpret out of sample python output of RMSE and MAPE for model selection. Formulas will be given
6	ARIMA – ACF and PACF	Form reasonable hypotheses of ARIMA p,d,q order based on ACF and PACF. For ambiguous situations, 'reasonable' answers will be fine, but severe grade penalty for 'obviously wrong' suggestions
6	ARIMA – Mean / Variance	Practice how to calculate the mean and variance of AR, MA and ARMA models of low order, e.g. 1,1,. Basic formula will be given, although not all terms in the formula may be elaborated on in the exam
6	ARIMA - Stationarity	Appreciate simple conditions on when an AR model is stationary, when an MA model is stationary (always!) and when ARMA is stationary – focus will be on low order models
6	ARIMA – seasonal models	Form hypotheses of p,d,q,P,D,Q based on ACF and PACF
6	ARIMA – non stationary variable(s)	Understand how to tell from ACF when a time series has a long term trend and requires differencing (either seasonal or non seasonal)

Final Exam Review [5]

Class	Topic	Things to Note
6	ARIMA-X	Conceptual understanding on difference between 1st and 2nd stage errors Applications of ARIMA-X
6	ARIMA / ARIMA-X	Model selection criteria (AICc) and high level understanding of automated model selection [i.e. how does auto.arima work on the backend]
7	VAR	Purpose of VAR
7	VAR	State a VAR of order p with k dependent variables in equation form, and conditions on variables
7	VAR	Model selection process and criteria
7	VECM	Purpose of VECM and conditions under which VECM can be used
7	VECM	Economic intuition behind error correction term
7	VECM	Order selection process for VECM [same as VAR]
7	GARCH	Mathematical intuition of similarity of GARCH to ARIMA-X modelling
7	GARCH	Economic intuition of GARCH in modelling volatility clustering and mean reversion
7	GARCH	Possibility of higher order GARCH models