Reading Guide for Kevin Sheppard's Financial Econometrics Content

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All citations are to my notes, including areas that overlap with Dr. Large. You are still responsible for the material Dr. Large presented, such as Maximum Likelihood estimation or the application of conditional probability.

First and foremost you should be familiar with the assigned problems. When reviewing the problems, it is important to focus on the *method* used in the solution and not on the specific solution. For example, problem 2.9 (week MT 5) makes use of conditional expectations along with the assumption that the error is mean zero conditional on $\mathbf{X}$ in establishing the unbiasedness of the estimator. The use of conditional expectations is an important concept, and understanding this concept will allow its application in similar situations. It is also a good idea to practice with the problems which were not formally assigned. Most of these are former exam questions.

You should also be familiar with the computational assignments and the issues encountered within and the techniques applied in analyzing the data.

Chapter 1

(a) Section 1.2: As it applies to linear regression

(b) Section 1.3.1: As it applies to linear regression (see problem 2.3)

(c) Section 1.3.4: Delta method

(d) Section 1.3.:, As it applies to linear regression (see problem 2.3)

(e) Sections 1.4.4-6: As they apply to linear regression

Chapter 2

(a) Section 2.2: Dummy variables and functional forms that can be analyzed as a linear regression, Affine transformations in linear regressions

(b) Section 2.3: Estimation of linear regression

(c) Section 2.4: R^2 and $\overline{R}^2$

(d) Sections 2.6: Properties of OLS and related estimators under the "classical" assumptions, for example how to show that $\hat{\boldsymbol{\beta}}$ is unbiased, conditionally on $\mathbf{X}$ (see problem 2.9).

(e) Section 2.9 and 2.12: What happens when assumptions are violated. You don't have to directly enumerate the assumptions.

(f) Section 2.10: Properties of OLS in the asymptotic framework, including considerations about estimating the parameter covariance.

(g) Section 2.11: Testing in the large sample framework. You *do not* have to know about the specifics of the distributions in the "classical" framework (e.g. F-distribution).

- (h) Section 2.12: Consequences of omitted Variables
- (i) Section 2.13.1 and 2.13.3: Model building and specification checking
- (j) Section 2.15: Heteroskedasticity and White's Test

Chapter 3
- (a) Section 3.2: Stationarity and Ergodicity
- (b) Section 3.3: ARMA Models
- (c) Section 3.4: Conditions for Stationarity of an ARMA model
- (d) Section 3.6: Autocorrelation, partial autocorrelations and model selections
- (e) Section 3.9: Forecasting and forecast evaluation
- (f) Section 3.10: Non-stationary Time Series, Types of non-stationarity, testing for unit roots

Chapter 4
- (a) Section 4.2: ARCH-family models, properties and features, news impact curve, estimation, GARCH-in-mean, alternative distributions
- (b) Section 4.3: Forecasting volatility, volatility forecast evaluation
- (c) Section 4.4: Realized Variance, definition, application, basic theoretical properties, empirical properties, models for realized variance
- (d) Section 4.5: Implied volatility, definition, empirical properties, VIX

Chapter 5
- (a) Section 5.2: Definition of VaR and conditional VaR, models for VaR, evaluating VaR models
- (b) Section 5.3: Expected Shortfall and evaluation of ES models
- (c) Section 5.4: Density forecasting and evaluation of density forecasts
- (d) Section 5.5: Coherent Risk Measures

Chapter 6
- (a) Section 6.1: Definition of a Vector Autoregression (VAR), vector white noise, vector autocovariance
- (b) Section 6.2: Companion form and its usefulness
- (c) Section 6.4: Forecasting from VARs
- (d) Section 6.5: Model Selection
- (e) Section 6.6: Definition of Granger Causality, Testing for GC
- (f) Section 6.7: Definition of Impulse Response, Choice of covariance factorization
- (g) Section 6.8: Definition of Cointegration, Transforming a VAR to ECM, Decomposing Cointegrating Vectors, Engle-Granger Test, Intuition behind Johansen Methodology (but do not need to know how to implement Johansen), Spurious Regression and Balance
- (h) Section 6.9: Computing the variance of the mean when the errors are not white noise

Chapter 7
- (a) Section 7.2: Definition of Simple Covariance Models, EWMAs, Difference between RiskMetrics methodologies, BEKK (Full, Diagonal, Scalar, Covariance Targetting), Matrix GARCH, CCC, DCC Definitions and implementation details, challenges facing multivariate GARCH models, Realized Covariance and its limitations/implementation details
- (b) Section 7.3: Definitions of other types of correlation, Exceedance Correlation and what it measures