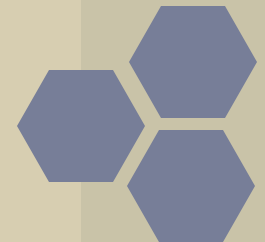# CFAspace

CFA Level II

Quantitative Methods

Introduction

CFA Lecturer: Jiahao Gu

Weight of Quantitative Methods

Topic Area	Level I	Level II	Level III
Ethical and Professional Standards	15	10-15	10-15
Quantitative Methods	12	5-10	0
Economics for Valuation	10	5-10	5-15
Financial Reporting and Analysis	20	15-20	0
Corporate Finance	7	5-15	0
Equity Investments	10	15-25	5-15
Fixed Income	10	10-20	10-20
Derivatives	5	5-15	5-15
Alternative Investments	4	5-10	5-15
Portfolio Management and Wealth Planning	7	5-10	40-55
Total	100	100	100

Data Source: CFAInstitute.org
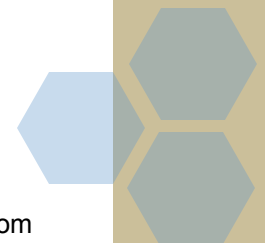
Overview

Readings	LOS
CORRELATION AND REGRESSION	**11**
MULTIPLE REGRESSION AND ISSUES IN REGRESSION ANALYSIS	**15**
TIME-SERIES ANALYSIS	**15**
Excerpt from "Probabilistic Approaches: Scenario Analysis, Decision Trees, and Simulations"	**7**
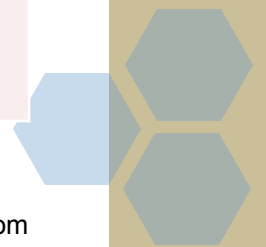
CORRELATION

AND

REGRESSION

1. Sample covariance, sample correlation coefficient and interpret scatter plot

2. Describe limitations to correlation analysis

3. Formulate a test of the hypothesis and determine whether the hypothesis is rejected at a given level of significance

4. Distinguish between the dependent and independent variables

5. Describe the assumptions underlying linear regression, and interpret regression coefficients

6. The standard error of estimate, the coefficient of determination, and a confidence interval for a regression coefficient

7. Formulate a null and alternative hypothesis about a population value of a regression coefficient, and determine the appropriate test statistic and whether the null hypothesis is rejected at a given level of significance

8. Calculate the predicted value for the dependent variable, given an estimated regression model and a value for the independent variable

9. Calculate and interpret a confidence interval for the predicted value of the dependent variable

10. Describe the use of analysis of variance (ANOVA) in regression analysis, interpret ANOVA results, and calculate and interpret the F-statistic

11. Describe limitations of regression analysis

MULTIPLE

REGRESSION

AND ISSUES IN

REGRESSION

ANALYSIS

1. formulate a multiple regression equation to describe the relation between a dependent variable and several independent variables, and determine the statistical significance of each independent variable

2. interpret estimated regression coefficients and their p-values

3. formulate a null and an alternative hypothesis about the population value of a regression coefficient, calculate the value of the test statistic, and determine whether to reject the null hypothesis at a given level of significance

4. interpret the results of hypothesis tests of regression coefficients

5. calculate and interpret 1) a confidence interval for the population value of a regression coefficient and 2) a predicted value for the dependent variable, given an estimated regression model and values for the independent variables

6. explain the assumptions of a multiple regression model

7. calculate and interpret the F-statistic, and describe how it is used in regression analysis

8. distinguish between and interpret the R^2 and adjusted R^2 in multiple regression

MULTIPLE REGRESSION AND ISSUES IN REGRESSION ANALYSIS

9. evaluate how well a regression model explains the dependent variable by analyzing the output of the regression equation and an ANOVA table

10. formulate a multiple regression equation by using dummy variables to represent qualitative factors, and interpret the coefficients and regression results

11. explain the types of heteroskedasticity and how heteroskedasticity and serial correlation affect statistical inference

12. describe multicollinearity, and explain its causes and effects in regression analysis

13. describe how model misspecification affects the results of a regression analysis, and describe how to avoid common forms of misspecification

14. describe models with qualitative dependent variables

15. evaluate and interpret a multiple regression model and its results

TIME-SERIES

ANALYSIS

1. calculate and evaluate the predicted trend value for a time series, modeled as either a linear trend or a log-linear trend, given the estimated trend coefficients

2. describe factors that determine whether a linear or a log-linear trend should be used with a particular time series, and evaluate limitations of trend models

3. explain the requirement for a time series to be covariance stationary, and describe the significance of a series that is not stationary

4. describe the structure of an autoregressive (AR) model of order p, and calculate one- and two-period-ahead forecasts given the estimated coefficients

5. explain how autocorrelations of the residuals can be used to test whether the autoregressive model fits the time series

6. explain mean reversion, and calculate a mean-reverting level

7. contrast in-sample and out-of-sample forecasts, and compare the forecasting accuracy of different time-series models based on the root mean squared error criterion

8. explain the instability of coefficients of time-series models

9. describe characteristics of random walk processes, and contrast them to covariance stationary processes

Overview of LOS

TIME-SERIES ANALYSIS

10. describe implications of unit roots for time-series analysis, explain when unit roots are likely to occur and how to test for them, and demonstrate how a time series with a unit root can be transformed so it can be analyzed with an AR model

11. describe the steps of the unit root test for nonstationarity, and explain the relation of the test to autoregressive time-series models

12. explain how to test and correct for seasonality in a time-series model, and calculate and interpret a forecasted value using an AR model with a seasonal lag

13. explain autoregressive conditional heteroskedasticity (ARCH), and describe how ARCH models can be applied to predict the variance of a time series

14. explain how time-series variables should be analyzed for nonstationarity and/or cointegration before use in a linear regression

15. determine an appropriate time-series model to analyze a given investment problem, and justify that choice

Excerpt from "Probabilistic Approaches: Scenario Analysis, Decision Trees, and Simulations"

1. Describe steps in running a simulation

2. Explain three ways to define the probability distributions for a simulation's variables

3. Describe how to treat correlation across variables in a simulation

4. Describe advantages of using simulations in decision making

5. Describe some common constraints introduce into simulations

6. Describe issues in using simulations in risk assessment

7. Compare scenario analysis, decision trees, and simulations

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Thank You!