KARACHI UNIVERSITY BUSINESS SCHOOL
UNIVERSITY OF KARACHI

BS (BBA) – VI		
Course Title	**:**	**STATISTICS**
Course Number	**:**	**BA(BS) – 532**
Credit Hours	**:**	**03**

Course Contents

1. Statistical Concepts and Market Returns

1.1. distinguish between descriptive statistics and inferential statistics, between a population and a sample, and among the types of measurement scales;
1.2. define a parameter, a sample statistic, and a frequency distribution;
1.3. calculate and interpret relative frequencies and cumulative relative frequencies, given a frequency distribution;
1.4. describe the properties of a data set presented as a histogram or a frequency polygon;
1.5. calculate and interpret measures of central tendency, including the population mean, sample mean, arithmetic mean, weighted average or mean, geometric mean, harmonic mean, median, and mode;
1.6. calculate and interpret quartiles, quintiles, deciles, and percentiles;
1.7. calculate and interpret
1.8. a range and a mean absolute deviation and
1.9. the variance and standard deviation of a population and of a sample;
1.10. calculate and interpret the proportion of observations falling within a specified number of standard deviations of the mean using Chebyshev's inequality;
1.11. calculate and interpret the coefficient of variation and the Sharpe ratio;
1.12. explain skewness and the meaning of a positively or negatively skewed return distribution;
1.13. describe the relative locations of the mean, median, and mode for a uni-modal, nonsymmetrical distribution;
1.14. explain measures of sample skewness and kurtosis;
1.15. compare the use of arithmetic and geometric means when analyzing investment returns.

Contents

Fundamental Concepts
Summarizing data using frequency distribution
The graphical representation of the data
Measure of central tendency
Other measures of location: Quantiles

Previous Next

Measurement of dispersion
Symmetry and Skewness in return distribution

2. Probability Concepts

2.1. define a random variable, an outcome, an event, mutually exclusive events, and exhaustive events;
2.2. state the two defining properties of probability and distinguish among empirical, subjective, and a priori probabilities;
2.3. state the probability of an event in terms of odds for and against the event;
2.4. distinguish between unconditional and conditional probabilities;
2.5. explain the multiplication, addition, and total probability rules;
2.6. calculate and interpret
  2.6.1. the joint probability of two events,
  2.6.2. the probability that at least one of two events will occur, given the probability of each and the joint probability of the two events, and
  2.6.3. a joint probability of any number of independent events;
2.7. distinguish between dependent and independent events;
2.8. calculate and interpret an unconditional probability using the total probability rule;
2.9. explain the use of conditional expectation in investment applications;
2.10. explain the use of a tree diagram to represent an investment problem;
2.11. calculate and interpret covariance and correlation;
2.12. calculate and interpret the expected value, variance, and standard deviation of a random variable and of returns on a portfolio;
2.13. calculate and interpret covariance given a joint probability function;
2.14. calculate and interpret an updated probability using Bayes' formula;
2.15. identify the most appropriate method to solve a particular counting problem, and solve counting problems using factorial, combination, and permutation concepts.

Previous
Next

Contents

Probability, Expected value and variance
Portfolio expected return and variance of return
Bayes' Formula, Principles of counting

3. Common Probability Distributions

3.1. define a probability distribution and distinguish between discrete and continuous random variables and their probability functions;
3.2. describe the set of possible outcomes of a specified discrete random variable;
3.3. interpret a cumulative distribution function;
3.4. calculate and interpret probabilities for a random variable, given its cumulative distribution function;
3.5. define a discrete uniform random variable, a Bernoulli random variable, and a binomial random variable;
3.6. calculate and interpret probabilities given the discrete uniform and the binomial distribution functions;
3.7. construct a binomial tree to describe stock price movement;
3.8. calculate and interpret tracking error;
3.9. define the continuous uniform distribution and calculate and interpret probabilities, given a continuous uniform distribution;

3.10. explain the key properties of the normal distribution;
3.11. distinguish between a uni-variate and a multivariate distribution, and explain the role of correlation in the multivariate normal distribution;
3.12. determine the probability that a normally distributed random variable lies inside a given interval;
3.13. define the standard normal distribution, explain how to standardize a random variable, and calculate and interpret probabilities using the standard normal distribution;
3.14. define shortfall risk, calculate the safety–fist ratio, and select an optimal portfolio using Roy's safety–fist criterion;
3.15. explain the relationship between normal and lognormal distributions and why the lognormal distribution is used to model asset prices;
3.16. distinguish between discretely and continuously compounded rates of return, and calculate and interpret a continuously compounded rate of return, given a specified holding period return;
3.17. Explain Monte Carlo simulation and describe its applications and limitations;
3.18. Compare Monte Carlo simulation and historical simulation.

Contents

Discrete Random variable
Continuous Random Variable
Monte Carlo Simulation

Previous

4. Sampling and Estimation

Next

4.1. Define simple random sampling and a sampling distribution;
4.2. Explain sampling error;
4.3. Distinguish between simple random and stratifixed random sampling;
4.4. Distinguish between time–series and cross–sectional data;
4.5. Explain the central limit theorem and its importance;
4.6. Calculate and interpret the standard error of the sample mean;
4.7. Identify and describe desirable properties of an estimator;
4.8. Distinguish between a point estimate and a confidence interval estimate of a Population parameter;
4.9. Describe properties of Student's *t*–distribution and calculate and interpret its Degrees of freedom;
4.10. Calculate and interpret a confidence interval for a population mean, given a Normal distribution with
  4.10.1. A known population variance,
  4.10.2. An unknown population variance, or
  4.10.3. An unknown variance and a large sample size;
4.11. Describe the issues regarding selection of the appropriate sample size, data mining bias, sample selection bias, survivorship bias, look–ahead bias, and time period bias.

Contents

Sampling
Distribution of Sample mean
Point and interval estimate of the population mean
More on sampling

5. Hypothesis Testing

5.1. Define a hypothesis, describe the steps of hypothesis testing, and describe and Interpret the choice of the null and alternative hypotheses;
5.2. Distinguish between one–tailed and two–tailed tests of hypotheses;
5.3. Explain a test statistic, Type I and Type II errors, a significance level, and how Significance levels are used in hypothesis testing;
5.4. Explain a decision rule, the power of a test, and the relation between confidence Intervals and hypothesis tests;
5.5. Distinguish between a statistical result and an economically meaningful result;
5.6. Explain and interpret the *p*–value as it relates to hypothesis testing;
5.7. Identify the appropriate test statistic and interpret the results for a hypothesis test concerning the population mean of both large and small samples when the population is normally or approximately distributed and the variance is
  5.7.1. Known
  5.7.2. Unknown;
5.8. Identify the appropriate test statistic and interpret the results for a hypothesis test concerning the equality of the population means of two at least approximately normally distributed populations, based on independent random samples with
  5.8.1. Equal or
  5.8.2. Unequal assumed variances;
5.9. Identify the appropriate test statistic and interpret the results for a hypothesis test concerning the mean difference of two normally distributed populations;
5.10. Identify the appropriate test statistic and interpret the results for a hypothesis test concerning
  5.10.1. The variance of a normally distributed population, and
  5.10.2. The equality of the variances of two normally distributed populations based on two independent random samples;
5.11. Distinguish between parametric and nonparametric tests and describe situations in which the use of nonparametric tests may be appropriate.

Previous
Next

Contents

Hypothesis testing;
Hypothesis tests concerning the mean
Hypothesis tests concerning the variance
Non Parametric Inference

6. Correlation and Regression

6.1. Calculate and interpret a sample covariance and a sample correlation coefficient, and interpret a scatter plot;
6.2. Describe limitations to correlation analysis;

6.3. Formulate a test of the hypothesis that the population correlation coefficient equals zero, and determine whether the hypothesis is rejected at a given level of significance;
6.4. Distinguish between the dependent and independent variables in a linear regression;
6.5. Describe the assumptions underlying linear regression, and interpret regression coefficients;
6.6. Calculate and interpret the standard error of estimate, the coefficient of determination, and a confidence interval for a regression coefficient;
6.7. 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;
6.8. Calculate the predicted value for the dependent variable, given an estimated regression model and a value for the independent variable;
6.9. Calculate and interpret a confidence interval for the predicted value of the dependent variable;
6.10. Describe the use of analysis of variance (ANOVA) in regression analysis, interpret ANOVA results, and calculate and interpret the *F*–statistic;
6.11. Describe limitations of regression analysis.

Contents

Introduction
Correlation Analysis
Linear Regression

Previous

Next

Recommended Books:

1. Bluman, A. G. (2003). *Elementary Statistics:* A Brief Version. McGraw–Hill.
2. Fruend, J. E. (2003).*Mathematical Statistics with Applications.* Prentice Hall.
3. Spiegel, M. R. (2000). *Schaum's Outline of Probability and Statistics.* McGraw–Hill.
4. Weiss, N. A. (2004). *Introductory Statistics,* 7th Edition, Addison–Wesley.