

Extra inference and interval estimation problems

- Recall from the previous homework that the daily S&P return has mean .00032 and standard deviation .00859. Consider the average S&P of a random sample of 20 days.
 - What is the mean value of this random variable?
 - What is the standard deviation of this random variable?
 - What is the probability of the average S&P return of the days being greater than .005? Is it more likely that the average S&P return will be greater than .005, or that one day's S&P return will be?
- The file *collsamp.mpj* in the `js` directory of the course disk gives summary information for a sample of research universities, as reported in *U.S. News and World Report* in 1997. For all of the questions below, use a 95% confidence level. In each case, comment on the appropriateness of the interval that you've constructed.
 - The variable **Freshman retention rate** refers to the proportion of students who return to school for their sophomore years. Construct an interval estimate for the average freshman retention rate for the population of U.S. research universities.
 - Give an interval estimate for the freshman retention rate at NYU.
 - The variable **Expend. per student** refers to the mean university expenditure per student. Construct an interval estimate for the average mean expenditure per student student for this population. What is this the "average" over? What is this the "mean" over?
 - Give an interval estimate for the mean expenditure per student for NYU.
 - Give an interval estimate for the true probability that a U.S. research university has freshman retention rate less than 80%.
- Consider again the sample of undergraduate Stern students taken to study their motivations in choosing a major (from the file *undergrd.mpj* in the `js` directory).
 - Construct a 90% confidence interval for the true proportion of all Stern undergraduates who feel that the number of employment opportunities upon graduation is extremely important in choosing a major.
 - Construct a 90% confidence interval for the true proportion of all Stern undergraduates who consider the size of their salary upon graduation a more important factor in choosing their major than the number of employment opportunities upon graduation is.
- Consider again the sample of stocks from *stocks97.mpj* in the `js` directory. Use a 95% level of confidence for the questions below.
 - Treating the entire set of stocks as a sample of stocks, is the average price change for this week significantly different from zero?
 - Give an interval estimate for the price change for a randomly chosen stock for this week.
 - Now separate the stocks by the market that the stock is listed on. Is the average price change for this week significantly different from zero for any of the markets?
 - Give interval estimates for the price change for a randomly chosen stock for this week from each market.
- Recall from an earlier problem that the daily S&P return from 1990–1995 had mean .00039 and standard deviation .00721. Consider the average S&P of a random sample of 30 days.
 - What is the mean value of this random variable?
 - What is the standard deviation of this random variable?
 - What is the probability of the average S&P return of the days being greater than .01? Is it more likely that the average S&P return will be less than .01 in absolute value, or that one day's S&P return will be?
- The file *munibond.mpj* in the `js` directory of the course disk gives summary information for a sample of New York municipal bond funds in October, 1997. The file gives two variables for each fund: the return **Return** (what would have been earned in the last 12 months, after deducting loads and including

dividends and capital gains or losses) and the yield `Yield` (the actual interest rate earned over the last 12 months, which is the number typically reported by funds). For all of the questions below, use a 95% confidence level. In each case, comment on the appropriateness of the interval that you've constructed.

- (a) Construct an interval estimate for the average return for the population of New York municipal bond funds.
 - (b) Give an interval estimate for the return of a randomly chosen municipal bond fund.
 - (c) Construct an interval estimate for the average yield for this population.
 - (d) Give an interval estimate for the yield for a randomly chosen bond fund.
 - (e) Is the average return for the population of New York bond funds significantly different from the average yield? Use the available data to construct an interval estimate that can address this question.
7. The *New England Journal of Medicine*, in its issue of January 8, 1998, contained an article by H.T. Stelfox, G. Chua, K. O'Rourke, and A.S. Detsky examining the possible relationship between the results of trials reported in journals and whether a researcher's research was supported by a drug company. The authors of the study examined 70 reports from 1995 and 1996 related to whether the use of calcium-channel blockers to treat hypertension led to an increased risk of heart disease. They classified 30 of the reports as favorable to the drugs, 17 as neutral, and 23 as critical of the drugs. They further determined that 29 of the favorable reports had authors who had received money from manufacturers of calcium-channel blockers, 10 of the neutral reports had such authors, and 8 of the critical reports had such authors.
- (a) Construct a 90% confidence interval for the true proportion of all favorable reports that have authors who received money from manufacturers of calcium-channel blockers.
 - (b) Construct a 90% confidence interval for the true proportion of all neutral reports that have authors who received money from manufacturers of calcium-channel blockers.
 - (c) Construct a 90% confidence interval for the true proportion of all critical reports that have authors who received money from manufacturers of calcium-channel blockers.
 - (d) Based on these results, do you think that there is a relationship between the nature of the report and whether the authors received financial support from the drug company?
8. Consider again the sample of stocks from `stocks98.mpj` in the `js` directory. Use a 95% level of confidence for the questions below.
- (a) Treating the entire set of stocks as a sample of stocks, is the average price change for this week significantly different from zero?
 - (b) Give an interval estimate for the price change for a randomly chosen stock for this week.
 - (c) Now separate the stocks by the market that the stock is listed on. Is the average price change for this week significantly different from zero for any of the markets?
 - (d) Give interval estimates for the price change for a randomly chosen stock for this week from each market.
9. The file `mbasurvey.mpj` gives some of the results from a sample of members of Stern's class of 2000 conducted by Georgia Cabrera during the Fall 1998 semester. The file gives three variables for each respondent: the salary earned by the respondent before they started at Stern, the salary that the respondent anticipates earning upon graduation, and the respondent's score on the GMAT examination. For all of the questions below, use a 95% confidence level. In each case, comment on the appropriateness of the interval that you've constructed.
- (a) Construct an interval estimate for the average previous salary for the population of members of the class of 2000.
 - (b) Give an interval estimate for the previous salary of a randomly chosen member of the class of 2000.
 - (c) Construct an interval estimate for the average GMAT score for this population.
 - (d) Give an interval estimate for the GMAT score for a randomly chosen member of the class of 2000.
 - (e) Based on the observed sample, is the average gain in salary (from their previous salary) that members of the class of 2000 anticipate they will receive after graduation different from \$50,000?

10. In a telephone survey of 1007 adults conducted by the History Channel and Roper Starch between October 13 and November 2, 1998, 735 respondents stated that they believe that a conspiracy was definitely or probably behind the assassination of President John F. Kennedy on November 22, 1963, in Dallas. Construct a 99% confidence interval for the true proportion of U.S. adults who believe that a conspiracy was behind the assassination.
11. The file `zagat98.mpj` gives results from a sample of Manhattan restaurant reviews in the 1998 Zagat restaurant guide (these data are courtesy of Dana Sze). The file includes the estimated cost of dinner, ratings for food, décor, and service, type of cuisine, and location.
 - (a) Construct a 95% confidence interval for the true proportion of Zagat-rated Manhattan restaurants that have estimated dinner cost at least \$40.
 - (b) Construct a 95% confidence interval for the true proportion of Zagat-rated Manhattan restaurants that have a food rating over 20.
 - (c) Construct a 95% confidence interval for the true proportion of Zagat-rated Manhattan restaurants that have food, décor, and service ratings all over 20.
12. The file `correction.mpj` contains data on the last 14 market corrections (defined as a 10% drop in stock prices). The file includes three variables that give the percent return during the market correction for the S&P Composite, mid capitalization stocks, and small capitalization stocks, and then three variables that give the percent return for each of these for the 12 month period following the correction. Use a 95% level of confidence for the questions below.
 - (a) Treating the set of correction periods as a sample from all possible correction periods, is the average return for mid cap stocks during a market correction significantly different from the average return for the S&P Composite during a market correction?
 - (b) Give an interval estimate for the return of small cap stocks for a random market correction.
 - (c) Is the average return for small cap stocks during the 12 months after a market correction significantly different from the average return for the S&P Composite during this time period?
 - (d) Is the average return for small cap stocks during the 12 months after a market correction significantly different from the average return for mid cap stocks during this time period?