

Statistics for Lawyers
Spring 2011 Exam
Klick

You have 24 hours to complete this exam. You may use any class materials or text book to prepare your answers but web resources are not permitted except tables of critical values for statistical distributions. Each of the first 6 questions is worth 10 points. For question 7 you must choose one of the previous 6 questions to count double. If you do not clearly indicate your choice, you will automatically lose 10 points from your raw score. Each subpart of question 8 is worth 6 points. Good luck, and remember that you are all above average (on some distribution).

1. In *DURA PHARMACEUTICALS, INC. V. BROUDO* (2005), the Supreme Court declared that securities fraud claims need to provide evidence of both transaction causation and loss causation. Sufficient (though maybe not necessary) evidence would involve an event study demonstrating the causal effect of the allegedly fraudulent statement on the price of a security and a separate event study showing the causal effect, presumably in the opposite direction, of a corrective disclosure on the price of the security. If the Court simply meant this as a clarification of the required elements for a fraud claim without wanting to change the overall legal “type 1” error allowed in these cases, what statistical type 1 error should be used in each of the two event studies and why?
2. You are the plaintiff’s lawyer in a torts suit where the defendant’s negligent driving led to a head on crash that killed your client’s 33 year old husband. There is no dispute over the negligence or causation. However, the defense claims the defense of contributory negligence because the deceased was not wearing a seatbelt. The defense lawyer cites data from the National Highway Traffic Safety Administration saying, “Fatality data show that in the age range 25-34, 66 percent of fatal accident victims do not wear a seatbelt. Because this demonstrates that it is more likely than not that the deceased would not have died had he been wearing a seatbelt, no liability is justified. In this same age group, the data are quite clear that most people, 70 percent in fact, do wear their seatbelt and in the average head on crash, only 10 percent of people die. This man would almost surely be alive today if he had worn his seatbelt.” What is your response to this argument?
3. In the 2012 presidential election between Barack Obama and Donald Trump, we observe another scandal over defective ballots. After all ballots except for those from New York are counted, Obama leads Trump by 20 electoral votes. New York’s 31 electoral votes have the potential to decide the election. Although Trump leads the New York popular vote by 1,000 votes, the Obama campaign has claimed that the vote from New York’s 14th congressional district has been tampered with. This is the only district where they suggest this is an issue. As evidence, they note that while Trump “won” the district 52,429 votes to 51,683, the district had 2,500 “lost” votes that were uncounted because the electronic voting machines registered that people voted but their choice was not recorded. The Obama administration claims that the company whose machines are used in the district has financial dealings with Trump. Independent auditing of this machines type found that the machines have a failure rate of 2.2 percent. You are asked to evaluate the claims of vote fraud from a statistical perspective. Provide your analysis.

4. Intuitively explain why the multi-step finance approach to event studies is equivalent to the one step dummy variable approach to event studies.
5. Inference in event studies is done using the standard normal distribution for critical values. This approach relies on the central limit theorem. Intuitively explain why this assumption may not be appropriate in the standard legal context where event studies are used (i.e., to examine the effect of a fraudulent statement on a stock's return on a given day).
6. The fundamental problem with respect to drawing a causal inference using observational data is the potential for omitted variable bias. Why do randomized experiments not suffer from this problem? What kinds of problems do randomized experiments suffer from?
7. Choose one question from questions 1-6 to count double.
8. For the questions in this section, use the dataset in the file statsexamS2011.xlsx which contains the following variables:
 date: The calendar date
 prc: The price at which the last trade of the day was transacted
 sprtrn: The return on the S&P 500 for the day
 rf: The risk free rate of return

The dataset contains share price information for Dura Pharmaceuticals (ticker DURA). It is alleged that Dura made misleading statements about its earnings and the likelihood of securing regulatory approval for a new asthma drug on April 15, 1997. Provide an analysis that examines transaction causation. Use only the 100 trading days before the misleading statement to estimate your counterfactual model.

- 8.a At what Type 1 error level would the price movement related to the statement event be deemed statistically significant?
- 8.b In what way does the causal inference made in 8.a depend on one's views about the efficiency of securities markets?
- 8.c Interpret the coefficient on the market return variable including its statistical significance.
- 8.d An alternative model used for event studies uses the following equation for the counterfactual prediction:

$$r_{it} = r_{ft} + \beta(r_{mt} - r_{ft})$$

Where r_{ft} is the risk free rate of return and r_{mt} is the market rate of return for day t.

Describe how you would estimate an event effect using this counterfactual model and do so indicating what coefficients you get for β and for your event effect.

- 8.e How does the interpretation of the β coefficient differ from the coefficient discussed in 8.c?