

AMS 5: Statistics.
Additional problems for homework #9
(Adapted from chapter 27 in the the FPP book)

March 14, 2008

Problem 1

One hundred draws are made at random with replacement from box A, and 250 are made at random from box B.

- (a) 50 of the draws from box A are positive, compared to 131 from box B: 50.0% versus 52.4%. Is this difference real, or due to chance?
- (b) The draws from box A average 1.4 and their SD is 15.3; the draws from box B average 6.3 and their SD is 16.1. Is this difference between the averages statistically different?

Problem 2

The Gallup poll asks respondents how they would rate the honesty and ethical standards of people in different fields – very high, high, average, low, or very low (see reference for study in the book). The percentage who rated clergy "very high or high" dropped from 60% in 2000 to 54% in 2005. This may have been due to scandals involving sex abuse; or it may have been chance variation. (you may assume that in each year, the results are based on independent simple random samples of 1,000 persons each year.)

- (a) Is this a one sample or two-sample test (ie. are we interested in learning about a single percentage or are we comparing two percentages)? Why?
- (b) Do we need one box model or two? Why? How many tickets go into each box? How many draws? What do the tickets show?
- (c) Can the difference between 60% and 54% be explained as a chance variation? Or was it the scandals or something else?

Problem 3

This problem continues the previous one. In 2005, 65% of the respondents gave medical doctors a rating of "very high or high", compared to a 67% rating for druggists. Is the difference real, or a chance variation? Or do you need more information to decide? If the difference is real, how would you explain it? Discuss briefly. You may assume that the results

are based on a simple random sample of 1,000 persons taken in 2005; each respondent rated clergy, medical doctors, druggists, and many other professions (see reference for study in the book).

Problem 4

One experiment involved 383 students at the University of British Columbia. 200 were chosen at random to get item A, and 92 of them answered "yes." The other 183 got item B, and 161 out of the second group answered "yes" (see reference for study in the book).

- Item A) Imagine that you have decided to see a play and paid the admission price of \$20 per ticket. As you enter the theatre, you discover that you have lost the ticket. The seat was not marked, and the ticket cannot be recovered. Would you pay \$20 for another ticket?
- Item B) Imagine that you have decided to see a play where admission is \$20 per ticket. As you enter the theatre, you discover that you have lost a \$20 bill. Would you still pay \$20 for a ticket for the play?

From the standpoint of economic theory, both items present the same facts and call for the same answer; any difference between them must be due to chance. From a psychological point of view, the framing of the question can be expected to influence the answer. What do the data say?

Problem 5

When convicts are released from prison, they have no money, and there is a high rate of "recidivism": the released prisoners return to crime and are arrested again. Would providing income support to ex-convicts during the first months after their release from prison reduce recidivism? The Department of Labor ran a randomized controlled experiment to find out (see reference for study in the book). The experiment was done on a selected group of convicts being released from certain prisons in Texas and Georgia. Income support was provided, like unemployment insurance. There was a control group which received no payment, and four different treatment groups (differing slightly in the amounts paid).

The exercise is on results for Georgia, and combines the four treatment groups into one. Assume that prisoners were randomized to treatment, or control.

- (a) 592 prisoners were assigned to the treatment group, and of them 48.3% were rearrested within a year of release. 154 were assigned to the control group, and of them 49.4% were rearrested within a year of release. Did income support reduce recidivism? Answer yes or no, and explain briefly.
- (b) In the first year after the release from prison, those assigned to the treatment group averaged 16.8 weeks of paid work; the SD was 15.9 weeks. For those assigned to the control group, the average was 24.3 weeks; the SD was 17.3 weeks. Did income support reduce the amount that the ex-convicts worked? Answer yes or no, and explain briefly.