ECO220Y, Term Test #1: SOLUTIONS

October 6, 2017, 9:10 – 11:00 am

(1) (a) These data are panel (longitudinal) data. We observe six different countries for five different years, for a total of 30 observations, where the unit of observation is a particular country in a particular year. (Note: If you subtracted out the missing values and said 26 observations that is also completely acceptable.) The key variable is the percentage share of 15-year-olds performing at PISA mathematics literacy level, which is an interval variable.

(b) In 2003 approximately 20% of 15-year-olds on Canada were performing well on the PISA math test (level 5 or higher) but that dropped to around 16% in 2015, which is a 4 percentage point decline and a 20 percent drop. This is a quite significant drop and especially for a country like Canada that was not a top performer compared to other countries in the first place.

(2) While the numbers are correct, the conclusion is completely false. There are more males (850) than females (753) in the study: in fact, females do slightly *better* than males with 50.5% of females choosing the dominant card compared to only 47.4% of males.

(3) (a) No, Figure 2 does not describe the relationship between these two variables. We would need to use a cross-tabulation to assess the relationship between these variables. (ASIDE: If we treated them as interval variables, we could also try other methods such as computing the coefficient of correlation, provided the linearity assumption holds.)

(b) No, Figure 3 is not a histogram (even though it superficially looks like one). It shows that the replies to the question asking about the importance of corporate culture do not systematically vary depending on how long the executive took to reply to the survey. The average response is very steady across executives responding immediately through executives taking 45+ days after the initial invitation to complete the survey. There is no systematic trend (e.g. executives really excited about the topic of corporate culture responding right away).

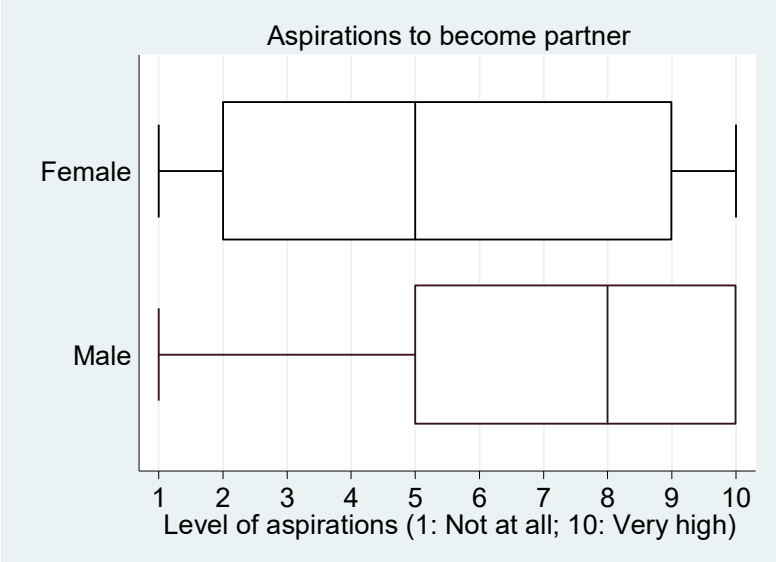
(4) (a) Given the approximate Normal shape, use the Empirical Rule: about 68.3% of observations lie within 1 s.d. of the mean; about 95.4% lie within 2 s.d.'s of the mean; about 99.7% lie within 3 s.d.'s of the mean. The excerpt tells us that the mean is 66 calls per day. Visual inspection of Panel A in Figure 2, a s.d. of about 10. It looks like about 68.3% of the data lie between 56 and 76, about 95.4% lie between 46 and 86, and about 99.7% lie between 36 and 96.

(b) The Panel B histogram has more bins because the number of observations is much bigger in Panel B than Panel A (n = 4,910 versus n = 778) and all of the formulas suggesting numbers of bins are increasing in the sample size.

(c) If you standardized the mean calls per day by subtracting the mean and dividing by the s.d. for each observation $\left(z_i = \frac{x_i - \bar{X}}{s_x}\right)$, the vertical axis would be identical, the shape (bimodal) would be identical, but the horizontal axis would be rescaled.

(5) (a) Non-sampling errors cause bias, whereas sampling error just causes random noise, not bias. (The authors considered non-response bias and systematic lying by lawyers about their performance, which could seriously bias their results (especially if these differentially affect the two sexes).) We would make a huge *non-sampling* error by attempting to make an inference about all lawyers: even the title of the paper reminds us that the sampled population is only *young* lawyers, which likely differ systematically from older lawyers.

(b) For females, the 25th percentile is 2, the median is 5, the 75th percentile is 9. (Note: For females, for the 75th percentile, either 8 or 9 is acceptable as it is very close and hard to tell from a visual inspection of the graph.) For males, the 25th percentile is 5, the median is 8, and the 75th percentile is 10. Given the large IQR's in both cases, there are no outside values.



(c) Marriage, White, Private law firm, Size of workplace > 100, Judicial clerk, Moot court, General journal, and Specific Journal

(d) The variable measuring new client revenue ($) is the most extremely positively skewed. We know that this variable must be great than or equal to zero. That fact combined with the huge standard deviations compared to the means – s = $171,965 versus X-bar = $53,346 for males and s = $68,892 versus X-bar = $23,349 for females – can only be explained by extreme positive skew.

(Note: Some students answered "Judicial clerk" and made all the arguments like above. In the future, we would *not* accept this as a correct answer. Researchers would never describe a dummy variable, which can take only two values (0 or 1), as skewed. Remember that it is arbitrary what is 0 and what is 1 so you couldn't assign a direction to the skew even if you wanted to apply that concept to a variable with only two unique values.)

(6) (a) In the data used in the 2014 working paper, among the respondents that saw the baseline video (with no recap) and were shown misleading ads, 24% chose the best of the four credit card offers, which is slightly less than just guessing (25% chance of guessing the best of the four cards)!

(b) These figures seek to investigate the relationships among three variables: which video each respondent saw, whether or not they were shown misleading ads/taglines, and whether they chose the dominant (best) credit card offer. Both Figure 4 and 6 show that people shown the full video with the recap and not misleading ads did the best: 62% chose the best card in Figure 4 and 65% in Figure 6. They also both show that people shown the shorter video without the recap and misleading ads did the worst: 24% chose the best card in Figure 4 and 37% in Figure 6. However, the figures differ in which was more important to making good choices: seeing the full video or no ads/taglines. In Figure 4 the biggest difference is caused by seeing or not seeing misleading ads, whereas in Figure 6 the bigger difference is caused by seeing the full video. However, these are all sample statistics subject to sampling error and the overall conclusions from these figures are similar: people do better if they see a longer video with a helpful recap of what to remember when choosing among credit cards and people tend to make worse choices in the face of false advertising.