

ECO220Y: Homework 17

Note: Do all calculations *without* software. Instead, use the statistical tables from our course website. Use approximation based on these tables when necessary.

Required Exercises: Chapter 14: 1, 3, 7, 9, 11, 13, 15, 23, 35, 37, 39, 41, 63

Required Problems:

(1) Recall Karlan and List (2007) “Does Price Matter in Charitable Giving? Evidence from a Large-Scale Natural Field Experiment” first discussed in Lecture 12. For people in the control group (those offered no match) who gave money to the charity in response to the solicitation, we obtain this STATA summary of the amount donated (in dollars).

```
. summarize amount if (gave==1 & control==1), detail
```

amount				

	Percentiles	Smallest		
1%	3	2		
5%	10	2		
10%	10	3	Obs	298
25%	20	5	Sum of Wgt.	298
50%	25		Mean	45.54027
		Largest	Std. Dev.	41.37982
75%	55	150		
90%	100	160	Variance	1712.29
95%	125	250	Skewness	1.906669
99%	160	300	Kurtosis	8.734306

For people in the treatment groups (those offered a 1:1, 2:1 or 3:1 match) who gave money to the charity in response to the solicitation, we obtain these STATA summaries of the amount donated.

```
. summarize amount if (gave==1 & ratio==1), detail
```

amount				

	Percentiles	Smallest		
1%	5	3		
5%	10	3		
10%	10	5	Obs	231
25%	20	5	Sum of Wgt.	231
50%	25		Mean	45.14286
		Largest	Std. Dev.	47.09741
75%	50	200		
90%	100	250	Variance	2218.166
95%	125	250	Skewness	3.243264
99%	250	400	Kurtosis	19.01166

```
. summarize amount if (gave==1 & ratio==2), detail
```

amount				
	Percentiles	Smallest		
1%	3	1		
5%	10	2		
10%	10	3	Obs	252
25%	20	5	Sum of Wgt.	252
50%	25		Mean	45.3373
		Largest	Std. Dev.	43.26304
75%	50	160		
90%	100	200	Variance	1871.691
95%	125	300	Skewness	2.375049
99%	200	300	Kurtosis	11.64395

```
. summarize amount if (gave==1 & ratio==3), detail
```

amount				
	Percentiles	Smallest		
1%	2	1		
5%	7.5	1		
10%	10	2	Obs	253
25%	20	2	Sum of Wgt.	253
50%	25		Mean	41.25178
		Largest	Std. Dev.	35.35036
75%	50	125		
90%	100	150	Variance	1249.648
95%	100	200	Skewness	1.663551
99%	150	200	Kurtosis	5.794014

(a) Conditional on giving money, did offering a 1-to-1 match versus no match increase the amount donated? Similarly, did a 2-to-1 match increase the amount compared to no match? Similarly, did a 3-to-1 match increase the amount compared to no match? Write out the formal hypotheses in each case. Do you need to do formal hypothesis tests to determine the answers? If you did those tests, what kind of P-values would you obtain? (Be as specific as possible without actually calculating them.)

(b) Given what you found in part **(a)**, which part of the abstract (reproduced below) is potentially misleading?

ABSTRACT: We conducted a natural field experiment to further our understanding of the economics of charity. Using direct mail solicitations to over 50,000 prior donors of a nonprofit organization, we tested the effectiveness of a matching grant on charitable giving. We find that the match offer increases both the revenue per solicitation and the response rate. Larger match ratios (i.e., \$3:\$1 and \$2:\$1) relative to a smaller match ratio (\$1:\$1) had no additional impact, however. The results provide avenues for future empirical and theoretical work on charitable giving, cost-benefit analysis, and the private provision of public goods.

(c) Suppose that someone in the 3:1 match group gave \$10,000 instead of \$200 to yield this STATA summary.

```
. summarize amount if (gave==1 & ratio==3), detail
```

amount					
Percentiles			Smallest		
1%	2	1			
5%	7.5	1			
10%	10	2	Obs		253
25%	20	2	Sum of Wgt.		253
50%	25		Mean		79.98696
		Largest	Std. Dev.		627.0578
75%	50	125			
90%	100	150	Variance		393201.5
95%	100	200	Skewness		15.74193
99%	150	10000	Kurtosis		249.5389

Suppose you did not check this detailed summary, but instead just looked at the mean and standard deviation. In this particular case, should the mean and s.d. (\$79.99 and \$627.06) have alerted you to the presence of an outlier (or outliers)? If you made the mistake of going ahead with the analysis, would you conclude that there is a statistically significant difference in the amount donated comparing a 3:1 match with a 2:1 match? An economically significant difference? A significant difference?

(2) For 1,200 credit card customers the amount spent (on that credit card) each month for four months (December 2012, January 2013, February 2013, March 2013, and April 2013) is recorded in the raw data ("credit_spending.xlsx") on our course site right next to this homework. Here is an excerpt of those data:

customer_name	dec12	jan13	feb13	mar13	apr13
Abdul, Qiting	185.86	49.09	35	0.61	320
Abraham, Mikail	2380.32	979.05	2244.96	1227.3	1599.4
Abramyan, Yi	12.06	6.03	4.46	573.86	273.9
...					
Zou, Sui	889.6	256.8	685.19	1664.19	65
Zou, Yu	0	136.14	196.12	84.98	43.99

You can look at those raw data and do calculations in Excel to check your work, however, for this question please answer as if you were writing a test (i.e. without a computer) and using the summary statistics below.

```
. correlate dec12 jan13 feb13 mar13 apr13
      (obs=1200)
```

	dec12	jan13	feb13	mar13	apr13
dec12	1.0000				
jan13	0.5298	1.0000			
feb13	0.4862	0.4843	1.0000		
mar13	0.5075	0.4555	0.4985	1.0000	
apr13	0.3961	0.3853	0.3442	0.4852	1.0000

. summarize dec12, detail

dec12				
	Percentiles	Smallest		
1%	0	-176.17		
5%	21.11	-155.13		
10%	47.215	-135	Obs	1200
25%	155.16	-128.21	Sum of Wgt.	1200
50%	546.355		Mean	728.182
		Largest	Std. Dev.	644.6249
75%	1186.98	2440.43		
90%	1734.625	2467.01	Variance	415541.3
95%	1970.7	2469.91	Skewness	.7670922
99%	2365.02	2497.54	Kurtosis	2.541951

. summarize jan13, detail

jan13				
	Percentiles	Smallest		
1%	-23.965	-496.2		
5%	15.73	-412.38		
10%	35.845	-299.8	Obs	1200
25%	115.23	-242.62	Sum of Wgt.	1200
50%	377.925		Mean	564.9852
		Largest	Std. Dev.	565.011
75%	895.015	2402.17		
90%	1404.61	2416.42	Variance	319237.4
95%	1779.61	2434.3	Skewness	1.185705
99%	2307.63	2471.73	Kurtosis	3.785926

. summarize feb13, detail

feb13				
	Percentiles	Smallest		
1%	0	-123.29		
5%	16.8	-76.77		
10%	35.69	-56.32	Obs	1200
25%	115.89	-29	Sum of Wgt.	1200
50%	380.48		Mean	565.605
		Largest	Std. Dev.	563.3056
75%	852.64	2402.01		
90%	1411.115	2403.03	Variance	317313.2
95%	1788.985	2407.01	Skewness	1.235567
99%	2284.775	2445.65	Kurtosis	3.877813

```
. summarize mar13, detail
```

mar13				
	Percentiles	Smallest		
1%	-30	-519.49		
5%	10.15	-230.04		
10%	30.035	-214.27	Obs	1200
25%	113.54	-159.26	Sum of Wgt.	1200
50%	402.225		Mean	602.761
		Largest	Std. Dev.	602.0878
75%	949.64	2451.13		
90%	1500.75	2487.55	Variance	362509.8
95%	1901.625	2488.5	Skewness	1.105214
99%	2321.98	2497.49	Kurtosis	3.453496

```
. summarize apr13, detail
```

apr13				
	Percentiles	Smallest		
1%	-35.095	-256.19		
5%	0	-216.95		
10%	14.105	-170.63	Obs	1200
25%	78.665	-143.36	Sum of Wgt.	1200
50%	296.59		Mean	479.0528
		Largest	Std. Dev.	525.2633
75%	695.755	2402.62		
90%	1251.29	2427.66	Variance	275901.5
95%	1641.305	2442.92	Skewness	1.466265
99%	2140.23	2467.93	Kurtosis	4.76434

(a) Comparing December versus January, January versus February, and January versus March, for a total of three comparisons, are there statistically significant differences in mean spending by month? How strong is the evidence of a difference in each case?

(b) Again considering those three comparisons of months, how large are any differences in mean spending? (Hint: Make sure to make an inference about all customers, not just reporting on your sample of 1,200, and make sure to include a margin of error for your inferences.)

(c) If in answering the previous two parts you made the serious error of failing to recognize that these data are paired, what effect would you expect that to have on your answers to parts **(a)** and **(b)**? (Note: This is a conceptual question and it is not asking you to re-do all the calculations above using an incorrect method.)

(3) A researcher wishes to make an inference about the difference between the average price in monopolized markets and competitive markets for retail gasoline. There are two research questions: (Q1) Do the data provide sufficient statistical support for the claim from basic microeconomic theory that less competition means higher prices for consumers? and (Q2) How big of a price premium do monopolists charge? The following data are available.

4 monopolized retail gasoline markets: 1.88 1.90 1.86 1.84
mean: \$1.87 per gallon; sd: \$0.026 per gallon

8 comparable but competitive markets: 1.79 1.69 1.87 1.86 1.66 1.86 1.91 1.76
mean: \$1.80 per gallon; sd: \$0.091 per gallon

(a) Which general method of statistical inference is most appropriate to address Q1? How about Q2? Explain in words. [This is a qualitative question not a quantitative one.]

(b) What kind of data are these? (cross-sectional, times series, panel) (observational, experimental, natural experiment) Explain.

(c) Draw a diagram like we did in Lecture 4 (with the boxes and arrows) for this example that illustrates the effect that we are interested in and any confounding (unobserved/lurking/omitted) variables.

(d) Using your diagram, explain why the presence or absence of a monopolist is an endogenous variable and how that will affect our inference regarding the research question.

(e) We choose “comparable” locations in an attempt to hold “other things equal” and hence to isolate the impact of monopolization. Explain how your answer to part (d) is related to the challenge of picking otherwise comparable locations when looking for monopolized and competitive markets to compare.

(f) Are prices higher, in a statistically significant way, in markets that are monopolized compared to competitive? Is this the same question as Q1?

(g) If we find that prices are significantly higher, can we conclude that monopolies cause higher prices? Carefully explain your answer.

(4) Consider this study about people claiming to have degrees (from institutions like U of T) that they have not actually earned: Attewell, P. and T. Dominab (2011) “Educational imposters and fake degrees” [dx.doi.org/10.1016/j.rssm.2010.12.004](https://doi.org/10.1016/j.rssm.2010.12.004). This study started with a well-known data set *The National Education Longitudinal Study*: a representative sample of U.S. 8th graders in 1988 & in 1994, 2000 (same people all 3 years) and conducted the *Postsecondary Education Transcript Study* where the researchers obtained the original higher education transcripts for those in NELS claiming higher ed. (~9,600 of ~12,100 participants). They “requested transcripts from 3,200 institutions... institutional response rate of approximately 88%.” Of 3,343 claiming a BA (Bachelors of Arts), 185 were fake (5.53%). On pp. 61 & 68 the paper states:

Our analyses hinge on the assumption that respondents who have misreported their credentials to NELS survey researchers on multiple occasions also misstate their credential to employers... Although we cannot directly test this assumption, the paper concludes with a comparison between fake and legitimate degree holders on earnings and wages. ... We found no significant wage differences between people with true and fake degrees.

(a) Reread the last sentence in the excerpt above. Write down the formal hypotheses and say which method – of all the methods you have learned in Chapters 12, 13, and 14 – would be used in this test.

(b) Suppose the researchers wondered if those with fake degrees are more likely to be unemployed. Write down the formal hypotheses and say which method – of all the methods you have learned in Chapters 12, 13, and 14 – would be used in this test.

(c) For Part (a), how would you find the point estimate of the difference? For Part (b), how would you find the point estimate of the difference?

(d) Again referring to the last sentence, what do the authors mean by “significant”? Be context specific.

(e) Should you conclude that getting a real degree has no value beyond giving you a credential on your resume?

(5) Recall the paper discussed in class: “Medicaid Increases Emergency-Department Use: Evidence from Oregon’s Health Insurance Experiment” published in *Science* in January 2014. (DOI: 10.1126/science.1246183). Next, the paper’s abstract, a description of a key table, and a copy of that table are reproduced.

Abstract: In 2008, Oregon initiated a limited expansion of a Medicaid program for uninsured, low-income adults, drawing names from a waiting list by lottery. This lottery created a rare opportunity to study the effects of Medicaid coverage using a randomized controlled design. Using the randomization provided by the lottery and emergency department records from Portland-area hospitals, we study the emergency department use of about 25,000 lottery participants over approximately 18 months after the lottery. We find that Medicaid coverage significantly increases overall emergency use by 0.41 visits per person, or 40 percent relative to an average of 1.02 visits per person in the control group. We find increases in emergency-department visits across a broad range of types of visits, conditions, and subgroups, including increases in visits for conditions that may be most readily treatable in primary care settings.

Excerpt (p. 265): We report the estimated effect of Medicaid on emergency department use over our study period (March 10, 2008 – September 30, 2009) in the entire sample and in subpopulations based on pre-randomization emergency department use. For each subpopulation, we report the sample size, the control mean of the dependent variable (with standard deviation for continuous outcomes in parentheses), the estimated effect of Medicaid coverage (with standard error in parentheses), and the p-value of the estimated effect. Sample consists of individuals in Portland-area zip codes (N=24,646) or specified subpopulation.

Table 2. Emergency-department use							
		Percent with any visits ¹			Number of visits ²		
	N	Percent in Control Group	Effect of Medicaid Coverage	P-value	Mean Value in Control Group	Effect of Medicaid Coverage	P-value
Panel A: Overall							
All visits	24,646	34.5	7.0 (2.4)	0.003	1.022 (2.632)	0.408 (0.116)	<0.001
Panel B: By emergency department use in the pre-randomization period							
No visits	16,930	22.5	6.7 (2.9)	0.019	0.418 (1.103)	0.261 (0.084)	0.002
One visit	3,881	47.2	9.2 (6.0)	0.127	1.115 (1.898)	0.652 (0.254)	0.010
Two+ visits	3,835	72.2	7.1 (5.6)	0.206	3.484 (5.171)	0.380 (0.648)	0.557
¹ For the percent-with-any-visits measures, the estimated effects of Medicaid coverage are shown in percentage points.							
² The number-of-visits measures are unconditional, including those with no visits.							

(a) Looking at Panel B, why isn't the mean usage of the ED (emergency department) for those with "No visits" zero? Similarly, why isn't the mean visits of those with "One visit" one?

(b) Locate the P-value of 0.019 in Table 2. Show all the work to calculate it. (In other words, write down the hypotheses and do the test yourself using the relevant information in the table.)

(c) Locate the P-value of 0.002 in Table 2. Show all the work to calculate it. (In other words, write down the hypotheses and do the test yourself using the relevant information in the table.)

(d) The results are not statistically significant in the last row of Panel B. This lack of statistical significance is not that surprising compared to the statistically significant results in Panel A because that subsample (Two + visits) has a sample size of only 3,835 versus 24,646 in Panel A. (In other words, they broke the sample up into three sub-samples.) Because the sample size is much smaller, sampling error goes up and that increases the standard errors and P-values. But then why in the second to last row of Panel B (One visit), which also has a sample size less than 4,000, is there a small P-value for the difference in mean ED visits?