

ECO220Y, Term Test #1

October 6, 2017, 9:10 – 11:00 am

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**SURNAME
(LAST NAME):** _____

**GIVEN NAME
(FIRST NAME):** _____

UTORID: (e.g. LIHAO118)								
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Instructions:

- You have 110 minutes. Keep these test papers and the *Supplement* closed and face up on your desk until the start of the test is announced. You must stay for a minimum of 60 minutes.
 - You may use a non-programmable calculator.
 - There are 6 questions (some with multiple parts) with varying point values worth a total of 100 points.
 - This test includes these 8 pages plus the *Supplement*. The *Supplement* contains the aid sheets (formula sheets) as well as graphs, tables, and other information needed to answer some of the test questions.
 - Anything written on the *Supplement* will *not* be graded. We will only collect these test papers, not the *Supplement*.
 - Write your answers clearly, completely and concisely in the designated space provided immediately after each question. An answer guide for your response ends each question: it is underlined so you do not miss it. It lets you know what is expected: for example, a quantitative analysis (which shows your work and reasoning), a fully-labelled graph, and/or sentences.
 - Anything requested by the question and/or guide is required. If the answer guide does not request sentences, provide only what is requested (e.g. quantitative analysis or a one or two word answer).
 - For questions with multiple parts (e.g. (a) – (d)), **attempt each part** even if you have trouble with earlier parts. In other words, not being able to answer (a) does NOT imply you cannot answer (b).
 - ***Your entire answer must fit in the designated space provided immediately after each question.*** No extra space/pages are possible. You *cannot* use blank space for other questions nor can you write answers on the *Supplement*. ***Write in PENCIL and use an ERASER as needed.*** This way you can make sure to fit your final answer (including work and reasoning) in the appropriate space. Most questions give more blank space than is needed to answer. ***Follow the answer guides and avoid excessively long answers.***

(1) See the *Supplement for Question (1): PISA Performance*.

(a) [8 pts] Which kind of data are these: cross-sectional, time series, or panel? Putting aside identifier variables, what is the one key variable being measured for each observation? Is it a nominal or interval variable? In these data, what is the unit of observation and how many observations are there? Answer 2 – 4 sentences.

(b) [6 pts] Compare *Canada in 2003* with *Canada in 2015*. Use **both a percent** and **percentage point** comparison. Specify what is being measured, the direction of the change, and the size of the change. Your answer should be clear and meaningful to someone who has not seen the figure or this question (i.e. your answer should stand on its own). Answer with 2 – 3 sentences.

(2) [7 pts] See the **Supplement for Question (2): Credit Card Choices by Sex**. **True/False/Explain:** “In this experiment, 403 of the males chose the best credit card, while fewer females, only 380, chose the best credit card. Hence, in this specific experiment and data, the males are slightly better at selecting among credit card offers compared to the females.” Make sure to *fully support your answer*. Answer with 1 – 3 sentences.

(3) See the **Supplement for Question (3): Corporate Culture**.

(a) [5 pts] Review Figure 2. Does Figure 2 describe the *relationship* between the replies to Q4 and Q4b? If yes, explain what it shows about the *relationship*. If no, identify the tool needed to assess the *relationship* between the replies to Q4 and Q4b. Answer with 1 – 2 sentences.

(b) [8 pts] Review Figure 3. Is Figure 3 a histogram? Explain. Which conclusion should you draw from Figure 3? Make sure that your conclusion is context-specific and is in plain English. Answer with 2 – 4 sentences.

(4) See the *Supplement for Question (4): Pollution and Worker Productivity*.

(a) [8 pts] Review Panel A in Figure 2. What is the *approximate* value of the standard deviation? Show your reasoning. Answer with a specific estimate and clear reasoning supporting your estimate.

(b) [4 pts] In Figure 2, why does Panel B have more bins than Panel A? Answer with 1 – 2 sentences.

(c) [6 pts] How would Panel B of Figure 2 change if you standardized the mean calls per day? As part of your answer, mention what standardization is. Answer with 1 – 2 sentences.

(5) See the *Supplement for Question (5): Gender Gaps among Lawyers*.

(a) [6 pts] In the AJD study, how do the possible consequences of potential non-sampling errors, which the authors discuss in the excerpts, differ from the possible consequences of sampling error? What would be the problem with using these data to make an inference about all lawyers in the United States? Answer with 2 sentences.

(b) [14 pts] Review Figure 3. Sketch a *fully-labelled* box plot of the results in Figure 3. Your graph should include a separate box plot for each sex, displayed side-by-side. Answer with a *fully-labelled* graph, where you make the reasoning behind your graph clear.

(c) [4 pts] Review Table 1. List *eight* dummy variables (also known as indicator variables) described in Table 1. Answer with a list of variables names (i.e. the names given in the first column of Table 1).

(d) [6 pts] Which variable in Table 1 is the most extremely positively skewed? Explain how you know. Answer with 2 – 3 sentences.

(6) See the ***Supplement for Question (6): Credit Card Results: 2014 and 2017.***

(a) [6 pts] Review Figure 4. In Figure 4, what does the number 24% mean? Include a comment on the magnitude (size) of that number. Answer with 1 – 2 precise sentences.

(b) [12 pts] Compare and contrast the overall results in Figures 4 and 6, noting major overall similarities and differences. Explain the overall conclusions from this research in plain English. Answer with 4 – 6 sentences.

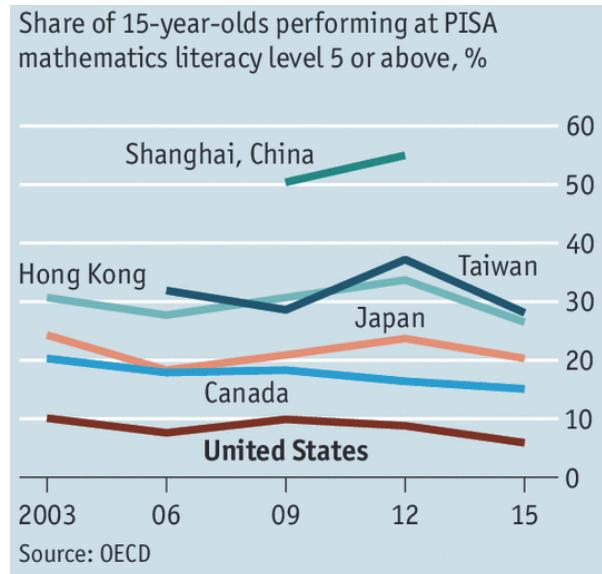
This *Supplement* contains the aid sheets (formula sheets) as well as graphs, tables, and other information needed to answer some of the test questions. For each question directing you to this *Supplement*, make sure to carefully review all relevant materials. Remember, only your answers written on the test papers (in the designated space immediately after each question) will be graded. Any writing on this *Supplement* will *not* be graded.

$$\text{Sample mean: } \bar{X} = \frac{\sum_{i=1}^n x_i}{n} \quad \text{Sample variance: } s^2 = \frac{\sum_{i=1}^n (x_i - \bar{X})^2}{n-1} = \frac{\sum_{i=1}^n x_i^2}{n-1} - \frac{(\sum_{i=1}^n x_i)^2}{n(n-1)} \quad \text{Sample s.d.: } s = \sqrt{s^2}$$

$$\text{Sample coefficient of variation: } CV = \frac{s}{\bar{X}} \quad \text{Sample interquartile range: } IQR = Q3 - Q1$$

Supplement for Question (1): Consider the figure to the right taken from an August 17, 2017 article titled “Effort, not ability, may explain the gap between American and Chinese pupils” in *The Economist* magazine.

Note that PISA stands for “The Programme for International Student Assessment” run by the OECD. The PISA page on the OECD’s website describes PISA as “a triennial international survey which aims to evaluate education systems worldwide by testing the skills and knowledge of 15-year-old students.”



Supplement for Question (2): Recall Carlin et al. (2017) from DACM. Each of the 1,603 participants watched a video and then made a choice among four credit card offers. Each also answered a series of opinion and demographic questions. Consider the cross-tabulation below between the variables chosedom (=1 if chose the dominant card, =0 otherwise) and male (=1 if male, =0 otherwise).

		male		Total
chosedom		0	1	
		0	1	
0	1	373	447	820
1	1	380	403	783
Total	1	753	850	1,603

Supplement for Question (3): Consider a 2017 NBER Working Paper titled “Corporate Culture: Evidence from the Field” <http://www.nber.org/papers/w23255.pdf>. The researchers ask the question “Does corporate culture matter?” and investigate by surveying 1,898 senior executives in both public and private North American firms. Below are two figures (Figure 2 and Figure 3) from that paper.

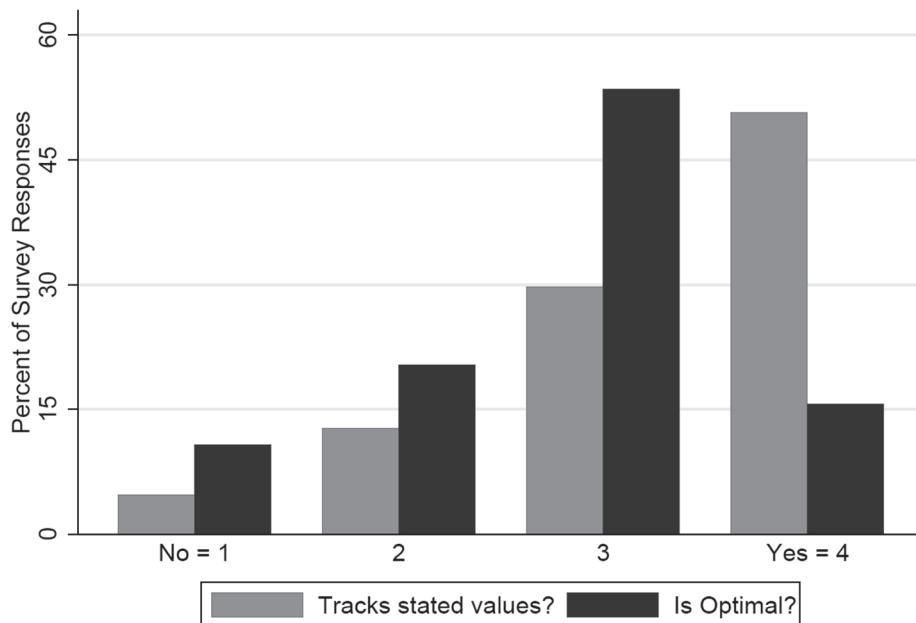


Figure 2. How effective is corporate culture in practice? The [bar chart] shows the percent of responses to Q4 [Tracks stated values?] “How closely does your current corporate culture track with your stated firm values?” where 1 = Not at all, 2 = Not very closely, 3 = Somewhat, and 4 = Very closely and Q4b [Is Optimal?] “Our firm’s corporate culture:” where 1 = Needs a substantial overhaul, 2 = Needs considerable work to get to where it should be, 3 = Needs some work but is close to where it should be, and 4 = Is exactly where it should be.” The sample consists of 1,348 survey responses to these questions from executives at public and private North American firms.

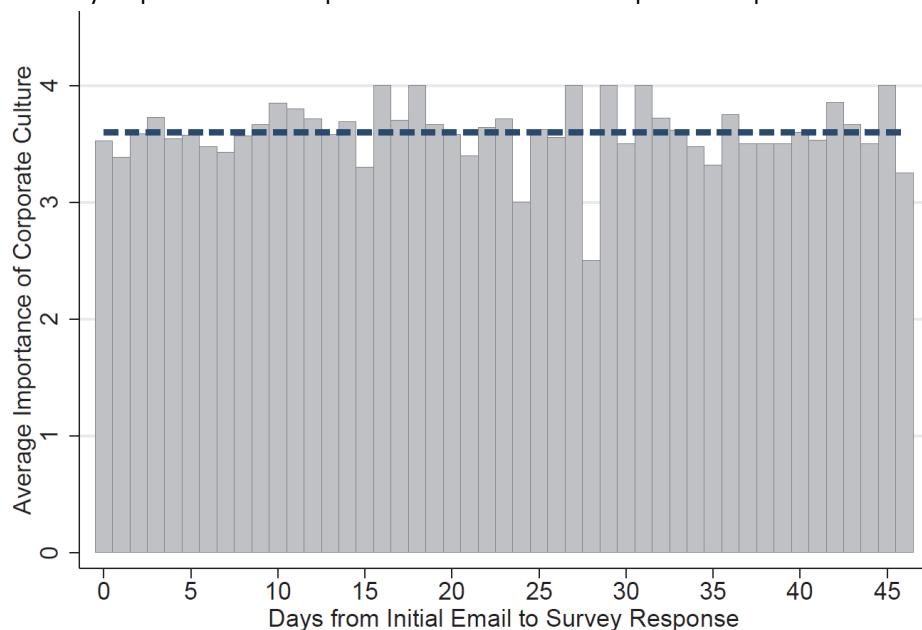


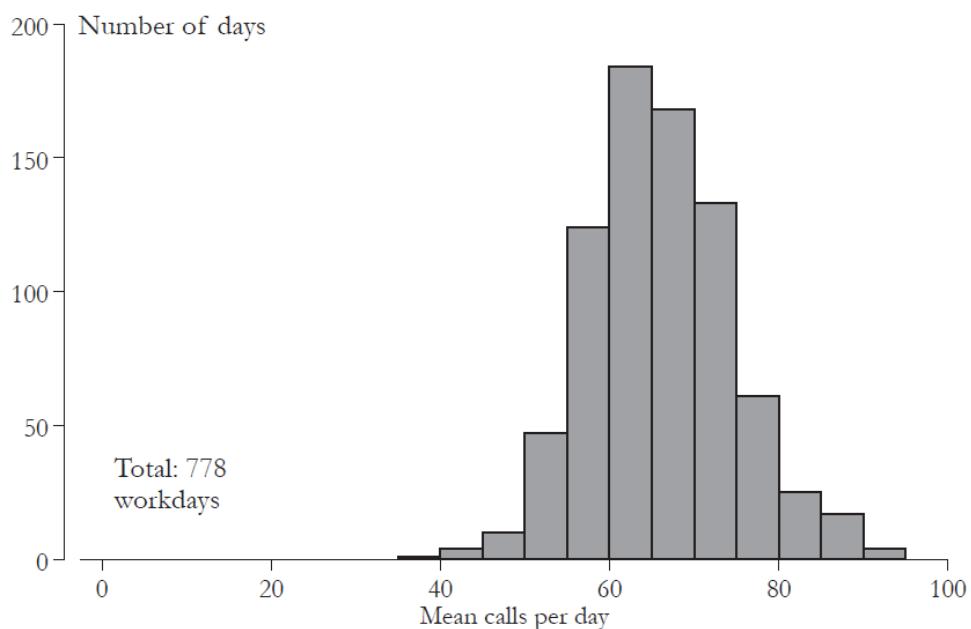
Figure 3. Reliability of culture measures. The figure shows the mean response to Q2, “How important do you believe corporate culture is at your firm?” where 1 = not important, 2 = somewhat important, 3 = important, 4 = very important. The x-axis represents the delay in days from when the initial survey invitation is sent to when the survey is filled out. The dashed line shows the mean response across all observations. The sample consists of 1,348 survey responses from executives at public and private North American firms.

Supplement for Question (4): Consider a 2016 NBER Working Paper titled “The Effect of Pollution on Worker Productivity: Evidence from Call-Center Workers in China” <http://www.nber.org/papers/w22328>. Below are an excerpt and two histograms (Figure 2, Panel A and Panel B) from that paper.

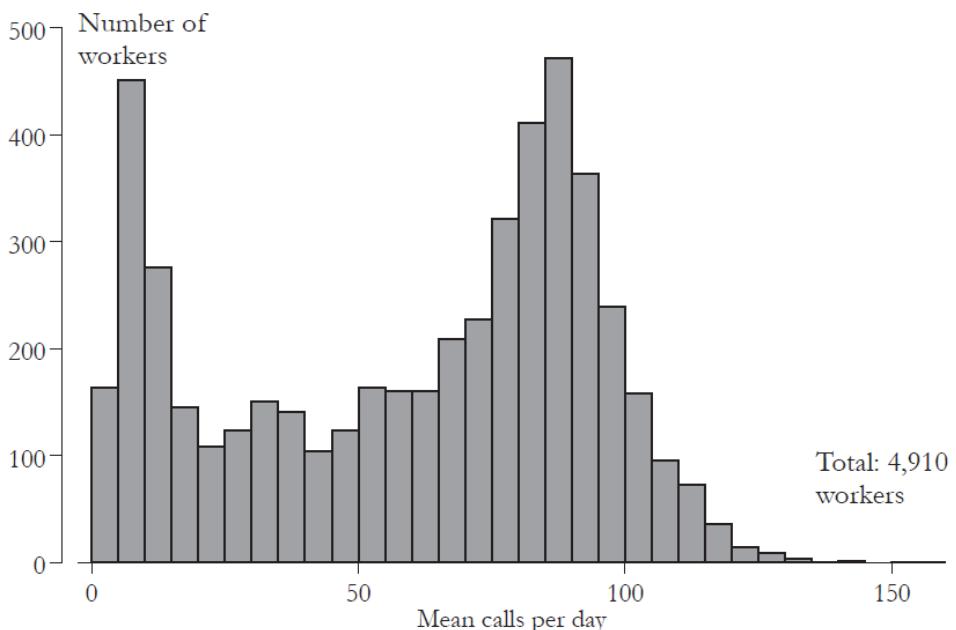
EXCERPT (p. 10): Figure 2 describes the distribution of worker productivity. Panel A plots the distribution of calls per day, which appears to be normal distributed. On a typical day, workers handle an average of 66 calls. Panel B describes the average productivity across workers. There are two peaks in the data corresponding to two distinct types of worker tasks. There are two types of workers: workers that call customers directly, and workers that take calls from customers. The workers that take calls from customers make relatively few calls per day, whereas the workers that make calls to customers make many calls per day. Those two groups lead to the “bimodal” distribution in Panel B of Figure 2.

Figure 2. Histograms of Productivity

A. Across Days



B. Across Workers



The pages of this supplement will *not* be graded: write your answers on the test papers. **Supplement: Page 4 of 6**

Supplement for Question (5): Consider a 2017 article published in the *Journal of Political Economy* titled “Gender Gaps in Performance: Evidence from Young Lawyers.” Below are some excerpts and Figure 3. Table 1 is on the next page.

EXCERPTS (pp. 1315 – 1318): Our analysis uses data from After the JD, a nationally representative, longitudinal survey of lawyers in the United States. The AJD study is a project of the American Bar Foundation and other legal associations. Lawyers in the sample are representative of all lawyers first admitted to the bar in 2000.

The survey was first conducted in 2002, and the same lawyers were interviewed again in 2007. The response rate in 2002 was approximately 70 percent. Among those responding in 2002, more than 85 percent also responded in 2007. Survey participants respond to detailed questions on job characteristics, employment history, educational background, and family status. In 2007, the survey also included questions on hours billed and other relevant variables such as aspirations to be promoted, which is why this period will be the focus of our analysis.

We focus on lawyers who bill hours—the large majority of whom work for private law firms. Table 1 [on next page] reports descriptive statistics for this core sample in 2007. The first measure of performance, hours billed, corresponds to lawyers’ total number of hours billed during the year before the survey, 2006. As shown in table 1, male lawyers bill, on average, 1,826 hours per year, while female lawyers bill 1,677 hours, on average.

Because the AJD data are self-reported by lawyers, it is possible that respondents misreport on how they perform. Although the survey was conducted anonymously and there were no incentives to misreport, we complement our data with external, firm-reported data sources on key variables from a number of alternative sources. The sources conform to our study and exhibit patterns overall and by gender similar to those found in our data. We discuss the sources and main findings in the online appendix.

EXCERPT (pp. 1334): Gender differences in the career aspirations of young lawyers may contribute to differences in performance. When asked to rate, on a scale from 1 to 10, their aspirations to become an equity partner in their firm, 60 percent of male lawyers answered with 8 or more, compared to only 32 percent of female lawyers (see Fig. 3).

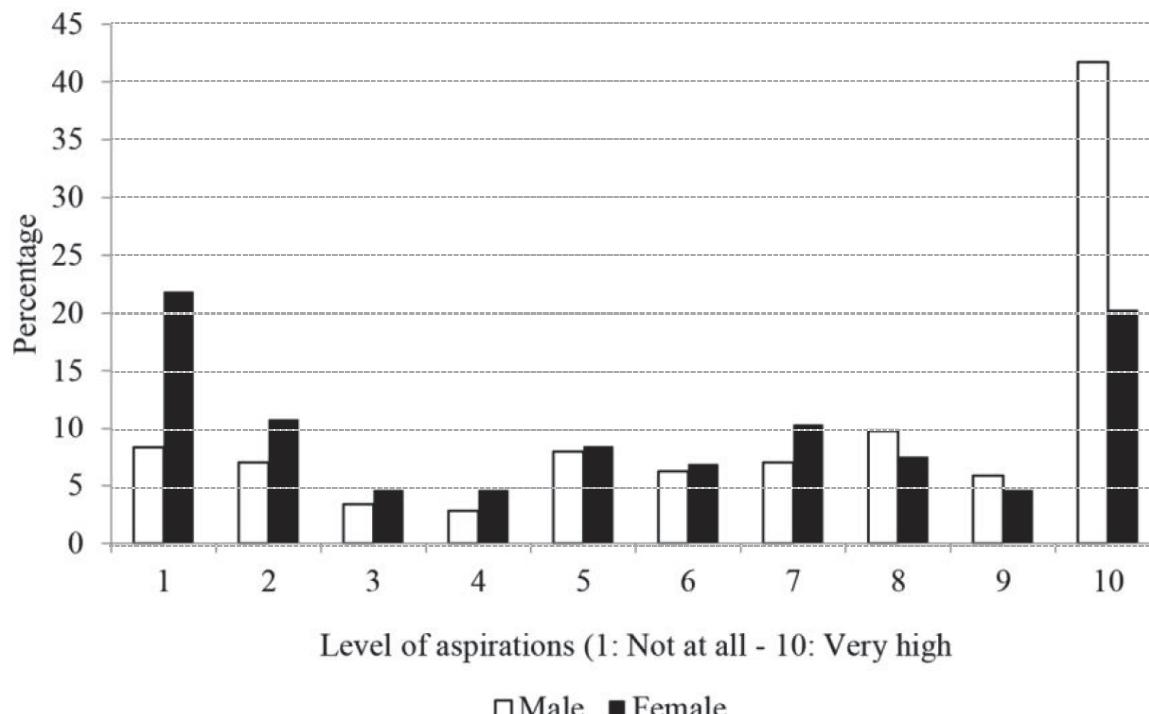


FIG. 3.—Aspirations to become partner. Percentage of responses by gender to the question “How strongly do you aspire to attain an Equity Partner position within your firm?” with possible answers ranging from 1 = not at all to 10 = very high (After the JD study, 2007).

Supplement for Question (5) continues on next page >>>

Supplement for Question (5), cont'd:

TABLE 1
DESCRIPTIVE STATISTICS

	MALE LAWYERS			FEMALE LAWYERS		
	Observations	Mean	Standard Deviation	Observations	Mean	Standard Deviation
Total earnings (\$)	684	150,667	74,531	441	132,685	70,282
Hours billed (annual)	684	1,826	535	441	1,677	520
New client revenue (\$)	684	53,346	171,965	441	23,349	68,892
Target hours to bill	458	1,827	144	304	1,759	201
Hours worked (per week)	684	54.09	12.80	441	48.83	13.84
Age	684	36.12	4.98	441	35.29	4.92
Marriage	684	.81	.39	441	.75	.43
Children	684	1.22	1.24	441	.82	.91
White	684	.83	.38	441	.75	.43
Tenure (years)	684	5.18	2.49	441	5.26	2.44
Private law firm	684	.92	.27	441	.93	.26
Size of workplace > 100	684	.48	.50	441	.51	.50
Law school ranking	597	4.95	1.08	392	5.05	1.10
Undergraduate university ranking	662	12.89	3.50	435	13.04	3.62
Judicial clerk	684	.02	.15	441	.03	.17
Moot court	684	.32	.47	441	.35	.48
General journal	684	.22	.42	441	.20	.40
Specific journal	684	.20	.40	441	.25	.44

Note.—Total earnings are calculated as a sum of straight salary and bonus (expressed in US dollars). Hours billed (annual) is the number of hours billed last year (2006). New client revenue is the approximate amount of new client revenue (expressed in US dollars) generated last year (2006). Target hours to bill is the total number of hours the lawyer was expected to bill in the previous year (2006) by the law firm for which the lawyer worked, conditional on having a strictly positive number of target hours. Marriage takes the value one if the lawyer is married, remarried after divorce, or in a domestic partnership and zero if single, divorced or separated, widowed, or other. Children refers to the lawyer's number of children. White takes the value one if the lawyer is Caucasian and zero if the lawyer is a member of a minority group (black, Hispanic, Native American, and Asian). Tenure is the number of years that the lawyer has been working for the current employer. Private law firm takes the value one if the lawyer works in a private law firm and zero if the lawyer works for another organization. Size of workplace > 100 takes the value one if the number of individuals employed in the organization is greater than 100 and zero otherwise. Hours worked (per week) is the number of hours spent working last week (at the office or away from the office). Undergraduate university ranking and law school studies, respectively. Both variables are redefined such that the higher the value, the more prestigious the educational institution. Judicial clerk takes the value one if the lawyer participated in simulated mock trials as a student and zero otherwise. General (specific) journal takes the value one if the lawyer participated in law journal editorial activities as a student and zero otherwise.

Supplement for Question (6): Recall the 2014 NBER Working Paper titled “Learning Millennial-Style” discussed in lecture. Figure 4 below, from that working paper, analyzes a sample of 401 respondents. Recall also the published version of this research: Carlin et al. (2017) titled “Millennial-Style Learning: Search Intensity, Decision Making, and Information Sharing” analyzed in DACM. Figure 6 below, from the 2017 paper, analyzes a sample of 1,603 respondents. Note that the authors changed some terminology, but the meanings and experiment are the same. Specifically, “No Ads” = “No tagline,” “Misleading Ads” = “Superfluous tagline,” “Recap Video” = “Implemental.”

Figure 4. Choice share per condition. Darker areas represent choice of the best card.

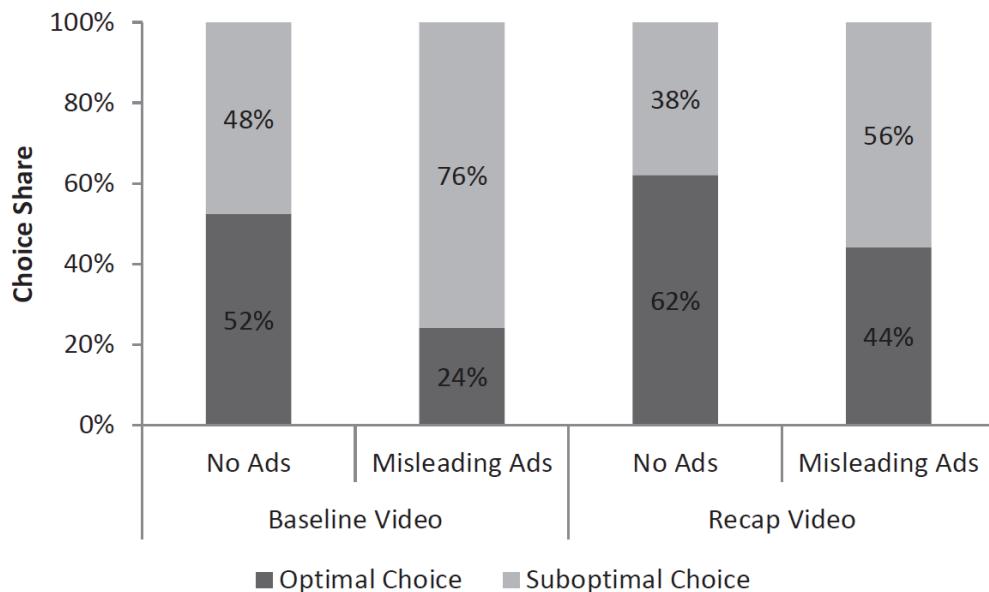


Figure 6. Choice Proportion of the Dominant Card in Each of the Four Experimental Treatments

