ECP 3510 Spring 2026
Practice Exam 1

This exam is closed book and closed notes. Collaboration by any means is strictly prohibited. Once you leave the classroom, your exam will be considered complete, and you will not be permitted to return. A calculator is permitted. Answer each question in the space provided. Be concise. Clarity matters more than length.

Name: _____

Question	Possible	Awarded
1	30	
2	20	
3	25	
4	25	
Total	100	
Curve		

By completing this exam, you agree that you will abide by the University of Florida's Student Honor Code, that you will not accept or provide help that has not been expressly permitted by the instructor, and that you understand that failure to comply with these policies will result in disciplinary action.

Question 1

In this question, you will analyze the results of recent research[1] by David Figlio and Umut Ozek, "The Impact of Cellphone Bans in Schools on Student Outcomes: Evidence from Florida." The authors have student-level data for all students enrolled in one public school district in Florida. Starting in the 2023-2024 academic year, the district banned cell phones in all schools. The authors are interested in how these bans impacted student outcomes: test scores, school discipline, and absenteeism.

Because all schools in the data banned cell phones at the same time, there is no clear "treatment" and "control" schools. To proxy for these, the authors separate schools into two groups: "Low Smartphone Activity" and "High Smartphone Activity," which is determined using pre-ban smartphone activity data and the average number of unique smartphone visits between 9am and 1pm on school days. Schools in the top tercile (top 33%) of smartphone activity are considered "High Smartphone Activity" schools, while the bottom tercile are considered "Low Smartphone Activity"

1. Table 1 provides summary statistics by these two groups.

   (a) (5 points) Which characteristics differ meaningfully across groups even before the policy?

   (b) (5 points) Does the simple difference in test scores between these two groups (+2.75) capture the causal effect of low smartphone use? If not, why is this biased?

[1] Please note that this research remains in the "working paper" stage, meaning these results have not been peer-reviewed.

2. The authors use these "treatment" classifications in a difference-in-differences approach, where the second difference is before and after the ban is implemented.

   (a) (6 points) Given your answers in (1), can this approach be used to estimate the causal effect? If not, what is wrong with this approach?

   (b) (4 points) What assumptions are required for this approach to recover a causal effect?

3. Table 2 provides the DiD results. The table notes include specifics on how each outcome is measured.

   (a) (5 points) What are the effects on suspensions? Is this large? What subgroup(s) drive these results?

   (b) (5 points) Are the effects on test scores different for male and female students? Why do you think this would be the case? (there are many possible answers here)

Question 2

Human capital is costly to produce and, for firms, easy to lose. The loss of one high-expertise worker can dramatically reduce firm productivity. Since human capital is nontransferable, these highly skilled workers can command wage premia. But what would happen if human knowledge could be partially retained by firms? AI models are now being trained on *labor data*, that is, AI models can be deployed to observe everything a worker does and can learn their skills and expertise. As a result, when a high skilled worker leaves an AI-monitored firm, this vital expertise is not lost and productivity can be maintained.

1. (5 points) What do you think this implies about the wage premium to human capital ($Y_s - Y_0$) before AI has learned these skills (short run)? In the context of the human capital model, do you think this would lead to higher or lower educational attainment? *Hint: You can think of this in terms of whether it would increase or decrease firms' demand for skilled/educated workers.*

2. (5 points) What do you think this implies about the wage premium to human capital ($Y_s - Y_0$) after AI has learned these skills (long run)? In the context of the human capital model, do you think this would lead to higher or lower educational attainment?

3. (5 points) What if education changes such that schooling continues to impart knowledge that is difficult for AI systems to learn or replicate? In this case, AI makes high-skilled workers more productive by automating generic tasks. How do you think this would affect the wage premium and educational attainment in the long run?

4. (5 points) Let's now think of this problem in terms of Spence's Signaling model. Would you expect educational attainment to increase or decrease in equilibrium under a signaling model when AI monitoring improves firms' ability to observe worker ability

directly?

Question 3

Card and Krueger (1992a) study whether differences in school quality affect the economic payoff to education. They combine Census wage data with historical information on public school inputs across U.S. states and cohorts.

1. (6 points) Card and Krueger argue that school quality affects wages primarily by changing the returns to education, not by directly affecting wages. Does this argument better fit a human capital or signaling perspective on education? Briefly explain why.

2. Table 3 is an excerpt of Table 2 in Card and Krueger (1992a) and provides the (Mincer) estimates for the returns to education by state and cohort.

   (a) (5 points) The average Mincer return is increasing across cohorts. Why could this be?

   (b) (5 points) The correlation between the estimated Mincer returns and measures of school quality is decreasing across cohorts. Why could this be?

3. Table 4 is a partial replication of Table 4 in Card and Krueger (1992a).

   (a) (4 points) Does the increase in returns across cohorts seem to be driven by increases in enrollment in higher quality private schools?

   (b) (5 points) How are the returns to education related to class size according to the results presented in this table?

Question 4

Consider a signaling model of education with two worker types L (low ability) and H (high ability). Workers live for two periods. Education is chosen in period 0, and wages are earned in period 1. Firms observe education levels e, but not worker type.

Wages are determined competitively and equal expected productivity given beliefs about worker type. Productivities are given by:

$$y_H > y_L > 0$$

The per-unit cost of education is type-specific: $c_H < c_L$. Workers discount future income at rate r_L and r_H.

1. (3 points) Write down the net present value of choosing education level e with wages $w(e)$.

2. (7 points) Write down the incentive compatibility constraints that would yield $e_L = 0$ and $e_H = e^* > 0$. In this separating equilibrium, firms pay $w(0) = y_L$ and $w(e^*) = y_H$.

3. (3 points) How much education, e^*_{LCSE}, do the H types attain in the least cost separating equilibrium?

4. (6 points) If H types become more inpatient (discount the future more) such that r_H increases, what happens to e^*_{LCSE}? Provide an explanation (economic intuition) for this result.

5. (6 points) If L types become more inpatient (discount the future more) such that r_L increases, what happens to e^*_{LCSE}? Provide an explanation (economic intuition) for this result.

Post-Exam Survey (Anonymous)

Only if you have time, I ask that you please complete this survey, which is anonymous. Your answers and the rest of the answers provided by the class will in no way influence grades on this exam. The survey responses will be used *strictly* for the purpose of improving this course.

1. How would you describe the length of the homework assignments so far?
   (a) Too long
   (b) Too short
   (c) Just right
2. How would you describe the difficulty of the homework assignments so far?
   (a) Too difficult
   (b) Too easy
   (c) Just right
3. How would you describe the pacing of the course?
   (a) Too fast
   (b) Too slow
   (c) Just right
4. How would you describe the amount of material covered up to this exam?
   (a) Too much
   (b) Too little
   (c) Just right
5. How confident do you feel applying the empirical methods covered so far?
   (a) Not confident
   (b) Somewhat confident
   (c) Very confident
6. How clear are the expectations for exams and assignments?
   (a) Not clear
   (b) Somewhat clear
   (c) Very clear
7. Which best describes your opinion on the in-class presentations?
   (a) I would prefer an additional exam instead
   (b) I think they are the best alternative assessment
   (c) I would prefer a different alternative assessment

Would you change anything about the course?

Tables and Figures

Table 1: Summary Statistics by Pre-Ban Smartphone Activity

	Low smartphone activity schools	High smartphone activity schools	Difference
Averaged test scores (percentiles)	49.17	46.42	2.75***
	(27.88)	(27.63)	(0.15)
Involved in a disciplinary incident	0.080	0.126	-0.046***
	(0.272)	(0.332)	(0.002)
Percent absent days	0.120	0.124	-0.004***
	(0.127)	(0.131)	(0.001)
White	0.272	0.244	0.028***
	(0.445)	(0.429)	(0.002)
Black	0.259	0.248	0.011***
	(0.438)	(0.432)	(0.002)
Hispanic	0.429	0.467	-0.038***
	(0.495)	(0.499)	(0.003)
Male	0.513	0.515	-0.002
	(0.500)	(0.500)	(0.003)
N	60,730	73,607	

Notes: This table reports summary statistics for schools with low and high pre-ban smartphone activity. Standard deviations are reported in parentheses below group means. The Difference column reports the difference in means (Low − High), with standard errors reported in parentheses below. Significance levels: $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$. *Source:* My calculations based on Table 1 in Figlio and Ozek (2025).

Table 2: Effects of Cellphone Bans on Student Outcomes

	Overall	Black	White	Hispanic	Male	Female	Elementary school	Middle and high school
Panel A: Suspended								
First year of ban	16.762*	38.826*	1.319	14.072	18.878	13.699	-12.120*	33.690**
	(9.094)	(20.001)	(7.125)	(9.862)	(11.496)	(8.342)	(7.237)	(14.017)
Second year of ban	-3.190	-1.685	-6.579	-1.540	-6.325	-0.809	-32.212***	20.447
	(8.526)	(18.313)	(7.355)	(9.161)	(10.876)	(7.749)	(6.750)	(13.274)
Comparison mean	138.3	236.6	85.61	127.1	179.6	94.89	57.76	217.2
Panel B: Student Test Scores								
First year of ban	0.283	-0.292	1.006***	0.380	0.373	0.190	0.213	0.711**
	(0.257)	(0.363)	(0.357)	(0.288)	(0.275)	(0.280)	(0.321)	(0.350)
Second year of ban	0.622**	0.657	0.965***	0.643**	0.819***	0.455	0.509	0.905**
	(0.276)	(0.403)	(0.372)	(0.315)	(0.298)	(0.299)	(0.349)	(0.391)
Comparison mean	50.95	42.60	61.74	45.91	49.62	52.35	49.28	52.25
Panel C: Percent Absent Days								
First year of ban	0.018	0.471	-0.294	0.047	-0.046	0.088	-0.492	-0.651**
	(0.373)	(0.693)	(0.294)	(0.352)	(0.359)	(0.400)	(0.500)	(0.276)
Second year of ban	0.100	0.561	-0.222	0.089	0.065	0.138	-0.585	-0.423
	(0.401)	(0.721)	(0.325)	(0.377)	(0.387)	(0.427)	(0.554)	(0.295)
Comparison mean	11.96	14.04	9.914	12.65	11.86	12.07	11.95	11.98

Notes: Each panel reports difference-in-differences estimates comparing high versus low pre-ban smartphone activity schools in the first two years of the ban relative to the pre-ban year. Robust standard errors in parentheses. In Panel A, the outcome is multiplied by 10,000 (rates per 10,000 students). Panel B reports nationally normed percentile test scores. In Panel C, percent absent days is multiplied by 100. Significance levels: $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$. *Source:* Figlio and Ozek (2025) Tables 2-4

Table 3: Card and Krueger (1992a) Table 2 Excerpt

ESTIMATED RETURNS TO EDUCATION BY STATE AND COHORT:
WHITE MALES BORN IN 1920–49

	ESTIMATED RETURN FOR COHORT BORN IN:		
STATE	1920–29	1930–39	1940–49
Alabama	4.52	6.08	7.15
	(.22)	(.21)	(.20)
Arizona	5.62	7.15	7.47
	(.49)	(.50)	(.42)
Arkansas	4.44	5.60	7.28
	(.23)	(.23)	(.23)
California	5.76	6.20	6.96
	(.21)	(.19)	(.13)
Colorado	5.82	6.22	7.49
	(.34)	(.33)	(.29)
Connecticut	5.46	7.14	7.83
	(.28)	(.28)	(.23)
Delaware	6.19	7.07	6.31
	(.76)	(.76)	(.58)
Florida	4.25	6.07	7.40
	(.33)	(.30)	(.23)
Georgia	4.76	6.14	7.71
	(.21)	(.21)	(.19)
Mean over all states	5.07	6.27	7.44
Standard deviation	.65	.58	.56
Correlation with:			
Pupil/teacher ratio	−.36	−.23	−.19
Term length	.62	.51	.35
Relative teacher wage	.71	.51	.25

Table 4: Card and Krueger (1992a) Table 4 Excerpt

ADDITIONAL DETERMINANTS OF THE RETURN TO EDUCATION: WHITE MEN
(Dependent Variable: Percentage Return to Education, Fixed-Effects Estimates)

	REGRESSION								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1. Pupil/teacher ratio (÷ 100)	−9.67	−9.36	−9.77	−9.33	−9.81	−9.80	−8.42	−10.62	−9.23
	(3.16)	(3.21)	(3.20)	(3.10)	(3.06)	(2.98)	(3.54)	(3.22)	(3.23)
2. Term length (hundreds of days)	−.51	−.04	−.65	−.98	−.40	−1.26	−.08	−1.04	.06
	(1.03)	(1.12)	(1.17)	(1.05)	(.97)	(1.01)	(1.00)	(1.13)	(1.04)
3. Relative teacher wage	1.22	.95	1.13	.86	1.05	1.05	.86	1.12	1.00
	(.47)	(.57)	(.58)	(.43)	(.44)	(.43)	(.48)	(.44)	(.47)
4. Median education of parents' generation	−.18	...	−.18	...	...	...	...	...	...
	(.11)		(.11)						
5. Log real per capita income of parents' generation	...	.18	.13	...	...	...	...	...	...
		(.52)	(.51)						
6. Fraction male teachers	...	...	...	−3.36	...	−3.46	...	...	...
				(1.39)		(1.43)			
7. Mean years of education of teachers	...	...	...	...	.33	.38	...	...	...
					(.13)	(.13)			
8. Mean years of experience of teachers	...	...	...	...	.03	.02	...	...	...
					(.02)	(.02)			
9. Fraction high school grads in cohort	...	...	...	...	...	...	.89	...	...
							(1.48)		
10. Fraction college grads in cohort	...	...	...	...	...	...	...	−3.86	...
								(2.11)	
11. Fraction of enrollment in private schools	...	...	...	...	...	...	...	...	.71
									(2.69)