College Students' Course Taking Behaviors and Educational Outcomes during COVID-19 Pandemic

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1. Introduction/Context

❖ At the end of March 2020, UCI, like most colleges across the country, transitioned all classes online due to the COVID-19 pandemic.

❖ This transition to Emergency Distance Learning, which affected the end of Winter quarter and all of Spring quarter, was accompanied by several policy changes at the institution: instructors were encouraged to make final assessments optional for students, students were allowed to take any class Pass/No Pass in the Spring quarter, and students living on campus were encouraged to leave.

❖ In this study, we examine the behavioral responses and academic outcomes of groups of students associated with Emergency Distance Learning and the accompanying academic policy changes.

❖ Understanding how different groups of students responded to the social, economic, and health crises, and political upheaval can help administrators to support vulnerable student subgroups and mitigate negative effects of these events by developing policy interventions.

3. Method

Regression Models Using Student, Term, and Year Fixed Effects

❖ We use regression models with student, term, and year fixed effects. These models use students as their own comparison, and control for time-invariant student characteristics such as motivation and stress resistance that explain students' average behaviors and performance. It also controls for the characteristics relevant to a certain term, year, and class standing which would affect the outcomes.

❖ These models allow us to examine if students have different enrollment behaviors and academic outcomes in Spring 2020 than expected, given their previous enrollment behaviors and average trends across grades, years, and terms.

$$y_{igty} = \mu_0 Spring2020 + \eta_y + v_t +$$
$$\gamma_g + \alpha_i + \mu_1 Spring2020 * x_i + \varepsilon_{igty}$$

y_{igty}: students' outcomes in class standing g, term t, year y

μ_0 : coefficient for Spring 2020, the main coefficient we are interested in

η_y: academic year fixed effect (2018-19, 2019-20)

v_t : term (Fall, Winter, Spring) fixed effect

γ_g : grade (class standing according to students' accumulated credits: freshman, sophomore, junior, senior) fixed effect

α_i: student fixed effect

$\mu_1 Spring2020 * x_i$: the interaction term of Spring 2020 and student's time-invariant characteristics such as female, first-generation college student, transfer student, etc.

ε_{igty}: error term

2. Research Questions

RQ1: Did students' enrollment behaviors and academic outcomes in the Spring 2020 emergency distance learning (EDL) term differ from what we would expect, given students' previous enrollment behaviors and academic outcomes?

RQ2: Do we see bigger differences in students' enrollment behaviors and academic outcomes for certain student subgroups?

4. Data

Students Sample

❖ This study uses student-by-term records from five terms (Winter 2019, Spring 2019, Fall 2019, Winter 2020, and Spring 2020) for all UCI undergraduate students who enrolled in Fall 2018 and Fall 2019 as freshmen or transfer students and were also enrolled in Spring 2020.

❖ This represents 15,876 unique students and 61,635 unique student-by-term observations.

Outcome Variables
Behavioral Outcomes (Spring 2020) :

❖ The proportion of units that students took Pass/No Pass: total enrolled P/NP units divided by total enrolled units

❖ Course Difficulty: average course-level mean grade of previous offerings of each student's classes (excluding winter 2020 records because of the change of grading policy)

Academic Outcomes (Spring 2020)
❖ Total completed units
❖ Term GPA

Characteristics of students	Obs.	Percent
Gender		
Female	8,293	52%
Male	7,583	48%
Ethnicity		
Asian / Asian American	8,537	54%
Black	585	4%
Hispanic	3,906	25%
White	2,297	15%
Other	473	3%
Underrepresented Minority Student	4,688	30%
First Generation College Student	7,425	47%
Low Income Student	4,592	29%
Application Status		
Freshman	10,989	69%
Transfer Students	4,887	31%
Cohort (application year)		
Fall 2018	7,415	47%
Fall 2019	8,461	53%
International Student	2,728	17%
Online Courses Experience Before Spring 2020*	5,531	35%
Total Observations	15,876	

Note:
Online Courses Experience Before Spring 2020 means students took at least one online course successfully before Spring 2020.

5. Results (Student, Term, and Year Fixed Effects Models)

Table 1				
Main Results without Interaction Terms				
	Enrollment Behaviors (Proportion of Pass/No Pass Units)	Enrollment Behaviors (Courses Difficulty)	Academic Outcomes (Total Completed Units)	Academic Outcomes (Term GPA)
Spring 2020	0.109***	-0.008	0.185**	0.134***
	(0.003)	(0.006)	(0.058)	(0.011)
Observations	61635	61635	61635	61635
Standard errors in parentheses * p<0.05 ** p<0.01 *** p<0.001				

Table 2							
Academic Outcomes: Total Completed Units (an example of the subgroup analysis)							
Spring 2020	0.185**	-0.103	0.230***	0.249***	0.189***	0.253***	0.215***	0.157*
	(0.058)	(0.068)	(0.061)	(0.064)	(0.061)	(0.061)	(0.059)	(0.062)
Grade (class standing)								
Reference: Freshman								
Sophomore	-0.057	-0.066	-0.058	-0.058	-0.057	-0.103	-0.053	-0.056
	(0.056)	(0.056)	(0.056)	(0.056)	(0.056)	(0.057)	(0.056)	(0.056)
Junior	-0.799***	-0.806***	-0.806***	-0.807***	-0.799***	-0.899***	-0.797***	-0.798***
	(0.099)	(0.099)	(0.099)	(0.099)	(0.099)	(0.101)	(0.099)	(0.099)
Senior	-1.385***	-1.378***	-1.395***	-1.397***	-1.385***	-1.450***	-1.388***	-1.383***
	(0.145)	(0.145)	(0.145)	(0.145)	(0.145)	(0.145)	(0.145)	(0.145)
Academic year								
Reference: 2018-2019								
Academic year 2019-2020	0.519***	0.523***	0.522***	0.522***	0.519***	0.544***	0.518***	0.517***
	(0.068)	(0.068)	(0.068)	(0.068)	(0.068)	(0.068)	(0.068)	(0.068)
Term								
Reference: Fall								
Spring	0.656***	0.657***	0.658***	0.658***	0.656***	0.672***	0.656***	0.656***
	(0.060)	(0.060)	(0.060)	(0.060)	(0.060)	(0.060)	(0.060)	(0.060)
Winter	0.767***	0.767***	0.767***	0.767***	0.767***	0.774***	0.767***	0.766***
	(0.033)	(0.033)	(0.033)	(0.033)	(0.033)	(0.033)	(0.033)	(0.033)
Interaction terms								
Spring 2020*Female Student		0.549***						
		(0.066)						
Spring 2020* Underrepresented Minority Student			-0.151*					
			(0.073)					
Spring 2020*First Generation College Student				-0.135*				
				(0.066)				
Spring 2020*Low Income Student					-0.012			
					(0.072)			
Spring 2020*Transfer Students						-0.227**		
						(0.079)		
Spring 2020*International Student							-0.171	
							(0.099)	
Spring 2020*Previous Online Courses Experience								0.082
								(0.069)
Total Observations	61635	61635	61635	61635	61635	61635	61635	61635
Standard errors in parentheses * p<0.05 ** p<0.01 *** p<0.001								

Note:
We have done the subgroup analysis for three other outcome variables. The results are discussed in 6. Conclusion.

7. Discussion

❖ Future studies should focus on disentangling the possible mechanisms underlying the observed increase in students' term GPA in Spring 2020. Possible explanations include 1. Students with lower academic performance are more likely to take Pass/No Pass; 2. Students strategically enrolled Pass/No Pass for more difficult courses; 3. Instructors could have changed their grading policy; 4. Students could opt out of final assessments. We tried to control for course difficulty, students' previous term GPA, and the proportion of Pass/No pass units in the models but still see positive effects for Spring 2020 on students' term-GPA. To further examine the trend of GPA change is necessary.

❖ A subsample of UCI students is followed with COVID-19 relevant survey questions, which include students' access to study places which allow them to focus on course works, access to computers and stable internet, and their new responsibilities besides course work in Spring 2020. This in-depth information can help us to better understand what kinds of factors mediate the differential effect we observed on student subgroups' enrollment behaviors and academic outcomes.

6. Conclusion

Enrollment behaviors:

❖ In Table 1, we can see the main effects of Spring 2020 on four students' outcomes. In general, students enrolled more Pass/No Pass units, completed more units, and have higher term GPA than expected, given their previous outcomes and average trends across grades, years, and terms.

❖ The results in Table 2 provide an example of subgroup analyses. In this table, we examine different effects for subgroups of students using interaction terms. In this table we examine total completed units, the positive effect for Spring 2020 is larger for female students than male students, smaller for underrepresented minority students than non underrepresented minority students, smaller for first-generation college students than non first-generation college students, smaller for transfer students than students who entered UCI as freshman.

❖ Results for three other outcomes not included here show the positive effect for Spring 2020 on students' taking Pass/No Pass units is larger for transfer students than students who entered UCI as freshman, smaller for female students than male students, smaller for underrepresented students than non underrepresented students, smaller for first-generation college students than non first-generation college students.

❖ The positive effect for Spring 2020 on students' term GPA is smaller for transfer students than students who entered UCI as freshman, larger for female students than male students, larger for underrepresented minority than non underrepresented students, larger for low-income students than non low-income students, larger for first-generation college students than non first-generation college students, and larger for students with online courses experience before Spring 2020 than students without online course experience before Spring 2020.

❖ No consistent effect on student' course enrolled difficulty.

Acknowledgments