Gender, Risk Aversion, and the "COVID" Grading Option in a Principles of Economics Course

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As the COVID-19 pandemic swept across the United States, colleges and universities faced the challenge of completing the academic term. Many institutions offered students the option of a "credit/no credit" grading system, which wouldn't affect their GPA. In this study, we examine which student characteristics are correlated with the decision to choose this grading option over a traditional letter grade. Our findings show that female students, particularly those with lower course grades, were more likely to opt for the "credit/no credit" option than male students. This aligns with previous research indicating that female students tend to be more risk-averse, particularly in economics courses.

Keywords: Gender; Confidence; Risk; Teaching Economics

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Introduction

In March 2020, many universities offered students the option to report final course grades as “credit/no credit” instead of traditional letter grades. This grading structure would not impact a student's GPA and any passing grade would count as credit towards degree requirements. Using data from a large public university, we studied the likelihood that a student would choose this alternative grading option for their principles of microeconomics course. Students had until the last day of classes (before the final exam) to select this alternative option, and therefore had full knowledge of their course grades prior to the decision.

This natural experiment allowed us to examine whether female students were more likely to select the alternative "credit/no credit" grading option due to potentially higher risk aversion compared to male students. Previous research has shown women may be more averse to risk and competition in general (Croson and Gneezy, 2009) and in economics classrooms specifically (Nierdele and Vesterlund, 2007; Nowell and Alston, 2007). We investigate whether this risk aversion influences female students' decisions regarding their final exam grades.

Data and Estimation

Our empirical specification investigates the likelihood that a student will choose the alternative "credit/no credit" grading option based on their course grades before the final exam, as well as other administrative data such as major, class standing, and self-reported gender. For all majors, earning "credit" for the course is sufficient, but a poor traditional grade may have different impacts depending on the student's classification and major. We classify students as *underclass* (first or second year of study) to control for differential impacts on new students versus more experienced students. We also control for a student’s intended major by classifying students as either *business* (enrolled in a business or economics major), *engineering* (enrolled in an engineering major), or some other major. Table 1 presents demographic data for 962 students.

Table 1: Demographic Data

	All Students	Male (N=597)	Female (N=365)
First year	43.6%	43.7%	43.3%
Sophomore	43.6%	41.9%	46.3%
Junior	9.9%	11.4%	7.4%
Senior	3.0%	3.0%	3.0%
Business	52.8%	51.3%	55.3%
Engineering	19.3%	25.3%	9.6%
Other Major	27.9%	23.5%	35.1%
Selected C/NC Option	31.3%	29.1%	34.8%

The university informed students of the grading options on March 22, 2020, but the window for selecting the C/NC option was limited to April 20 to May 6. Students had completed two midterm exams prior to the selection window and had access to all grades, except for their final exam score, before the selection deadline. It is not known whether students who selected the C/NC option did so before or after taking the third exam, but they were shown how to determine what final exam score was needed to attain a particular course grade.

The final exam was worth either 30% and 40% of the final grade depending on how the score compared to the midterm average, but all students were required to take it. The first exam was held in class, while all remaining exams were online. Online homework, discussion boards, and in-class response polling accounted for 30% of the overall grade. Students who chose the C/NC option had significantly lower final grades than those who chose traditional letter grades, but there was little final course grade difference between genders. Final course grades were nearly the same as *Prefinal* grades, and students with lower *Prefinal* grades were more likely to select the C/NC option. Table 2 presents relevant average grade data, with "Final Grade" representing the actual final score a student earned regardless of their grading option.

Table 2: Average Grade Data by Selected Grading Option

Graded Item	All students			C/NC Option			Traditional Option		
	All (962)	Male (597)	Female (365)	All (301)	M (174)	F (127)	All (661)	M (423)	F (238)
Final Grade	85.13	85.28	84.89	79.87	79.85	79.91	87.52	87.51	87.55
Prefinal	85.33	85.48	85.08	79.72	79.74	79.69	87.88	87.84	87.96
Final Exam	82.17	82.43	81.74	76.84	76.94	76.69	84.59	84.69	84.43
Exam 1	75.26	76.84	72.70	67.95	69.80	65.45	78.58	79.70	76.58
Exam 2	78.41	79.33	76.91	70.89	72.03	69.34	81.84	82.35	80.95
Exam 3	75.54	75.43	75.71	69.47	69.82	69.01	78.28	77.70	79.28
Midterm Average	76.55	77.39	75.18	69.59	70.79	67.94	79.72	80.11	79.04
Homework, etc.	91.89	91.05	93.27	87.98	86.19	90.43	93.67	93.05	94.78

Note: Sample size of each column is included in parenthesis. Exam 1 was conducted in person without notes available while Exams 2 and 3 were conducted online and open note.

We use a probit regression to analyze the probability that a student chooses the C/NC option based on their prior course performance and administrative data. *CNC* is the dependent variable, which is equal to 0 if a student selects a traditional letter grade and 1 for the C/NC option. We also include a binary variable for gender (*Female*=1 for female students, 0 otherwise) and the student's *Prefinal* and average grade for the two online midterm exams (*Exam2and3*) as measures of their ability to perform well on online exams.

Results

Table 3 presents the results for the full sample conditional on administrative data and prior course grades. Under Specification 1, a one-point increase in the *Prefinal* score lowers the probability a student selects the C/NC option by 1.8%, while a one-point increase in their *Exam2and3* score decreases the probability by only 0.6%. A student's major doesn't appear to have an impact on their decision, and class standing only appears to matter under specific conditions.

Including gender only as a dummy variable imposes the restriction that the pre-final grade influences the C/NC decision of male and female students identically. It is possible that the

effect of *Prefinal* grades on the C/NC decision differs across genders. Specification 2 includes an interaction term between *Female* and *Prefinal*. Women appear more likely to take the C/NC option overall (based on the positive intercept term) but beyond that, a higher pre-final grade has less of an effect on the decision than it does for men (based on the negative interaction term). Otherwise, results are similar to the first specification. The predicted marginal effect of being female on the CN/C option is around 5%.

Table 3: Probit estimation results for the full sample (N=962)

	Specification 1			**Specification 2**		
	Coeff.	**Std. err.**	**Marginal Effect**	**Coeff.**	**Std. err.**	**Marginal Effect**
Underclass	-0.291*	*0.146*	-0.085	-0.284	*0.146*	-0.083
Female	0.172	*0.098*	0.049	2.011	*1.196*	0.049
Business	-0.001	*0.111*	-0.000	0.002	*0.111*	0.001
Engineering	0.039	*0.142*	0.011	0.040	*0.142*	0.011
Exam2and3	-0.020**	*0.007*	-0.006	-0.019**	*0.007*	-0.005
Prefinal	-0.065**	*0.010*	-0.018	-0.060**	*0.011*	-0.019
*Prefinal*Gender*				-0.022	*0.014*	-†
Constant	6.719**	*0.570*	-	6.140**	*0.673*	-
Pseudo R^2	0.195			0.197		

Note: † Marginal effects cannot be accurately calculated for interaction terms.
*5% significance level; **1% significance level.

The decision to select the C/NC option was heavily influenced by the *Prefinal* score, and the underlying data suggests an interesting behavior. As *Prefinal* scores rose above 80%, the proportion of students selecting traditional grades rose rapidly. More than 50% of students with *Prefinal* scores between 81-82% (and those above) chose the traditional option while most students with *Prefinal* scores between 80- 81% (and those below) chose the C/NC option.

Specification 1 was re-estimated for two subgroups based on *Prefinal* scores and the results are presented in Table 3. For students with *Prefinal*<81, neither *Exam2and3*, nor *Prefinal*, are statistically significant. Midterm exam scores might not matter if desired grades are unattainable. In this group, female students are 13.3% more likely to select the C/NC option compared to a similarly positioned male student. This may be evidence of an increased aversion to earning low grades among female students that echoes the findings of Rask and Tiefenthaler (2008).

Table 3: Probit estimation results based on prefinal scores

	***Prefinal* Grade Less than 81% (N=255)**			***Prefinal* Grade Greater than 81% (N=707)**		
	Coeff.	**Std. err.**	**Marginal Effect**	**Coeff.**	**Std. Err.**	**Marginal Effect**
Underclass	-0.260	*0.266*	-0.092	-0.210	*0.180*	-0.051
Female	0.362*	*0.176*	0.133	0.070	*0.123*	0.016
Business	-0.119	*0.183*	-0.043	0.116	*0.148*	0.027
Engineering	-0.550*	*0.248*	-0.208	0.489**	*0.183*	0.124
Exam2and3	-0.006	*0.011*	-0.002	-0.007	*0.011*	-0.002
Prefinal	-0.027	*0.016*	-0.010	-0.142**	*0.021*	-0.033
Constant	2.943**	*1.130*	-	12.186**	*1.417*	-
Pseudo R^2	0.052			0.1837		
Implied Probability of CNC for Average Males†	0.550			0.128		
Implied Probability of CNC for Average Females†	0.687			0.143		

Note: The implied probability is based on a student in their first two years (Underclass=1) majoring in Business or Economics (Business=1) with an average test score and pre-final score. *=significant at the 5% level. **=significant at the 1% level.

For students with *Prefinal>81%*, females were not significantly more likely to take the C/NC option. Engineering majors were more likely to take the C/NC option compared to other majors. Engineering majors with strong grades may have opted for C/NC credit in their economics course to shirk on the final (but still earn credit) to allocate effort toward more time-intensive courses related to their major (like math and physics). This result is interesting since engineering majors were *less* likely to take the option among the sub-81% group.

Discussion

Our results show that female students were more likely to choose the C/NC option, particularly those with lower pre-final grades. This aligns with previous research indicating that women are more risk-averse and men may be more confident or less affected by lower grades in academic settings. Understanding how grading incentives and risks may disproportionately impact men and women is crucial as we work to increase female representation in the field. That female students may be more sensitive to grade-based feedback echoes work of Emerson et al. (2012), Rask and Tiefenthaler (2008), Ost (2010), and Owen (2010) who all find that and poor academic performance discourages female students from the major.

It's worth noting that the decision to put in less effort after the C/NC option was announced, and the decision to choose the C/NC option itself, may have been influenced by the

pandemic and its impact on individual students. However, we can't capture these effects with the available data. Further research is needed to shed more light on this issue. Perhaps some worked less knowing they *could* select the C/NC option, if needed, but the choice ultimately came down to where they stood going into the final exam. After the decision was made, incentives and causality were much clearer. Those who selected the C/NC option, assuming they were safely above the "C-" cutoff to receive credit, had less incentive to study for the final.[3]

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[3] OLS results for final scores conditional on the same variables presented earlier are available from the authors. Final exam scores are estimated for the entire sample, and broken down by prefinal score and gender.