Do High-Stakes Exams Deter Women From Studying Further?

Lessons From Economics PhD Programs

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Motivation

- In 2020, 55% of all PhD graduates in the U.S. were women
  - while only 34% in Economics
- This gap is not only U.S.-specific

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- In 2020, 55% of all PhD graduates in the U.S. were women
  - while only 34% in Economics
- This gap is not only U.S.-specific
- **What we do:** assess the role of the high-stakes exams in deterring women from pursuing PhD in Economics

Background

- North American-style Economics PhD programs require passing exams from core subjects
- Substantial evidence on women performing worse than men under pressure [Gneezy et al., 2003], [Ors et al., 2013], [Azmat et al., 2016], [Ballen et al., 2017] [Cai et al., 2019]

Background

- North American-style Economics PhD programs require passing exams from core subjects
- Substantial evidence on women performing worse than men under pressure [Gneezy et al., 2003], [Ors et al., 2013], [Azmat et al., 2016], [Ballen et al., 2017] [Cai et al., 2019]
- Expecting to underperform at exams, women may be less likely to apply to Economics PhD programs
- We test this hypothesis with a hypothetical choice experiment online

Experiment

- Baseline survey + choice experiment
- Target population: master students in Economics and related fields
- We follow [Wiswall and Zafar, 2017]

Hypothetical choice experiment

Share of women (40%) is the same in all programs.

	Assessment type	First year failure rate[1]	Monthly PhD scholarship[2]
A	*Only Exams (100%)*	25%	1650€
B	*Exams + Proposal (50%/50%)*	34%	1750€
C	*Only Exams (100%)*	43%	1900€

[1] Remember: if you fail the first year, you have to leave the program.

[2] After taxes

Figure: Sample Scenario 1

We ask respondents to allocate probabilities to the three programs

Hypothetical choice experiment

First year failure is the same in all programs (15%).

	Assessment type	Share of women in PhD cohort	Monthly PhD scholarship[1]
A	*Only Exams (100%)*	52%	1600€
B	*Exams + Proposal (50%/50%)*	27%	1700€
C	*Only Exams (100%)*	15%	1800€

[1] After taxes

Figure: Sample scenario 2

Baseline survey

- Students' demographic characteristics (age, gender, family background)
- Interest in pursuing PhD in Economics
- Willingness to live and work abroad
- Attitudes towards different assessment methods (exams and written assignments)
- Attitudes towards risk-taking attitudes

Empirical model

We assume:

$$p_{ij} = \int 1\{U_{ij} > U_{ij'} \text{ for all } j' \neq j\} \, dH_i(\epsilon_i)$$

Where: $U_{ij} = X_j' \beta_{ik}, \ \epsilon_i \sim EVD$

The probability of choosing a given program j is:

$$p_{ij} = \frac{exp(X_j' \beta_i)}{\sum_{j'=1}^{J} exp(X_j' \beta_i)}$$

Willingness-to-pay for a PhD program attribute

Suppose an increased failure rate from $x_k = 18\%$ to $X_k = x_k + \Delta = 29\%$.

The indifference condition in terms of monthly scholarship Y for every attribute k:

$$x_k \beta_{ik} + \beta_{i1} ln(Y) = \beta_{ik}(x_k + \Delta) + \beta_{i1} ln(Y + WTP_{ik}(\Delta))$$

$WTP_{ik}(\Delta)) > 0$ is i's WTP (by accepting a lower scholarship) to avoid an increase in the failure rate

Hypotheses

Female respondents display a higher WTP for

1. non-exam assessments,
2. a more gender-diverse cohort,
3. a lower failure rate.

We expect:

$$E\left[WTP_{fk}(\Delta)\right] > E\left[WTP_{mk}(\Delta)\right]$$

where f is female and m is male.

Pilot study

- In March 2024, we sent the survey to all major Economics departments in Italy.
- We obtained completed surveys from 135 students.
- 36% were female.
- 24 years old on average.
- 63% are interested in pursuing a PhD in Economics.

⏩ Summary statistics ⏩ Results table

Pilot study

1. **Assessment methods:** 53% of men vs 33% of women believe that exams are a more objective assessments than other forms.
   - But those women who are interested in pursuing a PhD, are very comfortable with exams.
   - Selection issues?

2. **WTP:** Men are willing to renounce to 58 EUR a month *to avoid* the assessment based on equally weighted exam and research proposal.

⏩ Results table

Thank you!

Do you know of any potential funding sources? :)

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Summary statistics 1

	Men				Women				
	Med.	**Mean**	**SD**	**N**	**Med.**	**Mean**	**SD**	**N**	**P-value**
Age	23	24.57	3.63	86	24	23.92	1.93	49	0.011
Student enrolled in term...	2	2.94	1.24	87	2	2.92	1.22	49	0.894
Wants to work in private sector (most-1, least-400	2	1.95	1.02	86	1	1.84	1.01	49	0.520
Wants to work in public sector (most-1, least- 4)	2	2.28	0.89	86	2	1.90	0.71	49	0.054
Wants to continue studies at PhD level (most-1, least-4)	2	2.22	0.96	86	3	2.63	0.97	49	0.024
Wants to study other course (most-1, least-4)	4	3.55	0.88	86	4	3.63	0.70	49	0.662
Self-assessed prob. of surviving top PhD program	50	49.17	28.09	86	60	54.61	24.28	49	0.000
Risk averse to risk loving (1-10)	6	6.00	2.24	86	6	5.53	2.28	49	0.010
Expected female share in a typical PhD in Econ	40	41.67	15.32	86	36	36.16	12.60	49	0.000
Both parents born in Italy	1	0.78	0.42	86	1	0.69	0.47	49	0.219
Single	0	0.49	0.50	86	0	0.37	0.49	49	0.158
Mother finished at least bachelor	0	0.45	0.50	87	0	0.33	0.47	49	0.152
It is financial stress for my parents to finance my studies	0	0.32	0.47	87	0	0.41	0.50	49	0.239
Position in cohort within top 30%	1	0.77	0.42	87	1	0.78	0.42	49	0.398
Thinks people with PhD in econ work more than master	0	0.32	0.47	87	0	0.41	0.50	49	0.239
Thinks people with PhD earn more than master	1	0.72	0.45	87	1	0.69	0.47	49	0.372

Table: Descriptive Statistics of the Surveyed Sample

Summary statistics 2

	Men				Women				
	Med.	**Mean**	**SD**	**N**	**Med.**	**Mean**	**SD**	**N**	**P-value**
Would move to other city in Italy (b/c of work/study)	1	0.80	0.40	87	1	0.92	0.28	49	0.084
Would move to other country in Europe (b/c of work/study)	1	0.84	0.37	87	1	0.86	0.35	49	0.384
Would move to USA (b/c of work/study)	1	0.69	0.47	87	1	0.59	0.50	49	0.206
Wants financial independence from parents	1	0.89	0.32	87	1	0.96	0.20	49	0.137
Prefers exams to other assessments	1	0.64	0.48	87	1	0.61	0.49	49	0.373
Thinks exams are a more objective assessments than other	1	0.53	0.50	87	0	0.33	0.47	49	0.030
Finds exams more stressful than other assessments	0	0.45	0.50	87	1	0.53	0.50	49	0.261
Thinks exams allow to show his/her full potential	0	0.48	0.50	87	1	0.61	0.49	49	0.139

Table: Descriptive Statistics of the Surveyed Sample

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Results

	Mean WTP in EUR		Mean WTP in %	
	Men	**Women**	**Men**	**Women**
% failure after 1st year	0.84	-2.02	0.14	-0.26
Boostrapped SE	3.73	6.80	0.21	0.37
T-stat	0.73	-0.7	0.73	-0.7
P-value	0.47	0.48	0.47	0.48
% of females in a cohort	0.1	-0.1	0.03	-0.06
Boostrapped SE	0.55	2.79	0.07	0.16
T-stat	0.96	-0.41	0.96	-0.41
P-value	0.34	0.68	0.34	0.68
=1 if assessment 100% exam	-58.03	-8.29	-1.97	-2.25
Boostrapped SE	22	46.1	1.26	2.63
T-stat	-1.63	-0.92	-1.63	-0.92
P-value	0.1	0.36	0.1	0.36

Table: WTP for selected characteristics of a PhD program in Economics: full sample

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