Glass ceiling in research: evidence from a national program in Uruguay

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Literature (brief)

- Blinder (1973) and Oaxaca (1973) start an economics literature on gender discrimination.
  - They decompose the wage gap in a part due to differences in observable characteristics and an unexplained part.

- Glass ceilings refers to a set of impediments to career advancement for women.
  - They are said to exist when the gender wage gap is wider at the top of the distribution than at the median.

Literature (brief)

- There are various studies in specific labor markets, among them in academia.
  - Ginther and Hayes (1999), Ward (2001), Mixon and Trevino (2005), McDowell et al. (2001)
- They find:
  - Female less likely to be promoted.
  - Most of the differences is due to observable characteristics.

Our goal

- To study promotions in the S&T arena in Uruguay.
- How?
  - Using data on the largest researchers public support program. The SNI.
- What?
  - Estimate gender gap in accessing the program.
  - Estimate gender gap in the different levels of the program.
  - Decompose the gaps and formally test the existence of glass ceilings.

Institutional background

- ANII (Agencia Nacional de Investigación e Innovación)
  - National Agency for Research and Innovation was created in 2006 as a key player to foster and support research and application of knowledge to production in Uruguay, funding research and scholarships in S&T as well as entrepreneurs.
- SNI (Sistema Nacional de Investigadores)
  - The National System of Researchers is an incentive scheme for researchers created in 2008.

Institutional background

- SNI
  - 4 levels: Initiation to research, Level I, Level II and Level III.
  - As of December 2015, the subsidies (net of taxes) were US$246, US$328, US$410 and US$492

Institutional background

Table 1. Composition of the SNI by level as of 2015		
Initiation	460	32%
Level I	623	43%
Level II	281	20%
Level III	74	5%
Total	1438	100%

Source: CVuy

Data

- To apply to the SNI researchers have to complete a standard (very detaild) cv. (cvuy).

- We use this data from the 2008 applications (evaluated in 2009) to the 2014 applications (evaluated in 2015).

Data

Table 2. SNI Categorization by gender						
	Males	Females	Total	Males	Females	Total
Rejected	1,345	1,616	2961	40.4%	47.1%	43.8%
Accepted SNI	1,986	1,814	3,800	59.6%	52.9%	56.2%
Initial level	783	913	1,696	23.5%	26.6%	25.1%
Level 1	796	716	1,512	23.9%	20.9%	22.4%
Level 2	309	171	480	9.3%	5.0%	7.1%
Level 3	98	14	112	2.9%	0.4%	1.7%
Total	3,331	3,430	6,761	100.0%	100.0%	100.0%

Figure 1. The SNI hierachy by gender 2008-2015

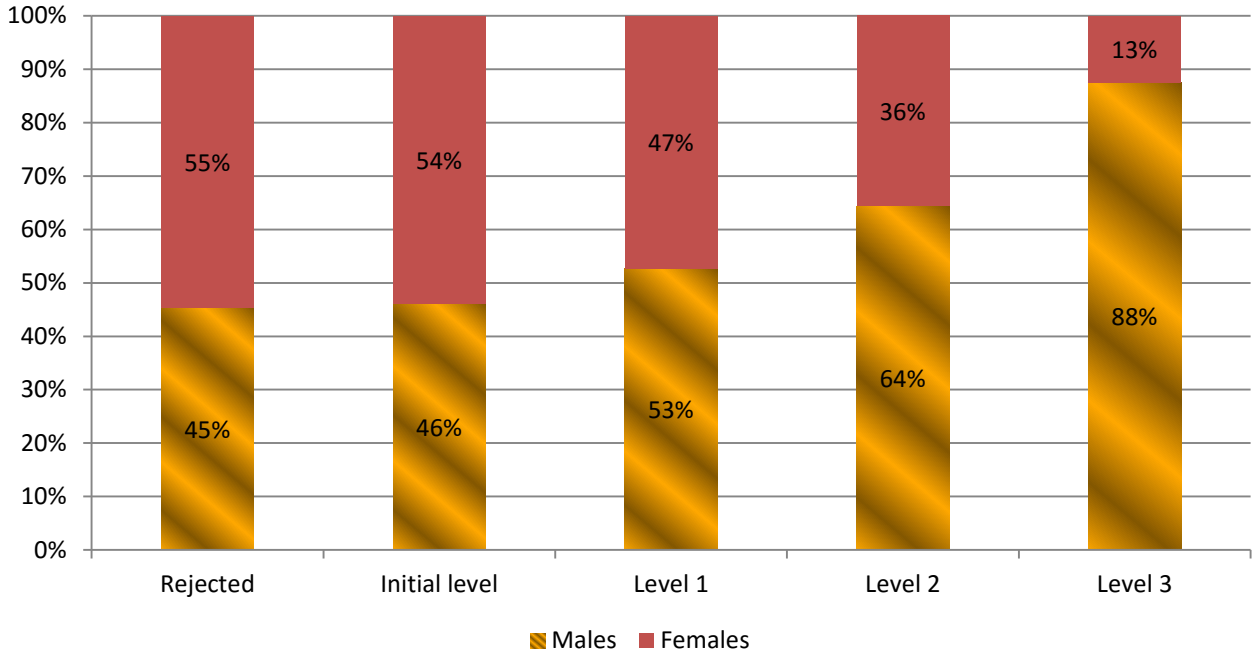


Table 3 Descriptive statistics							
	Overall		**Males**		**Females**		**Difference**
	Mean	Std Dev.	Mean	Std Dev.	Mean	Std Dev.	
Socio demographics							
Female	0,51	0,50					
Age	42,9	10,4	43,7	10,5	42,2	10,3	1,4854***
Human capital							
PhD Degree	0,43	0,49	0,46	0,50	0,40	0,49	0,0658***
S&T productivity(average of the last three years)							
Books and chapters in books	0,84	1,17	0,90	1,25	0,79	1,10	0,1053***
Articles in refereed journals	0,72	1,13	0,81	1,31	0,62	0,90	0,1887***
Impact Factor	0,50	0,98	0,51	1,02	0,49	0,93	0,0179
Human resources formation(average of the last three years)							
Tutored dissertations	0,89	1,56	0,98	1,62	0,81	1,50	0,1643***
Undergraduate teaching	0,60	0,49	0,61	0,49	0,60	0,49	0,0082
Graduate teaching	0,24	0,43	0,24	0,43	0,24	0,43	-0,00307
Institutional affiliation							
Full time position	0,32	0,47	0,33	0,47	0,32	0,47	0,0115

Results

Table 5. Marginal effects of the probability of being selected into the SNI

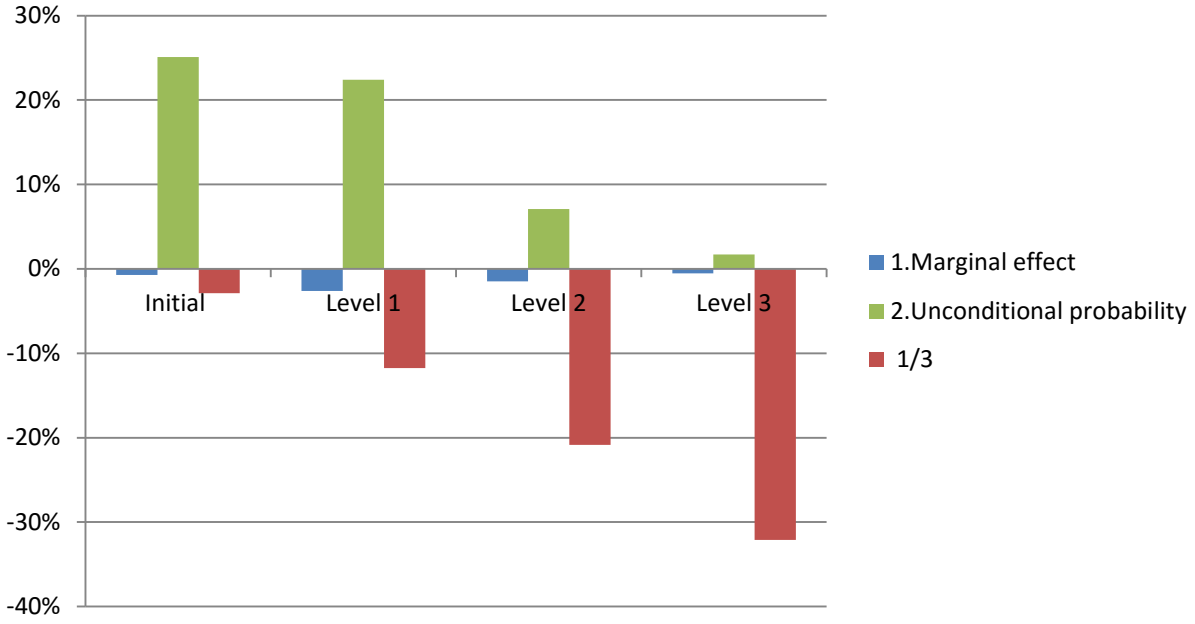
	(1)	(2)	(3)	(4)
Female	**-0.0261****	**-0.0247****		
	(0.0112)	**(0.0114)**		
Age	-0.000498	-0.000706	-0.000315	-0.00102
	(0.000595)	(0.000605)	(0.000924)	(0.000795)
PhD Degree	0.208***	0.217***	0.236***	0.200***
	(0.0116)	(0.0116)	(0.0165)	(0.0161)
Tutored dissertations	0.0213***	0.0222***	0.0221***	0.0222***
	(0.00442)	(0.00468)	(0.00690)	(0.00631)
Articles in refereed journals	0.159***	0.164***	0.168***	0.160***
	(0.0115)	(0.0117)	(0.0176)	(0.0160)
Impact Factor	0.00999	0.0112	0.00622	0.0193
	(0.00879)	(0.00916)	(0.0118)	(0.0160)
Books and chapters in books	0.0465***	0.0483***	0.0582***	0.0412***
	(0.00656)	(0.00669)	(0.00944)	(0.00851)
Undergraduate teaching	0.0650***	0.0775***	0.0635***	0.0897***
	(0.0119)	(0.0117)	(0.0169)	(0.0162)
Graduate teaching	0.0851***	0.0845***	0.0845***	0.0821***
	(0.0141)	(0.0143)	(0.0207)	(0.0197)
Full time position	0.161***	0.180***	0.182***	0.176***
	(0.0135)	(0.0134)	(0.0189)	(0.0188)
Universidad de la República	0.0509***			
	(0.0135)			
Universidad ORT Uruguay	0.0303			
	(0.0423)			
Universidad de Montevideo	0.0533			
	(0.0577)			
UCU	0.00443			
	(0.0315)			
Universidad de Montevideo	-0.119			
	(0.127)			

Results

Table 6 Decomposition of the probability of being accepted to SNI							
	Coefficients	Percentage	Std. Err.	z	P>z	[95% Conf.	Interval]
Reference group: females							
Char	**-0.04644**	**67.45%**	0.00708	-6.56	0	-0.06031	-0.03256
Coef	**-0.02240**	**32.55%**	0.01046	-2.14	0.032	-0.04291	-0.00190
Reference group: males							
Char	**-0.04112**	**59.74%**	0.00678	-6.07	0	-0.05441	-0.02784
Coef	**-0.02771**	**40.26%**	0.01059	-2.62	0.009	-0.04848	-0.00695
Raw	**-0.06884**	**100%**	0.01187	-5.8	0	-0.09211	-0.04557

Results

Table 7. Marginal effects of the probability of reaching different levels in the SNI for women					
	Outcome= Rejection	Outcome=Initial	Outcome= Level 1	Outcome= Level 2	Outcome= Level 3
Female	**0.0538*** **	**-0.00727*** **	**-0.0263*** **	**-0.0148*** **	**-0.00546*** **
	(0.00941)	(0.00133)	(0.00460)	(0.00270)	(0.00111)
Observ	6,761	6,761	6,761	6,761	6,761



Conclusions

- Female researchers have a 6.7% lower probability of being accepted into the SNI
- This gender gap is wider for the upper ranks of the SNI hierarchy were females are largely underrepresented.
- S&T and human resources formation indicators of females are statistically lower than that of males.
  - These explain between 4.1 to 4.7 percentage points of the average 6.7% gap.
- But observable characteristics explain most of the differences in the lower ranks but less than a third than the probability difference of accessing the highest SNI level.
- This evidence supports the existence of a glass ceiling effect within the SNI system.