Women in Economics

Floriane Jouy-Gelin   Paul Floquet   Andréa Fournel

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Some descriptive stats

- Over raw US data, Economics ranks among the worst fields when it comes to promoting women. The share of women in the field did not exceed 34% for Phd students, 26% for teaching assistants, and 14% for tenured professors (Bayer & Rouse, JEP, 2016)

- The gap extends to scientific production: in 2008, male econ assistant professors published twice more (4.8 vs 2.3 average number of papers over the last 5 years), the highest difference ratio among all fields (Ceci & alii, 2014).

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- As to the wage gap, it ranges from 16% for associate professors, to 26% for female full professors, by large the worst ratio of all fields (for instance, in maths, there is a thin 3% wage gap in favor of female full professors)

- In the review of (Ceci & alii, 2014), Economics is the only field in which a significant discrimination in access to tenure is found.

Explanatory hypotheses

- A classical Arrow-Phelps model of statistical discrimination on the labour market can provide a very intuitive framework to account for such responsiveness;
- People who evaluate and recruit female academics have biased beliefs about their intellectual value because of inherent prejudice;
- Women rationally anticipate these prejudice by reducing their labour supply, giving the preference to other academic fields.

Roadmap

How is gender discrimination in Economics tackled in the literature?
What are the forces at play?

1. Demand side (*biased perception of women academics' worth)*
   - 1.1. The risk of a shaky identification strategy for prejudice
   - 1.2. Some interesting approaches (coauthoring, teacher's evaluations)

2. Supply side (*women being underrepresented in the field*)
   - 2.1. Difficulty to isolate pure discrimination in recruitment ...
   - 2.2. ... but a decisive lack of role models

Roadmap

Examples of shaky strategies

Quantifying prejudice raises several issues of identification;

- Classical problems of discrimination econometrics (omitted variables, relevant control group...)
- Picking a relevant proxy of intellectual quality;
  - Hengel, Erin (2017). "Publishing while Female. Are women held to higher standards? Evidence from peer review," *Cambridge Working Papers in Economics*, 1753
  - Uses readability tests as a proxy of the quality of an article from QJE-AER-JPE-ECA, in order to prove that women are held to higher standards by referees.
- Sample size & selection issues:
  - Sarsons, Heather, & Guo Xu (2021). "Confidence Men? Evidence on Confidence and Gender among Top Economists." *AEA Papers and Proceedings*, 111: 65-68.
  - Uses the answers of Chicago Booth's panel of 51 leading economists (among which 10 women) to prove that female academics are less "confident" and more "consensual".

Examples of shaky strategies

- Significance and external validity of the results:
  - Alice Wu (2017). "Gender Stereotype in Academia: Evidence from Economics Job Market Rumors Forum," Working Papers 2017-09, Princeton University, Woodrow Wilson School of Public and International Affairs
  - Applies web scrapping devices to a forum which is very popular among econ Phd students: *www.econjobrumors.com*;
  - Builds LPM and logit models to find the keywords which are the strongest predictors of the occurrence of a gendered world ("man", "guy" / "women", "girl", "chick")

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  - Builds LPM and logit models to find the keywords which are the strongest predictors of the occurrence of a gendered world ("man", "guy" / "women", "girl", "chick")
  - Unsurprisingly, strongest predictors for men words ("adviser", "bully", "mathematician") are at variance with female ones ("hot", "attractive", "tits" ... among the least vulgar).
  - But very low R^2s (rarely above 3%) and not much evidence about women academic work being less talked about than men's.

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Approaches

- Remaining in our Arrow-Phelps framework, if women are falsely believed to be less productive, a very simple way to test is to consider coauthoring;

- Coauthoring an article means sending a noisy signal on the value of each participant (who contribute more ?). If the Arrow-Phelps framework applies here, those for whom the signal is meant will interpret it using their prejudiced group information : i.e. they'll assume that women coauthors did not provided the bulk of the job.

Coauthoring (Sarsons, 2017)

Sarsons, Heather (2017), "Recognition for Group Work: Gender Differences in Academia." *American Economic Review*, 107 (5): 141-45

- Heather Sarsons attempts to test that hypothesis, though with a strategy which, to her own admission, reaches "correlations" rather than "causalities".

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- Her main explained variable is the probability to obtain tenure.

- Sarsons' intuition is to carefully review the CVs of 568 economists (of which 132 women) enrolled in the top 30 U.S. institutions. A person which, between year 6 to 8 postgraduate, moves to a university 5 ranks below on Ideas/Repec, or leaves the academia, is considered as having failed to obtain tenure.

Coauthoring (Sarsons, 2017)

Results:

- Controlling for school, year, academic field fixed effects, and individual rankings in Ideas/Repec, the share of solo-authored articles is a significant predictor of access to tenure for women ($\beta = 0.41, t = 2.41$), not for men ($\beta = -0.05, t = 0.63$):

Figure 1: Fraction of papers solo-authored vs. Probability of obtaining tenure
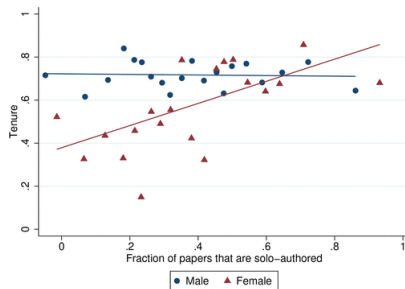
Coauthoring (Sarsons, 2017)

- Sarsons details the results by creating cross variables for each case of collaboration : 1. Coauthoring with men only ; 2. Coauthoring with a mixed group; 3. Coauthoring with women only.

TABLE 2—RELATIONSHIP BETWEEN PAPERS AND TENURE

	Dep var: Tenure (1)	
		× Female
Solo-authored pubs	0.068 (0.009)	0.005 (0.015)
Pubs with only male CAs	0.072 (0.012)	−0.071 (0.019)
Pubs with male and female CAs	0.096 (0.033)	−0.051 (0.037)
Pubs with only female CAs	0.069 (0.016)	0.012 (0.027)
Total coauthors	−0.001 (0.006)	
School fixed effects	Yes	
Tenure year fixed effects	Yes	
Field fixed effects	Yes	
Observations	559	

Coauthoring (Sarsons, 2017)

- When women coauthor with men, it's like the entirety of the benefit is appropriated by the male coauthors.
- Sarsons replicates her methodology on the top 20 sociology journals and finds no evidence of such a bias (partly because of non-alphabetic ordering practices).

But some issues ...

Further approaches

We'd like to identify, not only indirect effects of prejudice about women's worth, but direct evidence of it.

A. Boring (2017), *Gender Biases in Student Evaluations of Teaching* - Methodology

To what extent do gender biases influence the way that evaluators assess individual competence?

Data: 20,197 observations of (mandatory) SETs of seminar professors over 5 years in a French social sciences University
Assessments decomposed in different dimensions of teaching skills, some being stereotypically associated with men (e.g. class leadership, contribution to intellectual development) or with women (e.g. organisation, ability to encourage group work)

OLS regression with student and professors-fixed effects, then ordered logit to allow for different effects at each cut-point (grades rank from 0 to 4)

A. Boring (2017), Main Results and Implications

- Being assigned to a male or female seminar professor has no significant difference in the final grade
- Male students significantly rate male professors better, whereas female students don't rate female professors better
- Male professors are 20% more likely to be globally assessed as "excellent' than female professors (55% more in class leadership assessment)
- Female professors aren't penalized for "female-stereotyped" criteria (approximately same results than their male counterparts), but male professors are rewarded for "male-stereotyped" criteria, which are deemed more important in overall teaching skills (Kirstead and al., 1988, MacNell and al., 2014)

Promotions and contract renewals are based on these SETs evaluations

⇒ more time-consuming for women

⇒ lack of models for female students

Mengel, Zauermann, Zölitz, JEEA (2018): "Gender bias in teaching evaluations"

In Maastricht university, students are randomly assigned an instructor for each lesson that can be either male or female. Before knowing their grades for this lesson, each student has then the possibility to evaluate his or her instructor. These evaluations will then be taken into account by the university when selecting candidates for a promotion among teachers.

A few data issues:

- Non-mandatory evaluation: only 36% of students evaluate their instructor (but they show no statistical difference with the rest of the cohort on observables)
- Don't take into account the dropouts (7.3% of the cohort).

Mengel, Zauermann, Zölitz 2018: Controls

Having a female instructor has no impact on your grades nor on the
perceived time spent studying for this particular lesson: no obvious
difference in quality between male and female instructors that would
explain this difference in evaluation.

Mengel, Zauermann, Zölitz 2018: Results

- Male students evaluate female female instructors 21% of a s.d worse than their male counterparts (0.2 points on a 5-points scale).

- Female students also evaluate female instructors 11.2% of a s.d worse than their male counterparts. In a group composed of 50% of male students, a male instructor would thus receive a 14.2% s.d higher evaluation than his female colleague

- The bias is strongly linked to the mathematical content of the class.

- This effect is mostly drawn by junior female instructor: more senior female teachers are not subject to this bias. Is it because only the utmost best have attained this level? Is it because male and female go on the job market with significantly different teaching portfolio? non-addressed question.

Roadmap

Bosquet, Combes, Garcia-Penalosa (2013): "Gender and competition: evidence from academic economists in France", SJE

French system of promotion through national contests/"concours" (CNRS, agrégation).

- Women may have a lower propensity of applying to "concours": valuing promotion less, requirements more costly for them, anticipating discrimination...

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- Data on all French academic economists 1981-2008.

Bosquet, Combes, Garcia-Penalosa (2013): propensity to take the national contest

Men are 50% more likely than women to take part in the contest. This difference accounts for 55 (in the "CNRS" contest) to 76% (in the "agrégation" contest) of the raw gender gap in promotion.

- Is it because entering the "concours" is costlier for women? They find no effect of differential geographical costs between the "agrégation" and the "CNRS" contest. But data issues: no information on marital status, number of children...

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- Is it because women value promotion less? They don't address this hypothesis.

Bosquet, Combes, Garcia-Penalosa (2013): discrimination within the test

- No strong evidence of discrimination against women conditional on having applied to the contest. It doesn't support the hypothesis that women don't apply because they anticipate discrimination within the contest.

- Testing implicit discrimination mechanism: trying to measure quality of research output.

- Little but insignificant discrimination against women to become "admissible" and evidence of discrimination against men once "admissible" to become "admis".

Bosquet, Combes, Garcia-Penalosa (2013)

Table 7: Likelihood to be promoted conditional on applying

	University			CNRS		
	(1)	(2)	(3)	(4)	(5)	(6)
Woman	-0.029	-0.035	-0.046	-0.068	-0.079	-0.063
	(0.033)	(0.032)	(0.032)	(0.059)	(0.053)	(0.061)
Age		-0.032[b]	-0.032[b]		-0.048	-0.042
		(0.013)	(0.014)		(0.039)	(0.039)
Age²		0.001	0.001		0.001	0.001
		(0.000)	(0.000)		(0.001)	(0.001)
Publisher(Pub)		0.175[a]	0.157[a]		0.004	0.028
		(0.046)	(0.048)		(0.124)	(0.137)
Pub*Quantity		0.074[a]	0.074[a]		0.063[c]	0.075[c]
		(0.020)	(0.020)		(0.038)	(0.041)
Pub*Quality		0.057[a]	0.053[a]		0.041[a]	0.039[b]
		(0.009)	(0.009)		(0.015)	(0.018)
Int. Department			0.093[a]			-0.010
			(0.036)			(0.069)
Ile de France			0.023			0.067
			(0.033)			(0.074)
Pos. other than univ.			0.001			
			(0.036)			
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
R²	0.030	0.150	0.164	0.043	0.192	0.197
Observations	781	781	781	198	198	198

Notes: Linear probability model (OLS). Standard errors clustered by individuals in brackets. [a], [b], [c] Significant at the 1%, 5% and 10% level, respectively. Pos. other than univ.: assistant professor positions in economics outside France, as well as CNRS researchers, and assistant professors from other disciplines.

Table 8: Conditional likelihood to be admissible and promoted, University

	Likelihood to be admissible		Likelihood to be promoted			
			Admissibles		Close to threshold	
	(1)	(2)	(3)	(4)	(5)	(6)
Woman	-0.041	-0.060[c]	0.004	-0.017	0.037	0.054
	(0.037)	(0.035)	(0.074)	(0.074)	(0.099)	(0.105)
Age		-0.028[c]		-0.062		-0.071
		(0.015)		(0.041)		(0.066)
Age²		0.000		0.002		0.003
		(0.000)		(0.001)		(0.002)
Publisher(Pub)		0.235[a]		-0.086		-0.100
		(0.049)		(0.105)		(0.152)
Pub*Quantity		0.097[a]		0.038		0.018
		(0.021)		(0.048)		(0.071)
Pub*Quality		0.066[a]		0.020		0.026
		(0.009)		(0.017)		(0.024)
Int. Department		0.039		0.202[a]		0.190[c]
		(0.039)		(0.071)		(0.098)
Ile de France		0.047		-0.015		0.020
		(0.037)		(0.071)		(0.097)
Pos. other than univ.		-0.033		0.072		0.032
		(0.039)		(0.088)		(0.128)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
R²	0.035	0.204	0.048	0.114	0.050	0.112
Observations	781	781	236	236	145	145

Notes: The likelihood to be admissible is conditional on applying. The likelihood of promotion is conditional on being admissible. Linear probability model (OLS). Standard errors clustered by individuals in brackets. [a], [b], [c] Significant at the 1%, 5% and 10% level, respectively. Pos. other than univ.: assistant professor positions in economics outside France, as well as CNRS researchers, and assistant professors from other disciplines.

Bosquet, Combes, Garcia-Penalosa (2013): testing for implicit discrimination mechanism

Trying to control for quality of research output: maybe women research output is less valued than that of men . Their measure of research output quality includes:

- Journal quality
- Number of authors
- number of pages

A very quantitative and disputable approach to measure research output quality. They find no proof of discrimination using this index.

Other references on hiring discrimination

- The French distinction between written and oral examination provides a natural experiment which has been exploited by the literature.

- For the Capes/Agrégation (Breda & Hillion, Science, 2017), there seems to be a general female preference, with maxima in fields with a high share of male like physics, maths and philosophy (social sciences being around the average). At the ENS (Breda & Thierry-Ly, AEJ-AE, 2015), there is a strange mechanism running in which male-dominated fields favor women (Physics, Philosophy) while female-dominated fields favor men (Biology, Literature). For economics-social-sciences, there is a positive, but non-significant pro-women bias.

- Large official U.S. studies conclude to gender fairness when it comes to obtaining a tenure (National Research Council, 2010).

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Paredes, Paserman, Pino (2020): "Does Economics make you sexist?" NBER

Does Economics attracts ex ante more sexist students? Do students become more sexists as they study Economics? Or is it both?

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- A provocative title for unconvincing results

Avilova & Goldin (2018)

- Some point to the lack of role model for women in economics. (Hale & Regev, 2014) used a 2SLS to test the impact of women share among faculty staff of top U.S. econ departments on the share of women Phd students, using resignations from male professors as IV; the coefficient on the explanatory in the second stage is sizeable (2.64) and significant.

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- At the time she was president of the AEA, Claudia Goldin launched a RCT called Undergraduate Women in Economics (UWE), meant to foster such role model activities on US campuses (mentoring for instance). Early diff-in-diff results (Avilova & Goldin, AER, 2018; Porter & Serra, 2017) indicate an impact of large magnitude (+8pp women majoring in economics, essentially young women with high grades, which would have otherwise majored in psychology or literature, and were not hindered to major in science because of bad results in maths).

Conclusion

Claudia Goldin (2014). "A Grand Gender Convergence: Its Last Chapter." *American Economic Review*, 104 (4): 1091-1119

Supplementary slides

Hengel

Hengel, Erin (2017). "Publishing while Female. Are women held to higher standards? Evidence from peer review," Cambridge Working Papers in Economics, 1753

- 9123 article published between 1950 and 2016 (AER, ECA, JPE, QJE) are submitted to automated readability tests. Once control for share of native english speaker and simplicity of the field, women are significantly 1 to 6% easier to read.

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- Readability of women clearly improves over their career, while men's one does not.

Hengel - Issues

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- But that literature relies on objective criteria (typically, women physicists treat less patients by day, but their patients are less likely to be readmitted in a medical service in the ensuing month).

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- But that literature relies on objective criteria (typically, women physicists treat less patients by day, but their patients are less likely to be readmitted in a medical service in the ensuing month).

- But readability tests make a very poor proxy of the quality of an article. Henley's findings that once controlled for the number of citations, articles by women in *Econometrica* take on average 6 more months to be reviewed, is a more interesting approach.

- Selection bias

Sarsons & Xu (1)

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- Gendered attitudes towards risk-taking and self-confidence have been suggested by the literature as one possible explanation for the wage gap, especially in the upper part of the income distribution.

- In lab experiments, women are slightly less prone to choose competitive tournaments as compensation scheme (Niederle & Vesterlund, QJE, 2007). Empirically, the generalization of performance pay is known to have had a slight detrimental impact on the wage gap (Bryan & Bryson, LE, 2016).

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- Controlling for pre-tenure characteristics, institution and question fixed effects, women are 7.6pp less likely to choose extreme solutions ("strongly agree/disagree"). Their average confidence score is 0.36 points lower (-6% compared with male level). Both coefficients are significant at 1% level.

Sarsons & Xu (3)

- If we introduce a cross variable Female × Foreign field, the coefficient is negative significant (-0.374). Economists are less confident about issues out of the scope of their field, but women have a extra non-confidence penalty.

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- With a cross variable Female × Standard deviation in response to a question, the coefficient is positive (1.35) significant at 1%. I.e. men are more boisterous about their confidence level when there is a consensus over an issue, but their confidence declines quicker when there's hotted debate. Women confidence, on the contrary, is more stable.
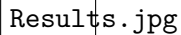
Mengel & alii : Table 2 - Controls

TABLE 6. Effect of instructor gender on grades, GPA, and study hours.

Dependent variable	(1) Final grade	(2) Final grade	(3) Final grades 2nd/3rd BA	(4) First year GPA	(5) Final GPA	(6) Hours spent
Female instructor (β_1)	0.0109 (0.0301)					0.0445 (0.1701)
Female student (β_2)	−0.0155 (0.0221)	0.0031 (0.0248)	0.0898 (0.0748)	0.0004 (0.0478)	0.0503 (0.0350)	1.3446*** (0.1463)
Female instructor × Female student (β_3)	0.0288 (0.0401)					−0.0832 (0.2412)
Share female instructors previous term		0.0592* (0.0344)				
Share female instructors previous term × Female student		−0.0061 (0.0480)				
Share female instructors first year			0.1154 (0.1419)	0.1216 (0.0825)	0.0546 (0.0583)	
Share female instructors first year × Female student			−0.1158 (0.1950)	−0.0465 (0.1167)	−0.0968 (0.0853)	
Constant	1.2756* (0.6521)	1.2714* (0.7582)	4.5961*** (1.0101)	−0.3812** (0.1800)	3.1744*** (0.1511)	8.2077 (5.4268)
Course FE	YES	YES	YES	NO	NO	YES
Parallel course FE	YES	YES	YES	NO	NO	YES
Observations	19,952	19,386	5,838	2,107	1,316	19,952
R-squared	0.4987	0.5040	0.4967	0.8437	0.7968	0.2601
$\beta_1 + \beta_3$	0.0397 (0.0305)	0.0531 (0.0383)	−0.000470 (0.135)	0.0750 (0.0850)	−0.0422 (0.0628)	−0.0387 (0.198)

Note: Column (1) shows the effect of instructor and student gender on course grades. Column (2) shows the effect of the share of female instructors in a student's previous term on final course grades in the current term. Columns (3)–(5) show the effect of share of female instructors in the first year of studies on final course grades in the second and third year (column (3)), the GPA at the end of the first year of studies (column (4)), and the GPA at the end of a student's studies (column (5)). The unit of observation in columns (1)–(3) and (6) is a student-course observation, the unit of observation in columns (4) and (5) is the student. In column (2), the coefficient "Share female instructors previous term" can be interpreted as β_2, and the interaction effect as β_3. In columns (3)–(5), the coefficient "Share female instructors first year" and its interaction effect can be interpreted as β_2 and β_3, respectively. All regressions include control variables for students' characteristics (GPA, grade, nationality, field of study, age). Columns (1), (2), (3), and (6) additionally control for section size. Robust standard errors are clustered at the section level (columns (1), (2), (6)) and the student level (columns (4) and (5)). *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

Mengel & alii : Results

Results.jpg

Avilova & Goldin

- There is consistent evidence that women in Economics are comparatively more responsive to their grades than men (Rask and Tiefenthaler, 2008); for instance, following the undergraduates of a top institution, (Avilova & Goldin, AER, 2018) provide the following data:

B. Fraction Majoring in Economics by Grade in Principles-Spring (or Fall if placed out)
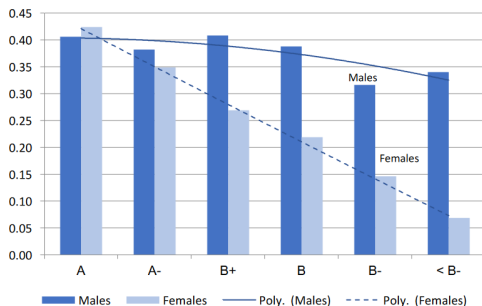
Source: Adams College administrative data.

Other references on hiring discrimination

- However, lab experiments which tried to reproduce hiring decisions in academic context find very strong gender bias against women when the job is highly math or data intensive (Moss-Racusin et al., PNAS, 2012)

Wu

Alice Wu (2017). "Gender Stereotype in Academia: Evidence from Economics Job Market Rumors Forum," Working Papers 2017-09, Princeton University, Woodrow Wilson School of Public and International Affairs

- A popular way is to use web scrapping devices and built logit models, where the probability of occurrence of a gendered word (female first name, female pronoun, colloquial words like "girl", "sister", "chick", etc.) is predicted by the presence of some keywords.
- Alice Wu applies such text scrapping tools applied to the most well-kwown forum for young econ Phds *www.econjobrumors.com* / 1.14 million posts between 2014Q1 and 2016Q2, 237.863 of which contain a gendered term, of which 24% a female-one .

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- Two *Topics* distinguished by keywords : Academic-Professional ones ("tenure", "paper", "career") and Personal-Physical ones ("pregnant", "handsome").

Wu - Issues (1)

Results from LPM and logit models

- The presence of a female keyword decreases the probability that a discussion be about academic-professional issues, raising the probability that it be about personal matters
  - (for instance, in a LPM, regressing a dummy equal to one if a Personal-Physical word appears, on a similar dummy if a female word appears, brings a significant 0.28 coefficient. 25.6% male posts contain a Personal-Physical keyword, versus 53.8% female posts)

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- Conversely, a logit model can identify the strongest predictors of the occurrence of a gendered word:
  - Strongest predictors for men : "adviser", "bully", "mathematician"...
  - Strongest predictors for women : "hot", "attractive", "gorgeous", "tits" ... among the least vulgar.

Wu - Issues (2)

Figure 4: 380 High-profile Economists (190 female,190 male)