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Gender, productivity, and promotion in the Irish economics profession

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Abstract

Women in economics follow different career paths than men, facing differential treatment when it comes to journal acceptance as well as promotion. We focus on a self-directed measure of productivity: working paper output. This avoids potential sex biases in the peer-review process. We find that men produce more working papers than women in Irish economics departments, and that authors with more working papers get promoted at higher rates. We do not find any differences in promotion rates by sex, whether in levels, returns to productivity, or coauthorship patterns.

1 Introduction

Women in economics follow different coauthorship patterns compared to men (Ductor et al. 2021) and receive less credit for coauthored work when it comes to promotion in top US institutions (Sarsons et al. 2021). In North America, women start at lower base salaries than men, but catch up quicker when they publish articles in peer-reviewed journals (Devereux 2021). Such findings have prompted exploration of the topic in Europe (Bateman et al. 2021). We provide novel evidence on gender, productivity, and promotion in the Irish economics profession.

In this paper we construct a novel dataset of the five working paper-producing economics departments in Ireland, which we take as a rough proxy for the core of the academic economics profession in the country.[1] We measure working paper output by men and women, as well as job promotion during the period of 2016 to 2020.

Working papers are of particular interest because of potential differences in peer-review treatment by gender. Hengel and Moon (2020) finds that female authors publishing in a given journal receive more citations than do men publishing in the same journal, interpreting this to mean that they are held to higher standards during the peer-review process, so that after passing that higher bar the papers are of better quality. Card et al. (2020) confirm the citation differential, finding also that differences in evaluation are driven by referee recommendations rather than stemming from editors; in fact, editors slightly favour women when it comes to desk-rejection decisions, which do not involve referees.

Unlike peer-reviewed articles, working papers are published at the author's discretion, circumventing any potential bias in the peer-review process. While there is no guarantee of their quality, they are costly to produce, influence the researcher's reputation, and contribute to the visible output of the institutions disseminating the series.[2] Because of this we interpret working paper output as a credible signal of productivity.[3] So far, studies focusing on working paper productivity are limited to those focusing on the Covid-19 pandemic—finding, for example, that women are less likely to produce work on this new topic (Amano-Patiño et al., 2020) and that the disruptions caused during lockdowns led to female academics' productivity dropping by 13.2% relative to male academics (Cui et al., 2022). Ours is thus the first attempt at documenting working paper productivity over the longer period 2016-2020.

We find that on average, men produce one to two more working papers than women over the five year period of 2016 to 2020. This is not explained by experience (years since PhD) or a rough measure of coauthorship patterns (mean number of coauthors per paper). Each additional working paper published during these years increases the likelihood of promotion by a percentage point. This effect is driven by coauthored papers, rather than solo. We find no statistically significant differences in promotion rates between men and women, whether in mean group differences or returns to productivity.

This paper fills a gap in the literature on female outcomes in technical disciplines across the life cycle in Ireland. McCoy et al. (2022) finds that teachers underestimate girls' mathematics ability in primary schools. Delaney and Devereux (2019) find that by the time it comes to

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[1]Our sample consists of research economists at the Central Bank of Ireland, the Economics and Social Research Institute, Maynooth University, Trinity College Dublin, and University College Dublin.

[2]Working papers from different series may be valued differently by the market, depending on such factors as institution rank and/or whether the series is academic or policy-oriented. but similarly within each disseminating institution relative to their quality and priorities.

[3]Working papers constitute an intermediate good between research inputs (analysis, framing, writing) and outputs (published articles). The former are difficult to monitor, while the latter are subject to luck – and potentially gender bias, as discussed above. Monitoring intermediate inputs can provide a balance between alleviating risk and discouraging moral hazard, along the lines discussed by Lazear and Rosen (1981).

choosing a university field of study, girls in secondary schools have already selected away from mathematical fields by their choice of secondary school courses. Delaney and Devereux (2020) find that women perform better in university than men, in both technical and non-technical fields, even conditional on pre-university performance. We follow women past the stage of tertiary education into the technical professional field of academic and policy-oriented economic research. We also contribute to the body of evidence on compensation and promotions based on output.

2   Data

We begin by scraping bibliographic data on working paper series listed on RePEc. Five institutions in Ireland currently publish working paper series in the field of economics: the Central Bank of Ireland (CBI), the Economic and Social Research Institute (ESRI), and the schools of economics of Maynooth University (MU), Trinity College Dublin (TCD), and University College Dublin (UCD). We call these the *Irish5 departments*. Our population of interest is research-active economists working in these five departments, who we term *Irish5 authors*. We focus on the period of 2016 to 2020. If an economist publishes at least one working paper during this period, and works in one of the five departments, they are an *Irish5 author*.

The authors named in the working papers series of the *Irish5 departments* consist of economists in these departments as well as their coauthors working in other departments, at other Irish institutions, or overseas. To identify *Irish5 authors*, we scrape affiliation from the working paper documents. Each author is assigned the affiliation reported in the most recent available working paper from the respective series, going back to 2016. This either places every named author since 2016 in an *Irish5 department*, another department in the same institution, a different Irish institution, or an overseas institution. For each paper we know the year of publication, the number of authors, and the series in which it was published. We also guess the sex of the author based on the likelihood somebody with the given name is male or female in the US social security records.

Next, for the set of authors identified above as working in an *Irish5 department*, we assemble additional information including sex, years since PhD attainment if applicable, years of job tenure at the current department, their current position,[4] and whether they were promoted during the period of 2016 to 2020. For the CBI, we submitted a list of names of economists we identified as working at the CBI, and were returned with an anonymized list of economists with the relevant details attached. For the other institutions, details were scraped from publicly available CVs, with sex being inferred by two research assistants based on the given name. This resulted in a single discrepancy, which we resolved. In the cases that sex inferred by research assistants does not match that guessed from the US social security records, we give precedence to the former.

Table I shows summary statistics of *Irish5 authors*. Around 60% are male, with a total of 113 female and 187 male authors.[5] The mean total number of published papers over the course of 2016 of 2020 is four, with the median being three, males produce significantly more than females (4.76 vs 3.66, $p = 0.0830$).[6] Most papers are co-authored, with the median author

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[4]We code five position levels: 1 equivalent to a PhD Student, 2 Postdoc, 3 Assistant Professor, 4 Associate Professor, and 5 Professor.

[5]For summary statistics by gender see table V in the appendix.

[6]Both men and women are more likely to co-author than solo-author a paper. The gender difference is significant for solo-authored papers (0.58 for males vs 0.32 for females, $p = 0.0342$), though not for co-authored papers (4.18 vs 3.35, $p = 0.1682$).

having zero solo-authored papers in this period, but two coauthored papers. The mean number of primary-author coauthored papers – papers in which authors are listed alphabetically, indicating equal contribution, or the authors are listed nonalphabetically and the reference author is listed first, indicating greater contribution – is slightly lower, but the median is the same. The average author has 2.7 coauthors per paper, and the average number of working papers produced, weighted by the number of co-authors, is around two. Males still produce more than females by this weighted measure (2.13 vs 1.55, $p = 0.0361$). The average proportion of male co-authors (excluding the author themselves) is 0.64.[7] The average author attained a PhD around ten years ago, has been at the department around eight years, and holds a position at the level equivalent to a postdoc. Thirty per cent of authors were promoted during our sample period.

TABLE I. *Irish5 Authors* Summary Statistics

	N	Mean	Median	SD	Min	Max
Male	300	0.62	1.00	0.49	0.00	1.00
Number WPs 2016-2020	300	4.35	3.00	5.30	1.00	54.00
Number Solo WPs 2016-2020	300	0.48	0.00	1.05	0.00	9.00
Number Co. WPs 2016-2020	300	3.86	2.00	5.06	0.00	52.00
Number Primary Author Co. WPs 2016-2020	300	3.17	2.00	4.42	0.00	44.00
Weighted WPs 2016-2020	300	1.91	1.00	2.33	0.20	21.67
Average Number Coauthors	300	2.73	2.73	0.99	1.00	6.50
Average Proportion Male Coauthors (excl. self)	276	0.64	0.69	0.32	0.00	1.00
PhD	295	0.77	1.00	0.42	0.00	1.00
Years since PhD	208	10.49	7.00	9.61	0.00	47.00
Years at Institution	286	8.03	5.00	7.21	0.00	43.00
Position level	294	2.35	2.00	1.30	1.00	5.00
Promoted 2016-2020	300	0.28	0.00	0.45	0.00	1.00

Unit of observation: an author.

Before proceeding to our main analysis, which focuses on the above *Irish5 authors* over the period of 2016 to 2020, we provide some longer-term context on sex in *Irish5 departments*. Figure 1 shows the share of author-papers in each year authored by males, for all named authors and for those identified as *Irish5 authors* since 2016. While the former group may not represent those in Irish economics, the latter is a selected sample of authors who have remained research-active into the 2016-2020 period. According to either sample, working paper output went from nearly exclusively male as late as the early 1990s to around 60% by 2008, where is has since remained.

Figure 2 shows the average number of papers per year by authors of each sex, again for all named authors as well as *Irish5 authors*. A research-active author may or may not publish a working paper during a given year, so the average number of papers per year can be less than one. Men consistently publish more working papers than women.

3 Results

Table II presents regression results with number of working papers published between 2016 and 2020 as the dependent variable. Even controlling for other covariates, the dummy variable for male predict up to two more working papers per year. An additional year since PhD attainment

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[7]The proportion of male co-authors is not significantly different for males and females (0.65 vs 0.64, $p = 0.8811$).

Figure 1. Share Male Authors

Figure 2. Average Number Working Papers Per Publishing Author by Year
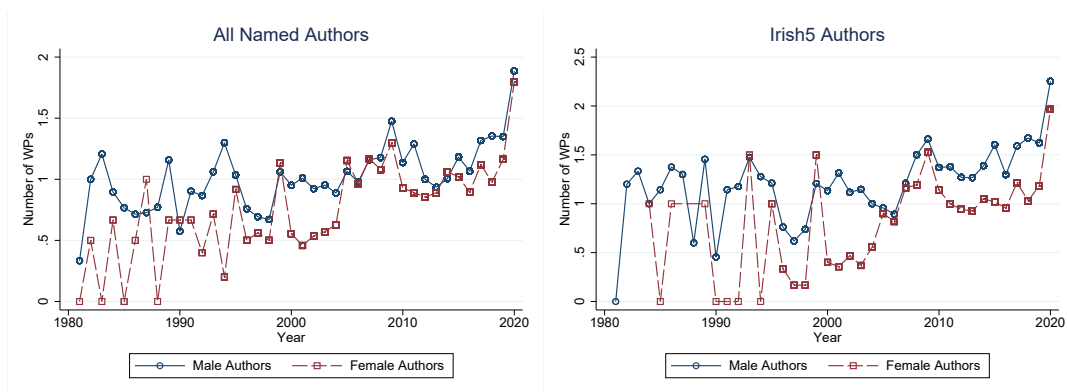
predicts around 0.1 more working papers per year. In the appendix Table VI we present results using number of working papers discounted by the number of authors on the paper. Using this weighted measure, the gender gap shrinks to one working paper.

Table III regresses an indicator for promotion during the period of 2016 to 2020 on sex, number of working papers published during that period, and covariates. The sample excludes professors who held this position in 2016 and were therefor ineligible for further promotion. In the first specification, with only an indicator for male included, there appears to be no gender effect on likelihood of promotion. Once we introduce the number of working papers published into the regressions, we find that publishing one additional working paper is correlated with a 1.3% higher promotion likelihood, statistically significant and consistent in magnitude across all specifications. In columns 3 onward we allow the return to working papers to vary by sex. We find no economically or statistically significant differences between the promotion returns for men versus women. In the appendix Table VII, we show that the impact of productivity on promotion is double the size when using the weighted rather than the raw measure though there is still no gender difference.

Table IV allows returns to vary by whether the working paper is solo or coauthored. We find that coauthored papers are responsible for the increased promotion likelihood, while solo papers have no discernible effect. Finally, allowing returns to vary by the interaction of sex and solo/coauthored paper status, we find no statistically or economically significant differences across groups.

We recreate the results of tables III and IV excluding non-primary authored working papers (papers in which the reference author should be listed first alphabetically, but is listed after) in tables VIII and IX respectively in the appendix. The results do not change.

TABLE II. WP output

	(1)	(2)	(3)	(4)	(5)	(6)
Male	1.096**	1.560***	2.072***	2.249***	2.293***	2.274***
	(0.550)	(0.583)	(0.766)	(0.848)	(0.846)	(0.831)
Years since PhD			0.147**	0.084	0.093	0.080
			(0.059)	(0.096)	(0.093)	(0.090)
Number Coauthors					0.315	0.231
					(0.382)	(0.408)
Promoted 2016-2020						1.852
						(1.163)
Constant	3.664***	2.330***	1.899**	1.689*	0.981	0.593
	(0.314)	(0.446)	(0.829)	(0.881)	(1.080)	(1.144)
N	300	300	208	206	206	206
R-sq	0.010	0.110	0.168	0.212	0.214	0.230
Dept FE		Yes	Yes	Yes	Yes	Yes
Position FE				Yes	Yes	Yes

Notes: OLS regressions of working paper output in 2016-2020. Robust standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE III. Likelihood of promotion

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Male	-0.006	-0.019	-0.036	-0.042	0.004	-0.005	-0.020
	(0.058)	(0.058)	(0.081)	(0.079)	(0.094)	(0.095)	(0.096)
Num WPs 2016-2020		0.013***	0.008	0.010	0.016	0.013	0.014
		(0.005)	(0.016)	(0.016)	(0.017)	(0.018)	(0.017)
Num WPs 2016-2020 x male			0.005	0.003	-0.005	-0.003	-0.000
			(0.016)	(0.016)	(0.018)	(0.018)	(0.017)
Years since PhD					-0.002	-0.002	0.008
					(0.005)	(0.005)	(0.006)
Number Coauthors						0.048	0.048
						(0.041)	(0.044)
Constant	0.311***	0.267***	0.282***	0.396***	0.322***	0.213	0.177
	(0.045)	(0.048)	(0.070)	(0.079)	(0.102)	(0.139)	(0.144)
N	270	270	270	270	182	182	180
R-sq	0.000	0.018	0.019	0.068	0.052	0.061	0.078
Dept FE				Yes	Yes	Yes	Yes
Position FE							Yes

Notes: OLS regressions of likelihood of promotion in 2016-2020. Robust standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE IV. Likelihood of promotion

	(1)	(2)	(3)	(4)	(5)	(6)
Male	-0.006	-0.016	-0.048	-0.002	-0.009	-0.030
	(0.058)	(0.058)	(0.085)	(0.103)	(0.104)	(0.106)
Number Solo WPs 2016-2020		-0.005	-0.019	-0.009	0.022	-0.002
		(0.037)	(0.095)	(0.118)	(0.121)	(0.121)
Number Co. WPs 2016-2020		0.013***	0.010	0.016	0.013	0.013
		(0.005)	(0.016)	(0.017)	(0.018)	(0.017)
Num Solo WPs 2016-2020 x male			0.024	0.017	0.008	0.032
			(0.102)	(0.125)	(0.125)	(0.126)
Num Co. WPs 2016-2020 x male			0.004	-0.005	-0.003	-0.001
			(0.016)	(0.018)	(0.018)	(0.017)
Years since PhD				-0.002	-0.002	0.008
				(0.005)	(0.005)	(0.006)
Number Coauthors					0.055	0.050
					(0.046)	(0.049)
Constant	0.311***	0.270***	0.403***	0.329***	0.193	0.171
	(0.045)	(0.048)	(0.083)	(0.108)	(0.161)	(0.167)
N	270	270	270	182	182	180
R-sq	0.000	0.019	0.069	0.052	0.061	0.078
Dept FE			Yes	Yes	Yes	Yes
Position FE						Yes

Notes: OLS regressions of likelihood of promotion in 2016-2020. Robust standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

4 Conclusion

We assemble a unique dataset of authors in working paper-producing Irish economics institutions. We observe that men publish one to two more working papers per year than women. This difference is not explained by experience (years since PhD) or mean number of coauthors per paper. Authors who publish one more paper over the five year period of 2016 to 2020 are one percentage point more likely to be promoted during that time period. We do not find any statistically or economically significant differences in promotion rates or the return to publishing across sexes. However, we do find that the effect of working paper output on promotion is driven by coauthored papers.

We consider our descriptive analyses a crucial first step towards documenting productivity differences by gender prior to the peer-review stage. Identifying the causal mechanisms behind these gender differences is an important topic for future research.

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A   Additional Tables

TABLE V. *Irish5 Authors* Summary Statistics by Gender

Variable	Female	Male	Difference
Number WPs 2016-2020	3.664	4.759	1.096*
	(3.337)	(6.171)	(0.630)
Number Solo WPs 2016-2020	0.319	0.583	0.264**
	(0.631)	(1.226)	(0.124)
Number Co. WPs 2016-2020	3.345	4.176	0.831
	(3.303)	(5.857)	(0.602)
Number Primary Author Co. WPs 2016-2020	2.637	3.487	0.849
	(2.709)	(5.165)	(0.525)
Weighted WPs 2016-2020	1.546	2.126	0.580**
	(1.408)	(2.715)	(0.275)
Average Number Coauthors	2.777	2.696	-0.081
	(0.919)	(1.031)	(0.118)
Average Proportion Male Coauthors (excl. self)	0.634	0.651	0.017
	(0.308)	(0.322)	(0.039)
PhD	0.804	0.754	-0.049
	(0.399)	(0.432)	(0.050)
Years since PhD	9.590	11.080	1.490
	(7.737)	(10.661)	(1.360)
Years at Institution	8.327	7.852	-0.475
	(6.908)	(7.400)	(0.877)
Position level	2.336	2.354	0.017
	(1.200)	(1.365)	(0.156)
Promoted 2016-2020	0.292	0.267	-0.025
	(0.457)	(0.444)	(0.053)
Observations	113	187	300

Unit of observation: an author.

TABLE VI. WP output

	(1)	(2)	(3)	(4)	(5)	(6)
Male	0.580**	0.702***	0.965***	1.063***	1.009***	1.000***
	(0.239)	(0.254)	(0.320)	(0.362)	(0.355)	(0.348)
Years since PhD			0.080***	0.063	0.052	0.047
			(0.029)	(0.049)	(0.050)	(0.049)
Number Coauthors					-0.395**	-0.434**
					(0.165)	(0.177)
Promoted 2016-2020						0.864*
						(0.483)
Constant	1.546***	1.076***	0.867**	0.971**	1.858***	1.678***
	(0.132)	(0.198)	(0.378)	(0.410)	(0.509)	(0.528)
N	300	300	208	206	206	206
R-sq	0.015	0.060	0.147	0.173	0.188	0.207
Dept FE		Yes	Yes	Yes	Yes	Yes
Position FE				Yes	Yes	Yes

Notes: OLS regressions of working paper output in 2016-2020. Robust standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE VII. Likelihood of promotion

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Male	-0.006	-0.020	-0.059	-0.059	-0.012	-0.015	-0.033
	(0.058)	(0.058)	(0.086)	(0.083)	(0.100)	(0.101)	(0.102)
Weighted WPs 2016-2020		0.029**	0.007	0.011	0.029	0.032	0.030
		(0.012)	(0.041)	(0.042)	(0.046)	(0.046)	(0.045)
Weighted WPs 2016-2020 x male			0.025	0.020	-0.003	-0.003	0.005
			(0.043)	(0.043)	(0.047)	(0.047)	(0.045)
Years since PhD					-0.001	-0.002	0.007
					(0.005)	(0.005)	(0.006)
Number Coauthors						0.062	0.064
						(0.041)	(0.044)
Constant	0.311***	0.268***	0.301***	0.409***	0.329***	0.174	0.136
	(0.045)	(0.048)	(0.075)	(0.082)	(0.106)	(0.149)	(0.154)
N	270	270	270	270	182	182	180
R-sq	0.000	0.018	0.019	0.068	0.051	0.065	0.081
Dept FE				Yes	Yes	Yes	Yes
Position FE							Yes

Notes: OLS regressions of likelihood of promotion in 2016-2020. Robust standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE VIII. Likelihood of promotion; primary authors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Male	-0.006	-0.020	-0.013	-0.020	0.056	0.041	0.029
	(0.058)	(0.058)	(0.084)	(0.081)	(0.100)	(0.100)	(0.101)
Num Primary Author WPs 2016-2020		0.014**	0.016	0.014	0.029	0.026	0.026
		(0.006)	(0.021)	(0.021)	(0.025)	(0.024)	(0.024)
Num Primary Author WPs 2016-2020 x male			-0.003	-0.002	-0.021	-0.016	-0.014
			(0.022)	(0.022)	(0.025)	(0.025)	(0.024)
Years since PhD					-0.002	-0.002	0.007
					(0.005)	(0.005)	(0.006)
Number Coauthors						0.048	0.049
						(0.041)	(0.044)
Constant	0.311***	0.273***	0.267***	0.382***	0.278**	0.173	0.132
	(0.045)	(0.048)	(0.073)	(0.082)	(0.109)	(0.142)	(0.148)
N	270	270	270	270	182	182	180
R-sq	0.000	0.016	0.016	0.064	0.052	0.060	0.076
Dept FE				Yes	Yes	Yes	Yes
Position FE							Yes

Notes: OLS regressions of likelihood of promotion in 2016-2020. Robust standard errors in parentheses. "Primary author" indicates either a solo-authored paper, or a coauthored paper where the ego is either listed alphabetically, indicated equal contribution, or listed non-alphabetically and first, indicating the ego made the primary contribution.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE IX. Likelihood of promotion; primary authors

	(1)	(2)	(3)	(4)	(5)	(6)
Male	-0.006	-0.018	-0.027	0.047	0.034	0.017
	(0.058)	(0.058)	(0.086)	(0.106)	(0.105)	(0.108)
Number Solo WPs 2016-2020		-0.009	-0.019	-0.009	0.022	-0.001
		(0.037)	(0.094)	(0.114)	(0.118)	(0.117)
Number 1st Author Co. WPs 2016-2020		0.015**	0.015	0.030	0.025	0.027
		(0.006)	(0.021)	(0.025)	(0.025)	(0.025)
Num Solo WPs 2016-2020 x male			0.025	0.019	0.009	0.030
			(0.101)	(0.122)	(0.122)	(0.122)
Num First Author Co. WPs 2016-2020 x male			-0.003	-0.022	-0.017	-0.015
			(0.022)	(0.026)	(0.025)	(0.025)
Years since PhD				-0.002	-0.002	0.008
				(0.005)	(0.005)	(0.006)
Number Coauthors					0.054	0.050
					(0.046)	(0.049)
Constant	0.311***	0.276***	0.389***	0.285**	0.158	0.131
	(0.045)	(0.048)	(0.086)	(0.113)	(0.160)	(0.166)
N	270	270	270	182	182	180
R-sq	0.000	0.018	0.064	0.053	0.061	0.077
Dept FE			Yes	Yes	Yes	Yes
Position FE						Yes

Notes: OLS regressions of likelihood of promotion in 2016-2020. Robust standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.