

Gender Equality and Positive Action: Evidence from UK Universities

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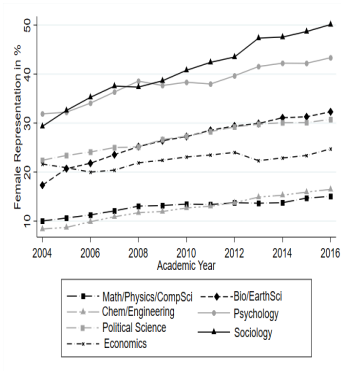
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Our Aim

- What is the impact of the Athena Swan Charter on:
 - Gender Equality
 - Career Trajectories
- Athena Swan Charter:
 - Equality initiative targeted to Science, Technology, Engineering, Mathematics and Medicine in the academic sector
 - 2015: Expanded to other disciplines, including Economics

Representation of Women Across Discipline Over Time



- Women are under represented in academia in the UK
- 2004-2016:
 - Hard sciences: 9% to 15%
 - Social sciences: 29% to 50%
 - Economics: flat at around 22%
- Similar to US trend (Lundberg & Stearn, 2018)

Related Literature

- Causal impact of practices and interventions leading to greater gender equality in academia, (Buckles, forthcoming)
 - gender-neutral tenure clock stopping policies (Antecol et al., 2018)
 - gender composition of evaluation committees (Bagues, Labini Zinovyeva, 2018)
 - single- versus double-blind peer review processes (Tomkins, Zhang, and Heavlin, 2017)
 - mentoring programs (Blau et al., 2010)
 - matching of female students to female professors (Carrell et al., 2010)

Our Contribution

- This paper causally evaluate the effects of:
 - A unique positive action intervention (Athena SWAN Charter)
 - Using a high-quality administrative panel data
 - On individual career trajectories and wages.

Athena SWAN Charter

- Established by the UK Equality and Challenge Unit in 2005
 - Science, Technology, engineering medicine and mathematics (STEMM)
- Provides recognition to universities that advanced in gender equal practices in STEM disciplines.
- 2-step process
 - Signature
 - Accreditation
- Accreditation awards: Bronze, Silver and Gold
 - We focus on Bronze level accreditation

Athena SWAN Charter: Examples of Good Practice

- No set targets - universities can decide on interventions based on their own self-assessment.

“Design of more transparent process for appointing heads of departments”

“Career track schemes to help women to move from fix-term contracts to permanent contracts”

“Staff review and development groups where women are encouraged to submit their CV for advice that helps them in career progression and new career prospects”

Data

- We use two sources of data:
 - A self-constructed data set: Athena SWAN data
 - UK HESA data: rich population-level panel data
- Our sample includes faculty members with
 - Full time permanent contracts
 - In STEMM disciplines
 - With standard teaching and research contracts
 - In universities that signed the charter between 2005 – 2014
 - In years 2009-2016
- Sample:
 - 177,465 observations for 35,035 male faculty
 - 76,230 observations for 16,910 female faculty
 - 91 universities (23 accreditations in 2009 – 83 accreditations in 2015)

Identification Strategy (I)

- Our main specification is a Fixed Effect specification for men and women:

$$Y_{ijt} = \alpha + \lambda D_{jt} + X_{ijt}\gamma + \eta_j + \delta_t + \gamma_j t + \epsilon_{ijt} \quad (1)$$

- Y_{ijt} - real log salaries using 2016 as the base year for individual i in university j and year t
- D_{jt} - dummy variable taking value 1 if the individual works for university j that holds an Athena SWAN Accreditation in year t and 0 otherwise
- X_{ijt} - a vector of socio-demographic characteristics
- η_j - university dummies
- δ_t - time trend
- $\gamma_j t$ - university-specific time trend

Identification Strategy (II)

- Diff-in-diff approach:
 - D_{jt} : Within individual changes before and after Athena SWAN accreditation
 - Compare female faculty (treatment) to male faculty (control)
- Validity of our identification strategy:
 - Same relative trends of women/men wages prior to Athena SWAN accreditation in universities with and without Athena SWAN accreditation
 - **Likely to hold:**
 - ⇒ Bronze accreditation does not require the implementation of any action prior to applying for accreditation
 - ⇒ The focus of the Athena SWAN is not on wages, but representation and career progression
 - We test for validity of the identification strategy by testing for parallel trends and impact on Non-STEMM disciplines.

Finding: Effect of Athena SWAN on Wages

Table 1: Pay and Athena SWAN Accreditation

	(1)	(2)	(3)	(4)	(5)	(6)
	Men	Non Professors	Women	Non Professors	Women-Men	Non Professors
	Professor		Professor		Professor	Non Professors
Log Salary	-2.28*** (0.00187)	0.72*** (0.000789)	-1.40*** (0.0037)	1.70*** (0.001)	0.88 P<0.05	0.97 P<0.01
R- Squared	0.129	0.21	0.206	0.201		
Mean	£82,158	£53,432	£77,733	£50,940		
Observations	55,520	121,940	11,425	64,810		
Individuals	11,200	26,910	2,600	15,325		

- Professors:

⇒ Gender pay gap falls from £4,445 to £3,623 following Athena SWAN accreditation

⇒ A fall in gender pay gap of £802

- Non-Professors:

⇒ Gender pay gap falls from £2,492 to £2,011 following Athena SWAN accreditation

⇒ A fall in gender pay gap of £481

Channels (I)

Table 2: Hiring and Athena SWAN Accreditation

	(1)	(2)	(3)	(4)	(5)	(6)
	Men		Women		Women-Men	
	Professor	Non Professors	Professor	Non Professors	Professor	Non Professors
P(Move)	1.32*** (0.00345)	0.082 (0.00218)	1.70** (0.0086)	0.28 (0.0028)	0.38 [0.65]	0.20 [0.58]
R- Squared	0.098	0.058	0.148	0.069		
Mean	1.06%	1.40%	1.51%	1.57%		
Observations	55,520	121,940	11,425	64,810		
Individuals	11,200	26,910	2,600	15,325		

Channels (II)

Table 3: Promotion and Athena SWAN Accreditation

	(1) Men	(2) Women	(3) Women-Men
P(Promotion)	0.36** (0.00177)	0.09 (0.00203)	-0.27 [0.37]
R- Squared	0.006	0.008	
Mean	1.80%	1.44%	
Observations	177,463	76,230	
Individuals	35,033	16,909	

Identification Test (I)

Parallel Trend Assumption

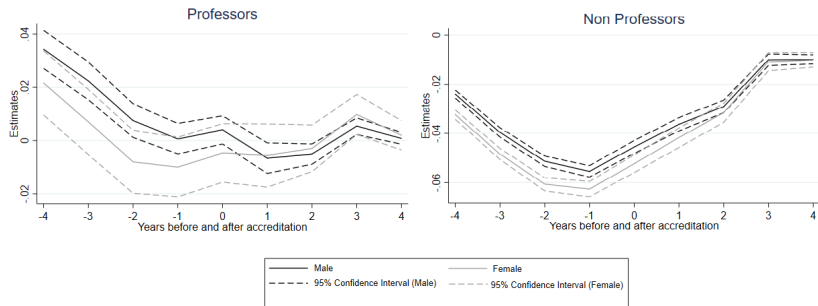


Figure 1: Before and After Accreditation

Identification Test (II)

Effect on Non-STEMM departments

Table 4: Non-STEMM and Athena SWAN Accreditation

	Men		Women		Women-Men	
	(1) Professor	(2) Non Professors	(3) Professor	(4) Non Professors	(5) Professor	(6) Non Professors
Log Salaries	-1.06*** (0.00227)	1.16*** (0.000885)	-1.46*** (0.00377)	1.21*** (0.000965)	-0.40 [0.36]	0.05 [0.67]
R- Squared	0.171	0.265	0.246	0.283		
Mean	£79,836	£50,433	£74,688	£48,847		
Observations	28,170	85,180	10,300	68,160		
No. of Individuals	6,245	19,470	2,490	15,910		

Discussion

- Gender pay gap reduced after Athena SWAN accreditation
- Channels:
 - Women have not got a higher probability of promotion to professor
 - Women have not a higher probability of moving to an Athena SWAN accredited university
 - ⇒ Junior women moving up win the academic ladder within ranks (below professor)
- Spill overs:
 - Men
 - Non-STEMM (not shown)
- Concerns about women to take additional administrative responsibilities (Babcock et al., 2017)

Thank you!

Appendix: Athena SWAN data

Table 5: Number of universities signed and got accredited over the years

Year	(1) No. of Universities signed the charter each year	(2) Cumulative No. of Universities signed the charter	(3) No. of accreditations per year	(4) Cumulative No. of Accreditations
2005	20	20	0	0
2006	2	22	12	12
2007	4	26	1	13
2008	6	32	3	16
2009	9	41	7	23
2010	6	47	5	28
2011	15	62	1	29
2012	18	80	11	40
2013	5	85	16	56
2014	6	91	10	66
2015	N/A	N/A	11	77
2016	N/A	N/A	6	83
Total	91		83	

Appendix: Identification Test (I)

Table 6: Identification test for pre-existing trends

	Men		Women		Women-Men	
	(1) Professor	(2) Non Professors	(3) Professor	(4) Non Professors	(5) Professor	(6) Non Professors
Year (t-4)	3.43*** (0.00363)	-2.41*** (0.000823)	2.16*** (0.00617)	-3.24*** (0.000975)	-1.27* P<0.1	-0.83*** P<0.01
Year (t-3)	2.24*** (0.00362)	-3.96*** (0.000962)	0.70 (0.00623)	-4.84*** (0.00116)	-1.54** P<0.05	-0.88*** P<0.01
Year (t-2)	0.75** (0.00323)	-5.13*** (0.00109)	-0.80 (0.00602)	-6.06*** (0.00135)	-1.56** P<0.05	-0.93*** P<0.01
Year (t-1)	0.06 (0.00294)	-5.54*** (0.00117)	-1.00* (0.00574)	-6.26*** (0.00158)	-1.06* P<0.1	-0.72*** P<0.01
Year (t)	0.40 (0.00268)	-4.55*** (0.00132)	-0.47 (0.00558)	-5.23*** (0.00182)	-0.87* P<0.1	-0.68*** P<0.01
Year (t+1)	-0.66** (0.00294)	-3.63*** (0.00137)	-0.57 (0.00603)	-4.17*** (0.00202)	0.10 [0.89]	-0.54 P<0.01
Year (t+2)	-0.51*** (0.00194)	-2.91*** (0.00130)	-0.3 (0.00446)	-3.16*** (0.00195)	0.21 [0.66]	-0.25 [0.27]
Year (t+3)	0.54*** (0.00159)	-1.01*** (0.00120)	0.98** (0.00384)	-1.09*** (0.00189)	0.44 [0.26]	-0.08 [0.71]
Year (t+4)	0.08 (0.00112)	-1.00*** (0.000948)	0.20 (0.00282)	-1.02*** (0.00151)	0.11 [0.68]	-0.03 [0.88]
R- Squared	0.129	0.243	0.209	0.255		
Observations	54,268	114,168	11,126	59,683		
Individuals	10,945	25,160	2,525	14,130		

Identification (II)

Table 7: Non-STEMM and Athena SWAN Accreditation

	Men		Women		Women-Men	
	(1) Professor	(2) Non Professors	(3) Professor	(4) Non Professors	(5) Professor	(6) Non Professors
P(Move)	0.82 (0.00565)	0.48* (0.00254)	1.80* (0.00946)	-0.04 (0.00291)	0.98 [0.37]	-0.52* P<0.1
R- Squared Mean	0.099 1.78%	0.068 1.76%	0.138 2.29%	0.083 1.98%		
P(Promotion)		-0.10 (0.00184)		0.04 (0.00197)		0.14 [0.61]
R- Squared Mean		0.009 1.50%		0.012 1.25%		
Observations	28,170	85,180	10,300	68,160		
No. of Individuals	6,245	19,470	2,490	15,910		

Appendix: Effect of Athena SWAN on Female Representation

Table 8: Female Representation and Athena SWAN Accreditation

	STEMM		Non-STEMM	
	Professor	Below Professor Level	Professor	Below Professor Level
P(Female)	0.123 (0.00473)	0.244 (0.00287)	0.951 (0.00677)	-0.853*** (0.00324)
R- Squared	0.0327	0.0744	0.0377	0.0233
Observations	66,948	186,745	38,467	153,343
Individuals	13,790	42,205	8,720	35,340