Exploring the relationship between staff composition and student success in Economics

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Siyaphumelela Conference 2024

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Introduction

- Recently completed a study documenting gender ratios in economics at all levels of academia.
- Aim 1: leverage routinely collected administrative data to explore the association between staff composition and student success
  - Economics as a case study
  - Enabling and expanding a pipeline of economists that are both demographically diverse and **well-qualified**
- Aim 2: establish a framework for ongoing monitoring, evaluation, and comparisons with other STEM and social science disciplines
- Highlight potential equity gaps in student success in Economics and prompt strategies for fostering institutional environments that work towards correcting these

Introduction

- The undergraduate section of the study found that:
  - A higher share of females than males enroll in undergraduate economics qualifications
  - Plus females are more likely to graduate and graduate at a faster rates
- This study explores the institutional correlates of performance with a focus on differences between male and female undergraduate students in an attempt to explain this undergraduate performance gap.

Data & population of interest

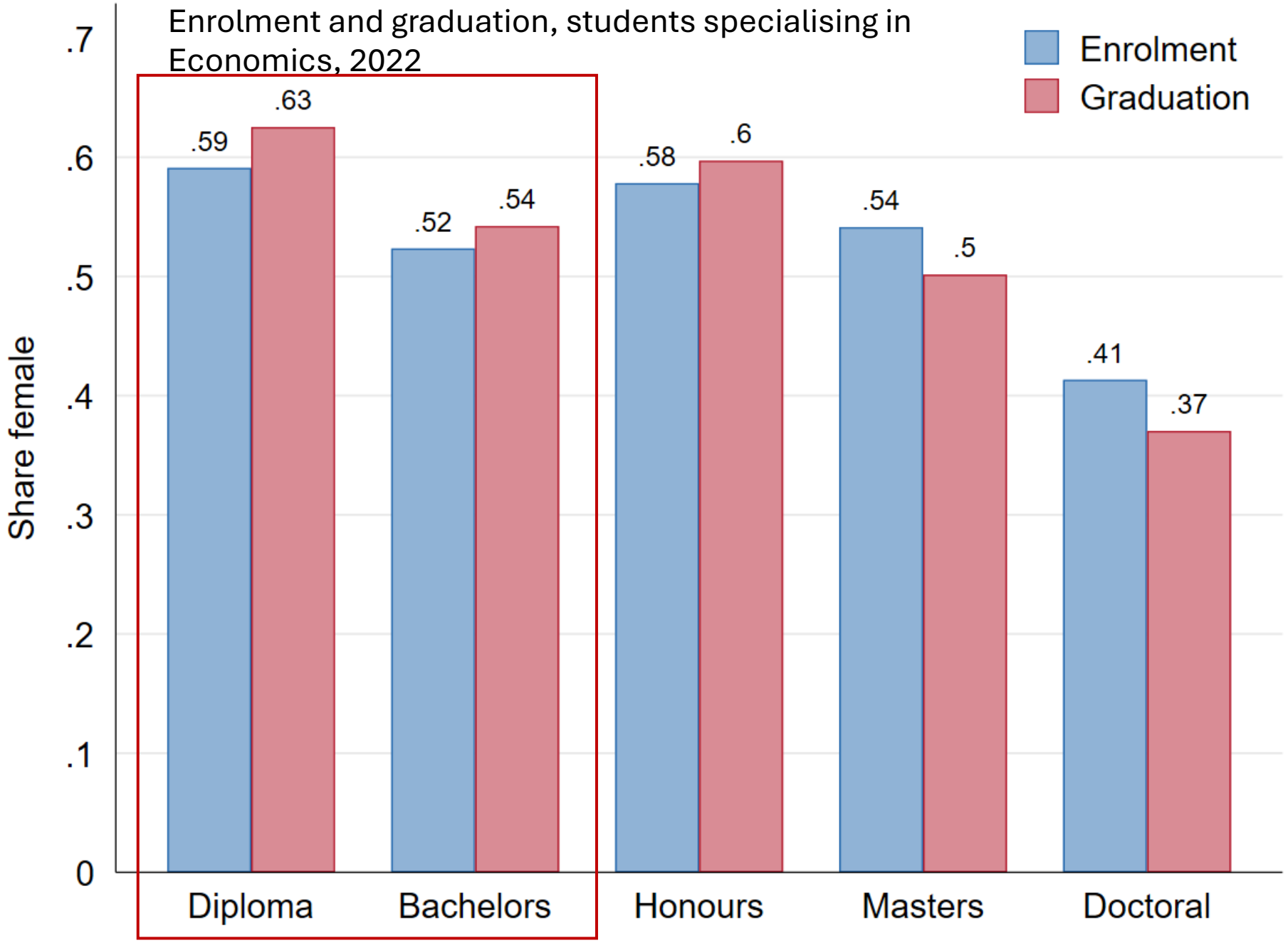
- Higher Education Management Information System (HEMIS) 2012-2022
- Students specialising in Economics: classified based on the main CESM specialisation of their qualification
- Staff in Economics: assigned to the economics discipline based on time spent teaching or doing research in economics CESMs
- Students first enrolling in economics in 2016-2019. Restricted to 3- and 4-year diploma and bachelor qualifications.

Defining economics

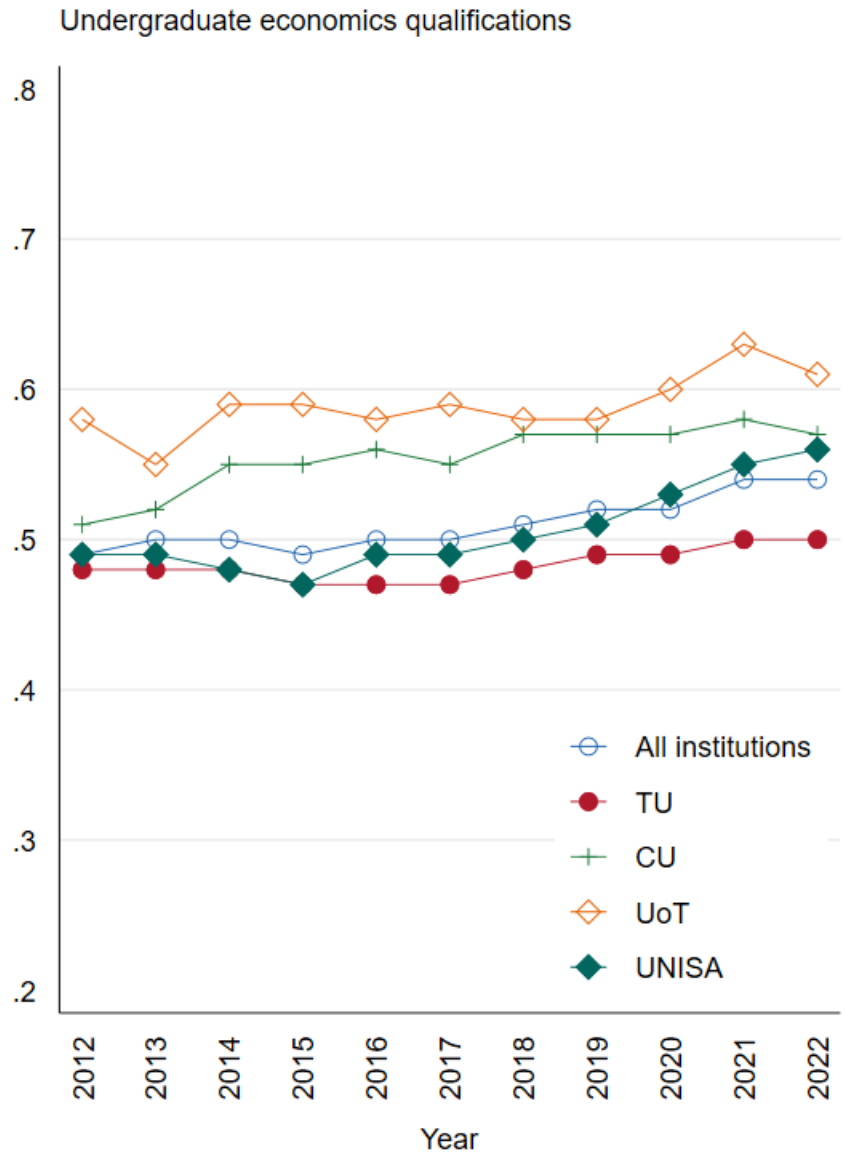
- Based on second and third order qualification CESM specialisation

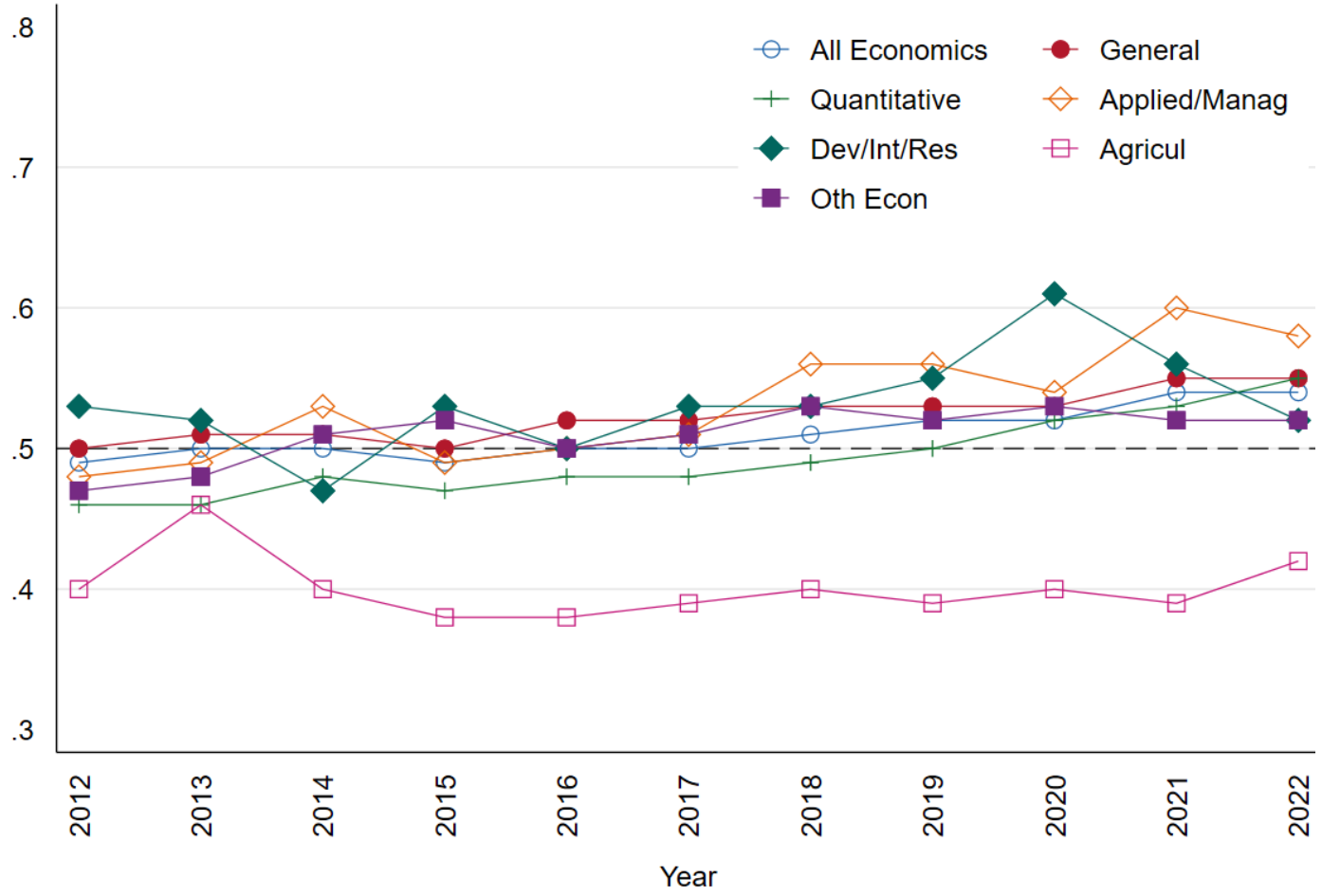
040401	Economics, General
040402	Applied Economics
040403	Managerial Economics
040404	Econometrics and Quantitative Economics
040405	Development Economics and International Development
040406	International Economics
040407	Natural Resource Economics
040499	Economics, Other
010102	Agricultural Economics

- Therefore, analysis does not include all students who take economics courses, only those with an economics specialisation.

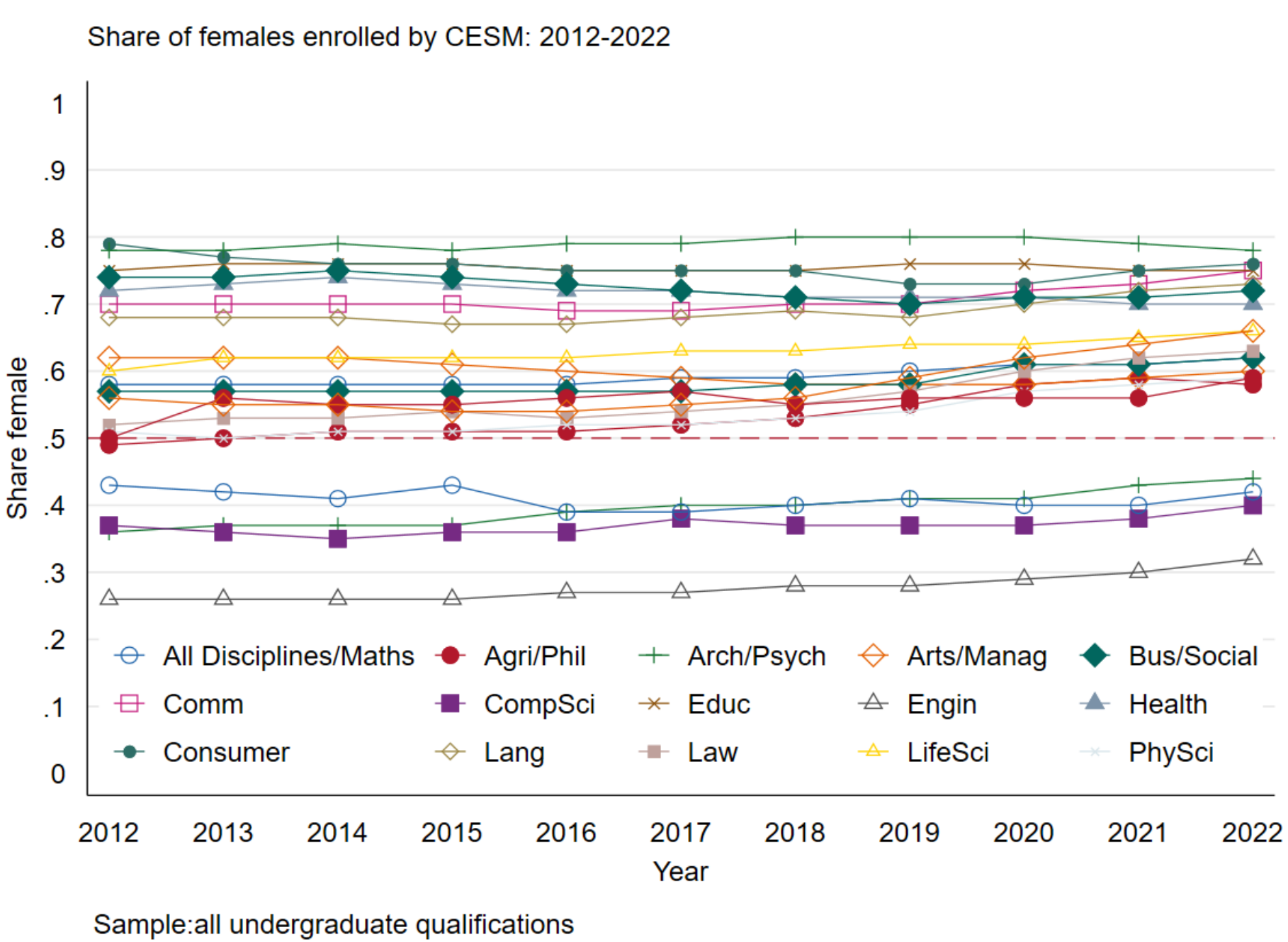

Enrolment and graduation, students specialising in Economics, 2022
Enrolment
Graduation
Share female
0
.1
.2
.3
.4
.5
.6
.7
.59
.63
.52
.54
.58
.6
.54
.5
.41
.37
Diploma
Bachelors
Honours
Masters
Doctoral

Share of females enrolled by institution type: 2012-2022





Undergraduate economics qualifications


Share of females enrolled by CESM: 2012-2022
Share female
1
.9
.8
.7
.6
.5
.4
.3
.2
.1
0
All Disciplines/Maths
Agri/Phil
Arch/Psych
Arts/Manag
Bus/Social
Comm
CompSci
Educ
Engin
Health
Consumer
Lang
Law
LifeSci
PhySci
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Year
Sample:all undergraduate qualifications

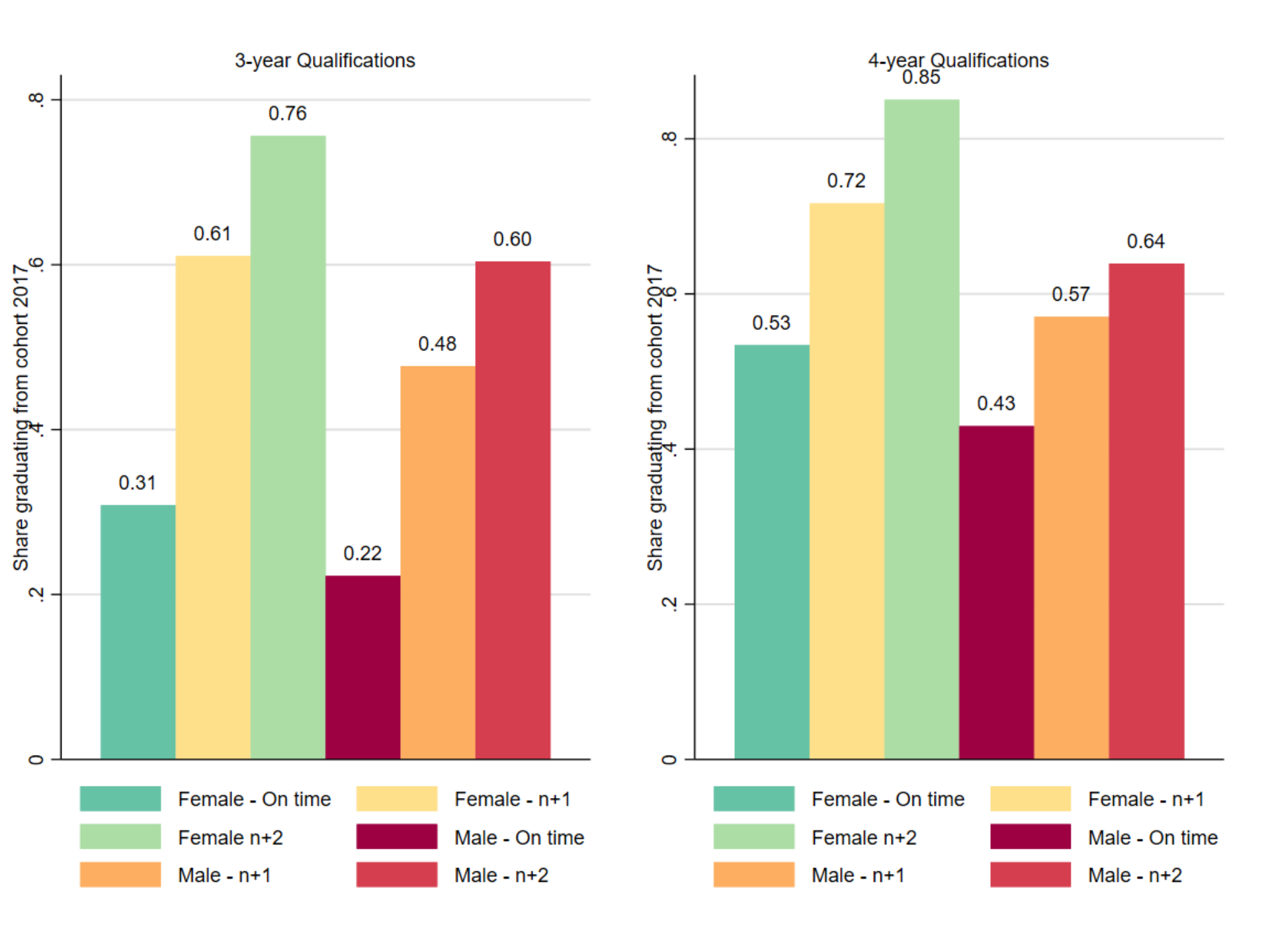
Performance differences between male and females in economics

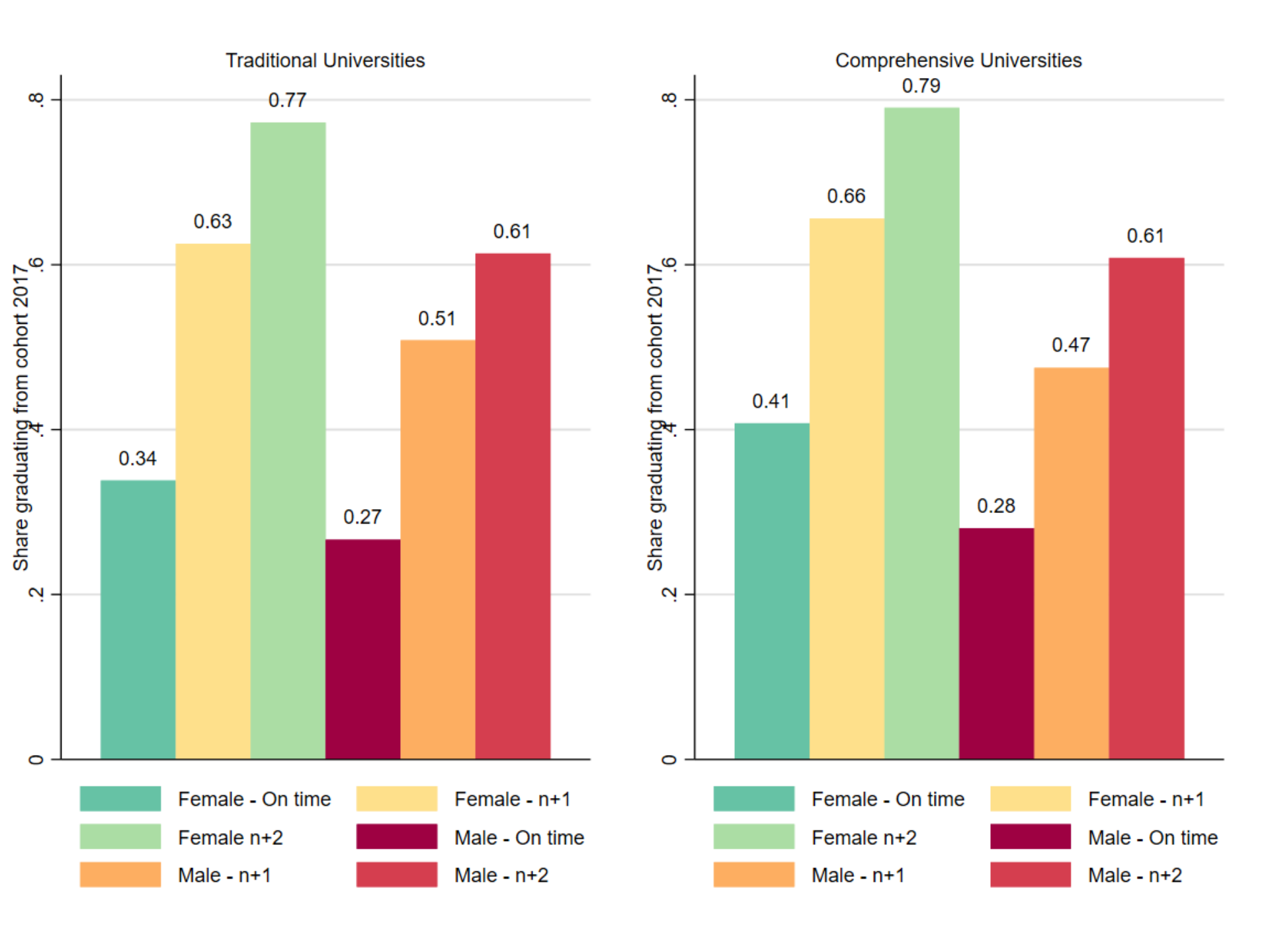
Economics student outcomes: 2016-2019 cohorts

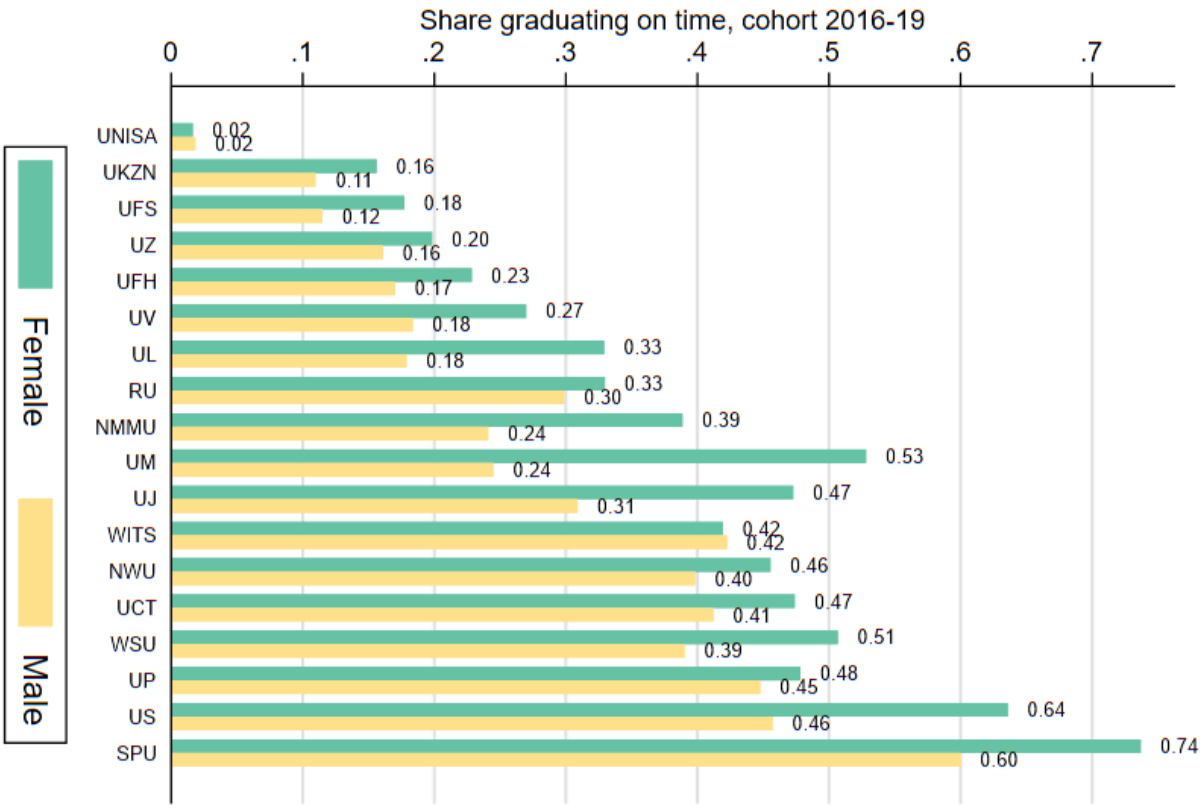
Outcome	Male - mean	Male - n	Female - mean	Female - n	Significant Difference
Courses taken in year 1	9.34	5406	9.43	6075	
Courses taken in year 2	8.95	4938	8.98	5765	
Courses taken in year 3	8.03	4713	7.92	5630	
Share courses passed year 1	.82	5184	.86	5918	***
Share courses passed year 2	.82	4769	.88	5662	***
Share courses passed year 3	.83	4508	.89		
On time graduation	.26	5411	.34		
Graduate within n+1	.49	5411	.63		
Graduate within n+2	.56	5411	.71		
Change CESM	.55	5411	.57		

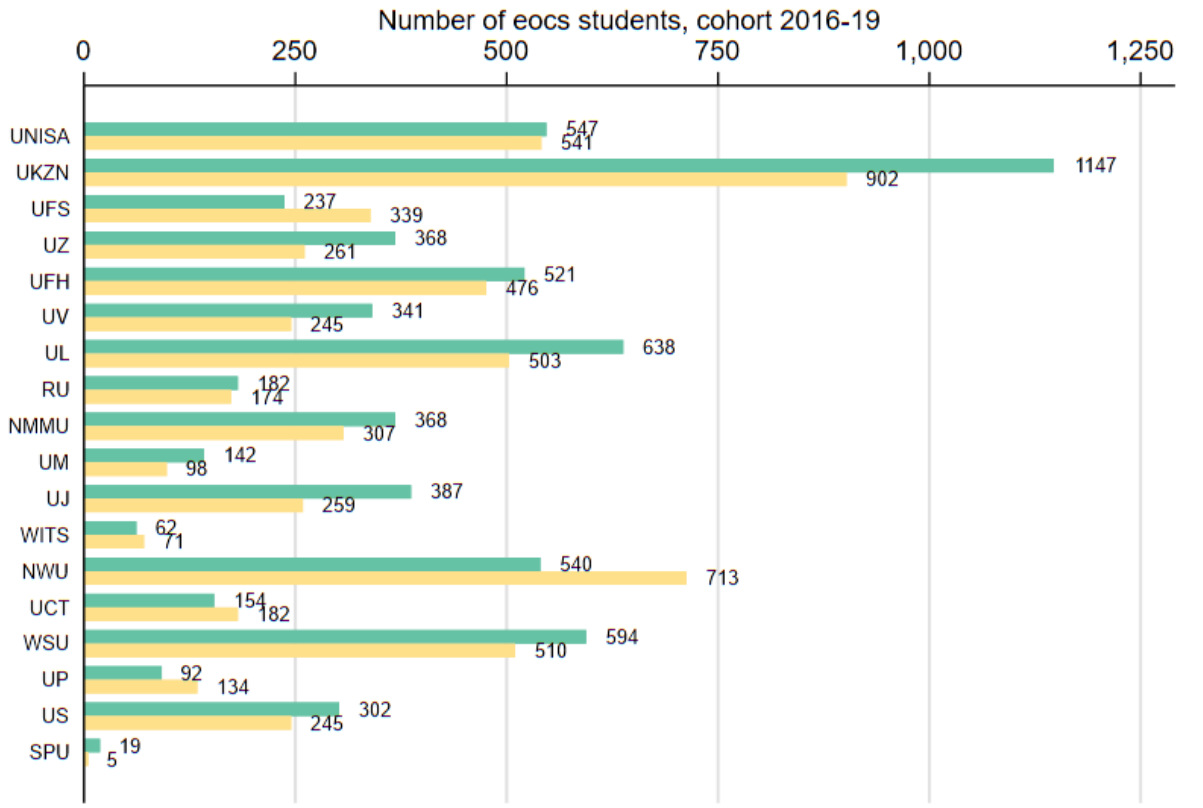
Over 55% of students starting out in economics change to a different CESM. Furthermore, between 40 and 50% of graduations are not in economics (not shown).

- Course load is similar, but males p in each year.
- Not significantly more or less likely qualification CESM.
- Males are less likely to graduate on time and overall.


3-year Qualifications
Share graduating from cohort 2017
0
.2
.4
.6
.8
0.31
0.61
0.76
0.22
0.48
0.60
4-year Qualifications
0.53
0.72
0.85
0.43
0.57
0.64
Female - On time
Female - n+1
Female n+2
Male - On time
Male - n+1
Male - n+2


Traditional Universities
Share graduating from cohort 2017
0
.2
.4
.6
.8
0.34
0.63
0.77
0.27
0.51
0.61
Female - On time
Female - n+1
Female n+2
Male - On time
Male - n+1
Male - n+2
Comprehensive Universities
Share graduating from cohort 2017
0
.2
.4
.6
.8
0.41
0.66
0.79
0.28
0.47
0.61
Female - On time
Female - n+1
Female n+2
Male - On time
Male - n+1
Male - n+2


Share graduating on time, cohort 2016-19
0
.1
.2
.3
.4
.5
.6
.7
Female
Male
UNISA 0.02 0.02
UKZN 0.16 0.11
UFS 0.18 0.12
UZ 0.20 0.16
UFH 0.23 0.17
UV 0.27 0.18
UL 0.33 0.18
RU 0.33 0.30
NMMU 0.39 0.24
UM 0.53 0.24
UJ 0.47 0.31
WITS 0.42 0.42
NWU 0.46 0.40
UCT 0.47 0.41
WSU 0.51 0.39
UP 0.48 0.45
US 0.64 0.46
SPU 0.74 0.60


Number of eocs students, cohort 2016-19
0
250
500
750
1,000
1,250
UNISA 547 541
UKZN 1147 902
UFS 237 339
UZ 368 261
UFH 521 476
UV 341 245
UL 638 503
RU 182 174
NMMU 368 307
UM 142 98
UJ 387 259
WITS 62 71
NWU 540 713
UCT 154 182
WSU 594 510
UP 92 134
US 302 245
SPU 19 5

Student characteristics by gender and performance

- Characteristics of male and female economics students are similar.
- Only differences evident are that males are:
  - More likely than females to enrol in agricultural economics, and less likely to enrol in general economics.
  - Older, on average, and with a lower share Black African students and higher share White students.
  - Higher enrolment at TUs versus CUs and in institutions with lower share Black higher share White economics staff.

Student, staff and institutional characteristics by gender gap size

Outcome	Gender gap >10pts		Gender gap <10pts		Significant difference
Gender gap in on-time graduation	.15	4374	.05	7113	
On time graduation	.39	4374	.25	7113	***
Graduate within n+1	.61	4374	.53	7113	***
Graduate within n+2	.67	4374	.63	7113	***
Share courses passed year 1	.86	4218	.83	6884	***
Change CESM	.5	4374	.6	7113	***

- Note that the average performance of students in the larger gender gap group is better than in the smaller gap group.

Outcome	Gender gap >10pts		Gender gap <10pts		Significant difference
Gender gap in on-time graduation	.15	4374	.05	7113	
Student characteristics:					
Female	.56	4374	.51	7113	***
Age	20	4374	19.59	7113	***
Black	.85	4374	.76	7113	***
Coloured	.03	4374	.02	7113	***
Indian	.01	4374	.07	7113	***
White	.11	4374	.13	7113	***
Other	0	4374	.02	7113	***
Diploma	.14	4374	0	7113	***
Bachelors Degree	.86	4374	1	7113	***
General	.69	4374	.87	7113	***
Applied or managerial	.04	4374	0	7113	
Agriculture	0	4374	.09	7113	
Other Ecos	.22	4374	.03	7113	***
Postal code information:					
Income Quintile 1	.31	4245	.16	6927	***
Income Quintile 2	.19	4245	.22	6927	***
Income Quintile 3	.17	4245	.22	6927	***
Income Quintile 4	.14	4245	.22	6927	***
Income Quintile 5	.19	4245	.18	6927	***
Ave education 2011	6.69	4245	6.82	6927	
Institutional information:					
TU	.39	4374	.83	7113	***
CU	.61	4374	.17	7113	***

Outcome	Gender gap >10pts		Gender gap <10pts		Significant difference
Gender gap in on-time graduation	.15	4374	.05	7113	
Economics staff:					
Professor	.1	4374	.12	7113	***
Female	.43	4374	.38	7113	***
Other qualification	.18	4374	.14	7113	***
Masters	.39	4374	.34	7113	***
PhD	.42	4374	.52	7113	***
Age	43.17	4374	43.07	7113	***
Black	.77	4374	.52	7113	*
Coloured	.03	4374	.03	7113	***
Indian	.02	4374	.05	7113	***
White	.18	4374	.32	7113	***
Other race	0	4374	.08	7113	***
Years at institution	10.08	4374	9.8	7113	***

- Institutions with a larger gender gap have economics staff that have, on average:
  - Lower qualifications and of lower rank.
  - A higher share of female and Black staff members.

L&T and Assessments in SA economics 1-year courses,

Small gender gap institutions

University	Course	Total number of students	Learning and Teaching			Assessment						
			Prescribed textbook	Lectures		Number of continuous assessments	Weighting of the biggest-weighted continuous assessment	Type of continuous assessments				Exam scope
				Live streaming	Pre-recorded video			Module test	Tutorial	Assignment / Exercise	Other (e.g. Essay)	
UCT	Micro	1 044	International	No	Yes	5	27%	Yes	No	Yes	Yes	100%
UFS[1]	Micro	1 200	Local	No	Yes	3	N/A	Yes	Yes	No	No	100%
	Macro	1 200	Local	No	Yes	3	N/A	Yes	Yes	No	No	100%
UJ	Economics[2]	546	Local	No	Yes	5	20%	Yes	Yes	Yes	No	80-89%
	Economics[3]	2 123	Local	No	Yes	5	35%	Yes	Yes	Yes	No	100%
NMU	Micro	1 250	International	No	Yes	6	45%	Yes	Yes	No	No	70-79%
	Macro	1 250	International	No	Yes	6	45%	Yes	Yes	No	No	70-79%
NWU[4]	Macro	1 470	Local	No	Yes	9	30%	Yes	No	Yes	Yes	100%
UP	Micro	2 700	Local	No	No	17	25%	Yes	Yes	Yes	Yes	100%
	Macro	2 700	Local	No	No	17	25%	Yes	Yes	Yes	Yes	100%
RU	Micro	425	International	No	Yes	13	40%	Yes	Yes	No	Yes	100%
SUN	Micro	2 164	International	No	Yes	3	60%	Yes	Yes	No	No	70-79%
	Macro	2 220	International	No	No	3	40%	Yes	Yes	No	No	67%
UWC	Micro	1 049	Local	No	Yes	8	30%	Yes	Yes	No	Yes	67%
	Macro	1 175	Local	No	Yes	8	20%	Yes	Yes	Yes	No	67%
Wits	Micro	1 740	International	No	Yes	4	42%	Yes	Yes	No	No	100%
UniZulu	Micro	1 100	Local	Yes	Yes	6	50%	Yes	Yes	No	No	100%
	Macro	1 100	Local	Yes	Yes	6	50%	Yes	Yes	No	No	100%

Yu 2023, unpublished manuscript

Decomposing the gender gap in on-time graduation

Blinder-Oaxaca decomposition

Group 1: male = **0**
Group 2: male = **1**

Number of obs	=	**11,100**
Model	=	**logit**
N of obs 1	=	**5,916**
N of obs 2	=	**5,184**

explained: (X1 - X2) * **b**
unexplained: X1 * (b1 - **b**) + X2 * (**b** - b2)
with **b** from pooled model (including group dummy)

ontime_	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
overall						
group_1	.3485463	.0067612	51.55	0.000	.3352946	.3617981
group_2	.2667824	.0066639	40.03	0.000	.2537213	.2798435
difference	.0817639	.0094933	8.61	0.000	.0631575	.1003704
explained	.0285399	.0062885	4.54	0.000	.0162146	.0408651
unexplained	.053224	.0072005	7.39	0.000	.0391114	.0673367

Conclusions

- ‘Martha effect’ evident in economics
  - Larger share of female students enrolling, plus
  - Females graduate faster and at a higher rate
- Characteristics of male and female students fairly similar.
- Student and institutional differences between institutions with large versus small gender gap.
- A decomposition of the gender gap in on-time graduation illustrates that less than half the gap can be explained by observable characteristics.
  - Similar within race group, although the gender gap is larger within Black students.

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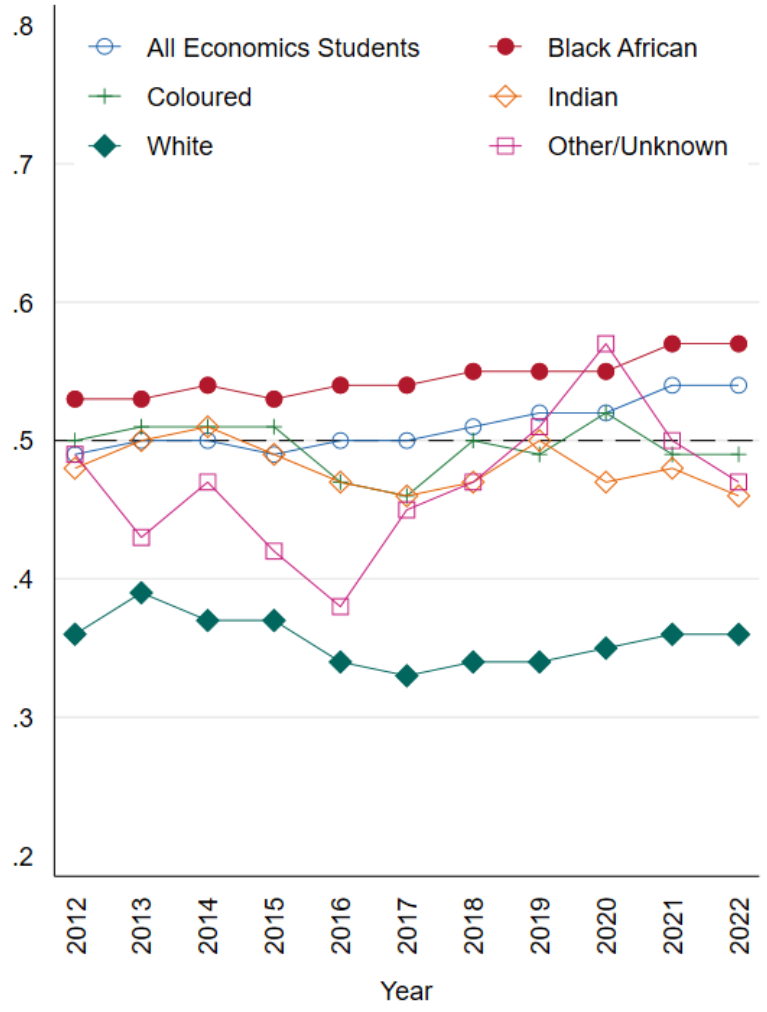
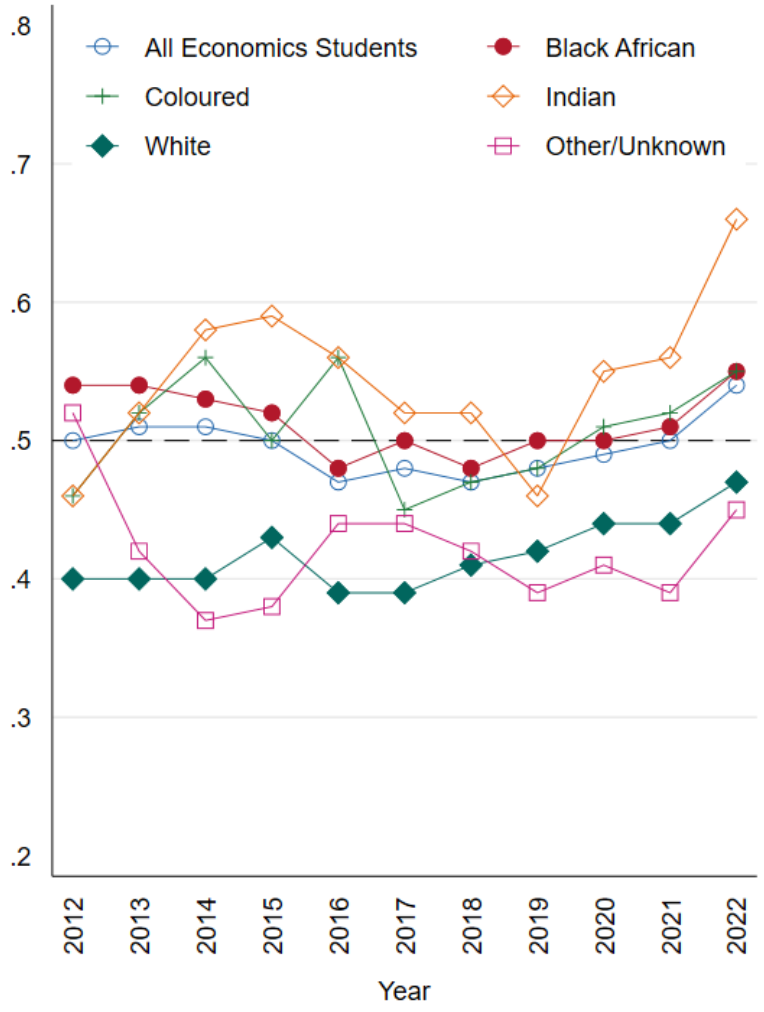
CHALLENGING INEQUALITIES THROUGH POLICY RELEVANT ACADEMIC RESEARCH.

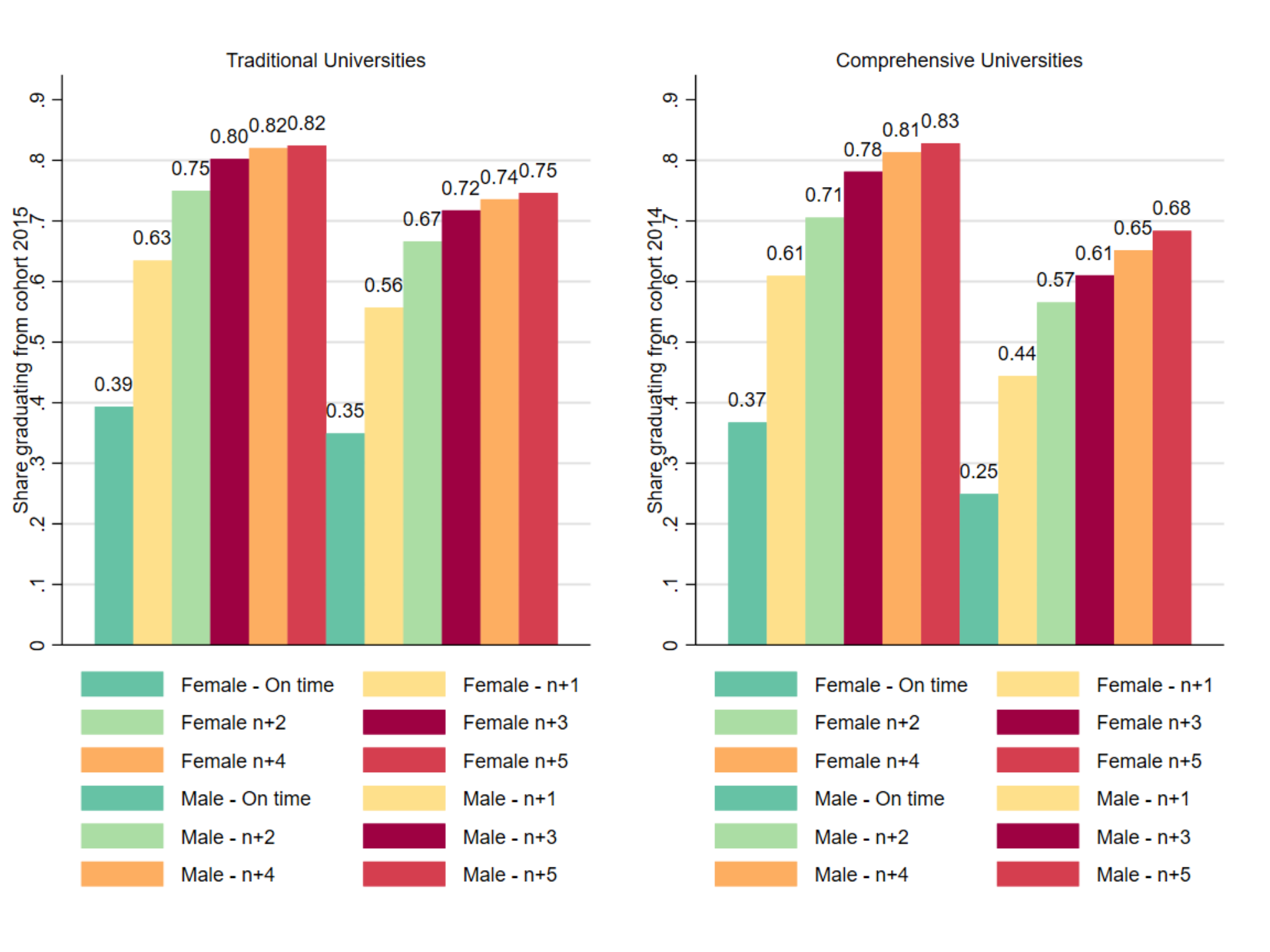
Share of females enrolled by race: 2012-2022



Undergraduate economics qualifications



Postgraduate economics qualifications


Traditional Universities
Share graduating from cohort 2015
0
.1
.2
.3
.4
.5
.6
.7
.8
.9
0.39
0.63
0.75
0.80
0.82
0.82
0.35
0.56
0.67
0.72
0.74
0.75
Comprehensive Universities
Share graduating from cohort 2014
0
.1
.2
.3
.4
.5
.6
.7
.8
.9
0.37
0.61
0.71
0.78
0.81
0.83
0.25
0.44
0.57
0.61
0.65
0.68
Female - On time
Female - n+1
Female n+2
Female n+3
Female n+4
Female n+5
Male - On time
Male - n+1
Male - n+2
Male - n+3
Male - n+4
Male - n+5

Black African only

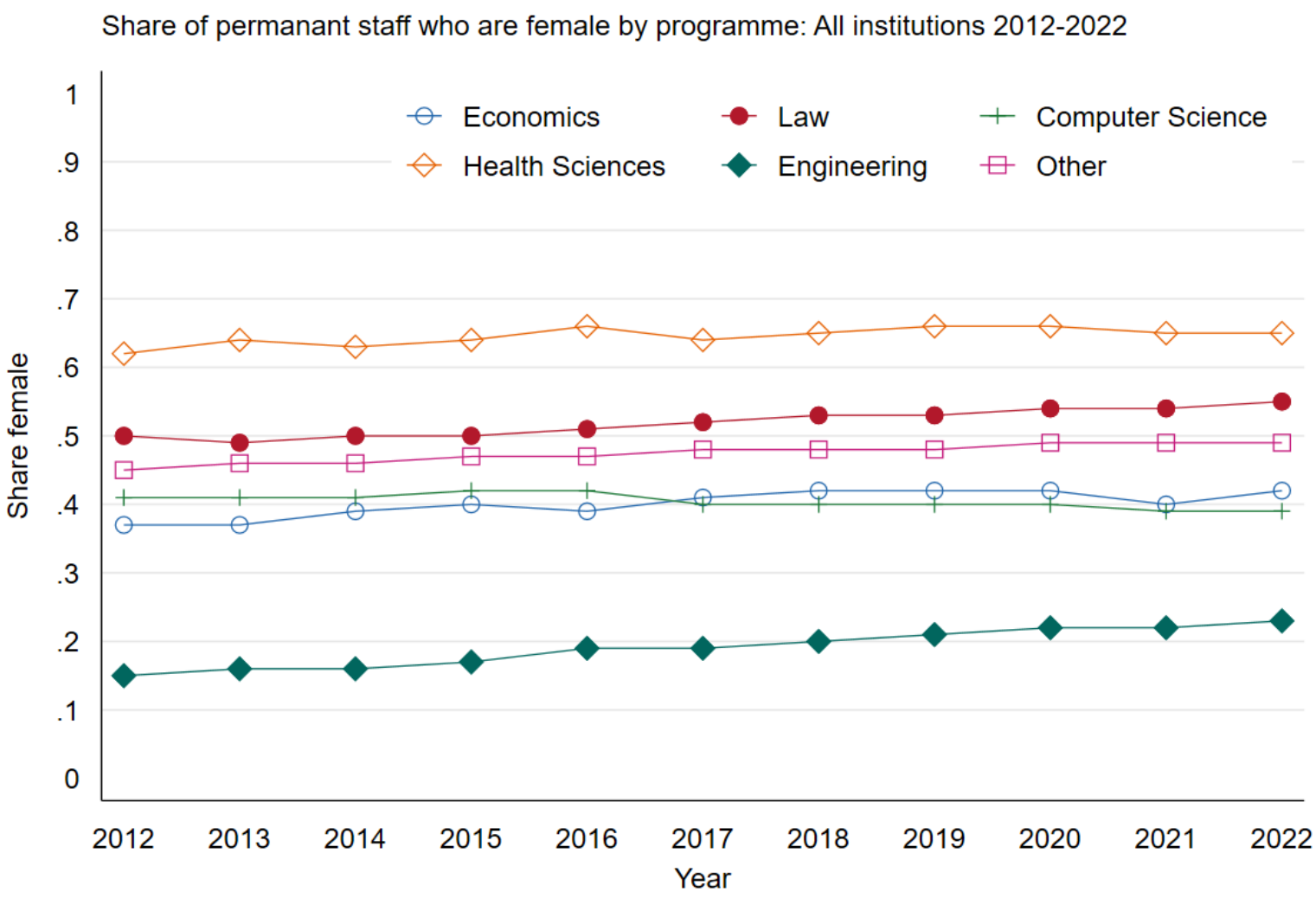
Blinder-Oaxaca decomposition

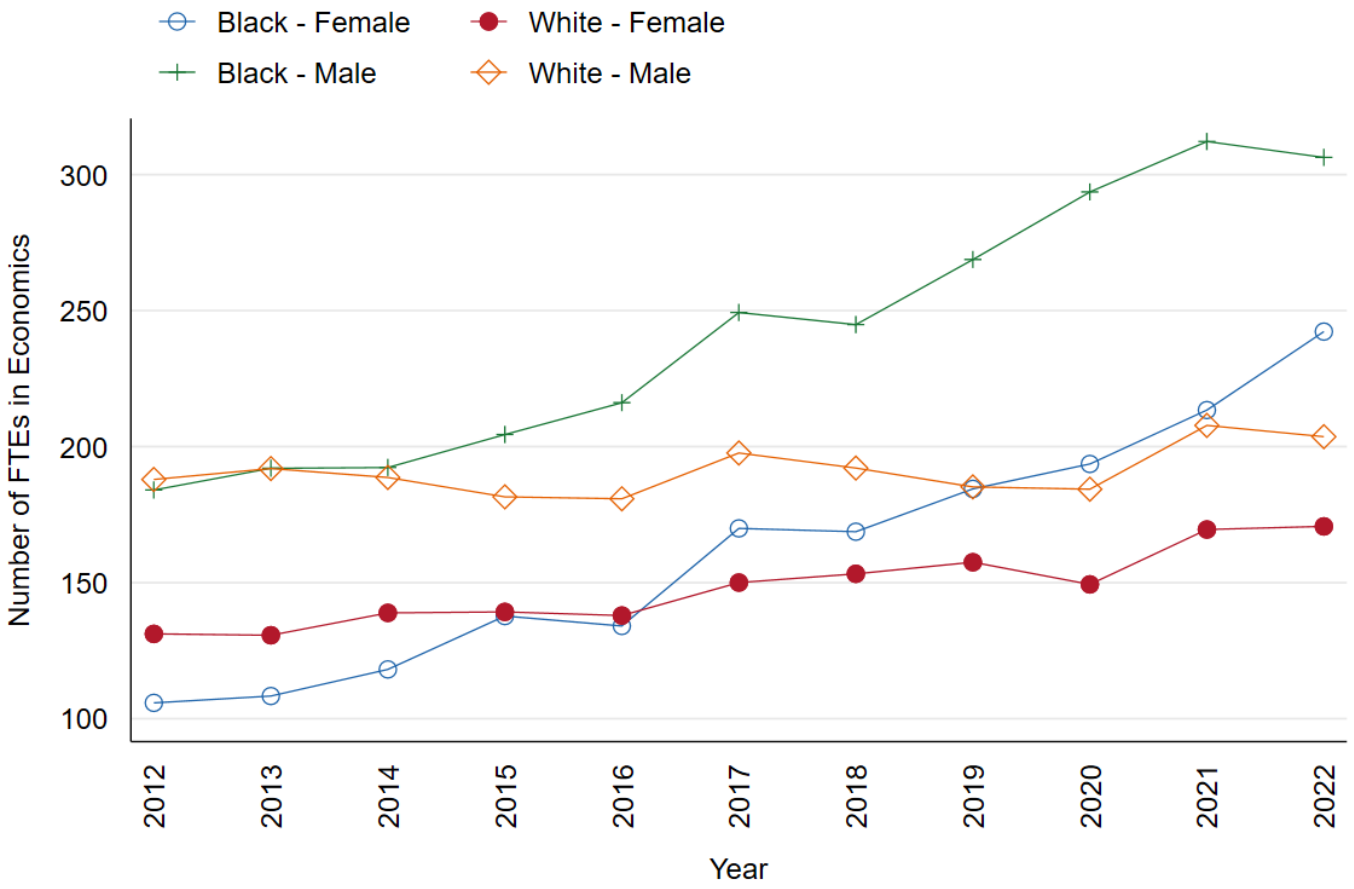
Group 1: male = 0
Group 2: male = 1

Number of obs	=	8,796
Model	=	logit
N of obs 1	=	4,909
N of obs 2	=	3,887

explained: (X1 - X2) * b
unexplained: X1 * (b1 - b) + X2 * (b - b2)
with b from pooled model (including group dummy)

ontime_	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
overall						
group_1	.3143206	.0072593	43.30	0.000	.3000926	.3285486
group_2	.2091587	.0072293	28.93	0.000	.1949895	.223328
difference	.1051619	.010245	10.26	0.000	.085082	.1252418
explained	.0458695	.0069908	6.56	0.000	.0321679	.0595712
unexplained	.0592924	.0076395	7.76	0.000	.0443193	.0742655


Share of permanant staff who are female by programme: All institutions 2012-2022
Economics
Law
Computer Science
Health Sciences
Engineering
Other
Share female
1
.9
.8
.7
.6
.5
.4
.3
.2
.1
0
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Year
Sample: permanant research or instructional staff with time spent in program CESM (FTE)



Black includes Black, Coloured and Indian staff. Staff with Other/Unknown race excluded.