

# Evaluating affirmative action when college applications are endogenous

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# Background

- Affirmative action (AA) policies by design change composition of student body
  - Contested
  - Potential for efficiency losses
- Application channel commonly assumed away in strategy-proof settings
  - However, AA might change preferences over programs, or there might be search frictions, or behavioural costs to applying,...
  - May matter for identification as well as policy

# This paper

Study effects of an AA policy that seeks to reduce gender imbalance within majors

1. Document application responses to AA
2. Estimate effects of the policy
  - Academic and labor market outcomes
  - Shifted-in vs shifted-out

# Norway's Centralized Admission System

- Centralized platform for all applications to higher public education
  - Submit rank-ordered list of up to 15 preferences
  - Specific program at specific institution, e.g. Physics at UiO
- Gale-Shapley Deferred Acceptance: Slots allocated based on application score
  - Largely comprised of high school GPA, with extra points in certain cases
  - Exact cutoff unpredictable
- Strategy proof: No incentive not to list true preferences

## The AA policy: Gender points

- Give targeted gender an advantage by boosting their application scores

$$AppScore_{ipy} = 10GPA_i^{HS} + 2Target_{ip}Active_{py}$$

- Regulated by the Ministry of Education
- Requirement: One gender clearly underrepresented
  - Women: Selected STEM programs
  - Men: Selected health programs

# Data

- Application data 1999-2018
  - Rank-ordered lists of preferences
  - Application scores and cutoffs
  - Offers and enrollment
  - Gender point policies over time
- Student trajectories + grades in higher education
- Background variables
- Labor market outcomes

# 1. Application responses

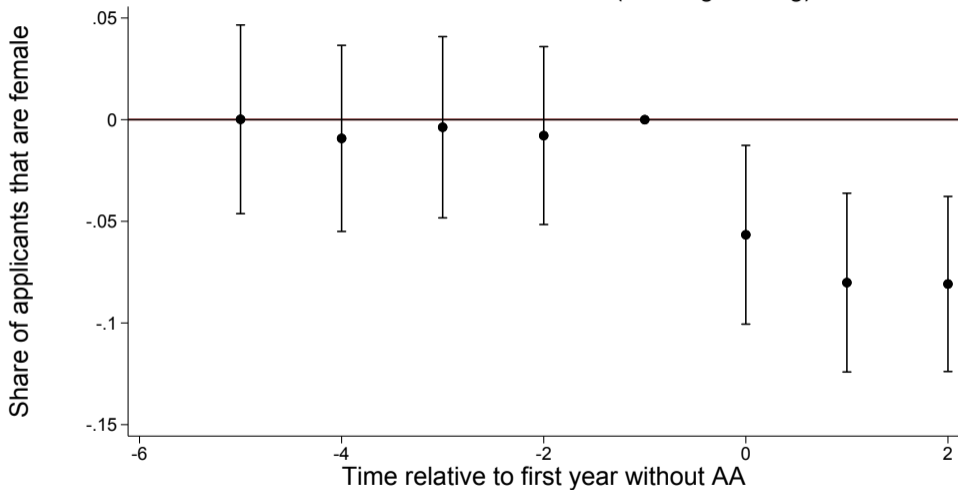
## Do college applications respond to AA?

- Utilize within-program changes in use of gender points between 1999 and 2018
  - Flagship technical university abolishes gender points (women) for about half of civil engineering programs in 2016
  - Three nurse programs introduce gender points (men) in 2018
- Estimate effect on gender balance in pool of applicants using DiD
  - Control group: Applicants to comparable programs that do not change their policy

$$Target_i = \delta_y + \theta_p + \sum_{t=-5}^T \beta_y \mathbf{1}_{\{t=y\}} Change_p + \epsilon_i$$

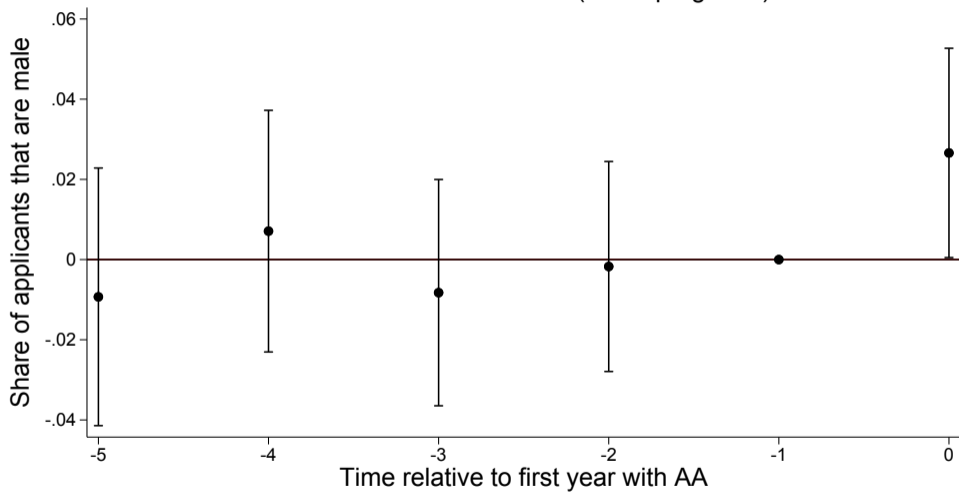


### Abolishment of AA for women (civil engineering)



Time series

### Introduction of AA for men (nurse programs)



Time series

2. What is the effect on candidates shifted in, vs. shifted out, by AA?

## Parameters of interest

The cost of AA measured in terms of an outcome  $Y$  can be written as

$$\sum_i Y_i(AA = 1) - Y_i(AA = 0)$$

Assuming that switching on AA without changing the treatment does not change the outcome, this can be written in terms of potential outcomes  $Y^1, Y^0$

$$\begin{aligned} &= \sum_i Y_i^1 D_i(AA = 1) + Y_i^0 (1 - D_i(AA = 1)) - Y_i^1 D_i(AA = 0) - Y_i^0 (1 - D_i(AA = 0)) \\ &= \sum_i [Y_i^1 - Y_i^0] \left[ D_i(AA = 1) - D_i(AA = 0) \right] \end{aligned}$$

## Parameters of interest

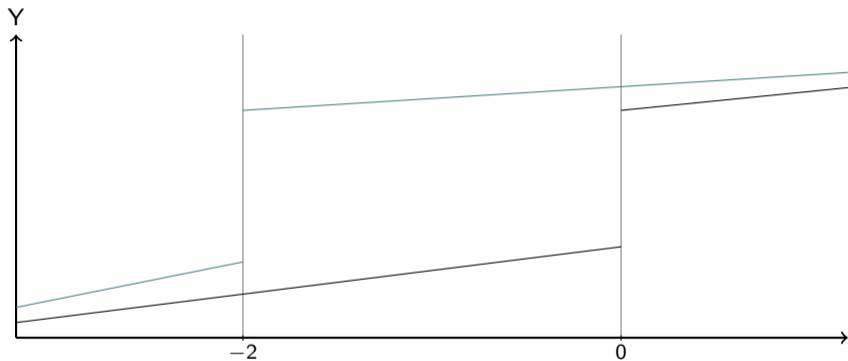
Groups by treatment status:

Shifted-in	$D_i(AA = 1) = 1, D_i(AA = 0) = 0$
Shifted-out	$D_i(AA = 1) = 0, D_i(AA = 0) = 1$
Unaffected (admitted)	$D_i(AA = 1) = 1, D_i(AA = 0) = 1$
Unaffected (rejected)	$D_i(AA = 1) = 0, D_i(AA = 0) = 0$

$$\begin{aligned} &= \sum_i [Y_i^1 - Y_i^0] \left[ D_i(AA = 1) - D_i(AA = 0) \right] \\ &= \sum_{i \in \text{In}} [Y_i^1 - Y_i^0] - \sum_{i \in \text{Out}} [Y_i^1 - Y_i^0] \\ &= N_{\text{In}} E[Y_i^1 - Y_i^0 | \text{Shifted-in}] - N_{\text{Out}} E[Y_i^1 - Y_i^0 | \text{Shifted-out}] \end{aligned}$$

Hence, the ATE for winners and losers is informative of the cost of the policy

# Illustration

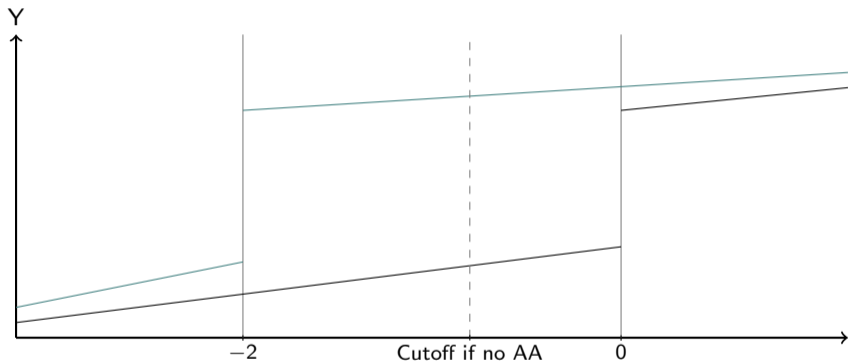


Distance to existing cutoff, minus any gender points

— Observed outcomes for targeted applicants

— Observed outcomes for non-targeted applicants

# Illustration

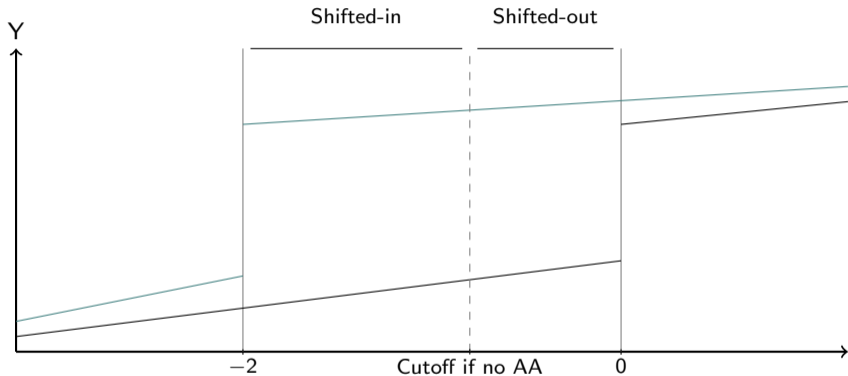


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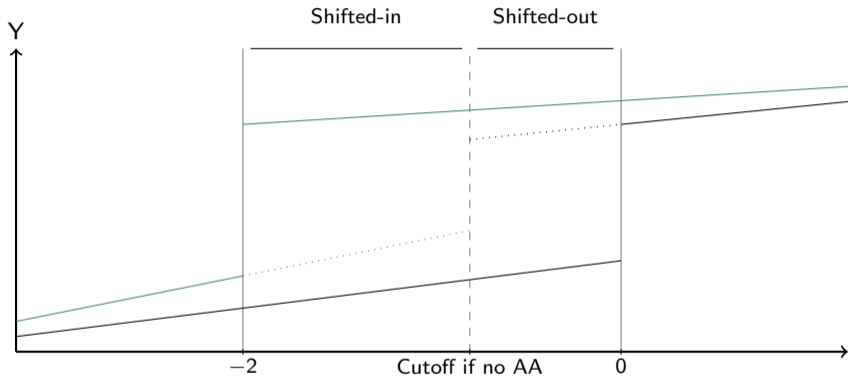
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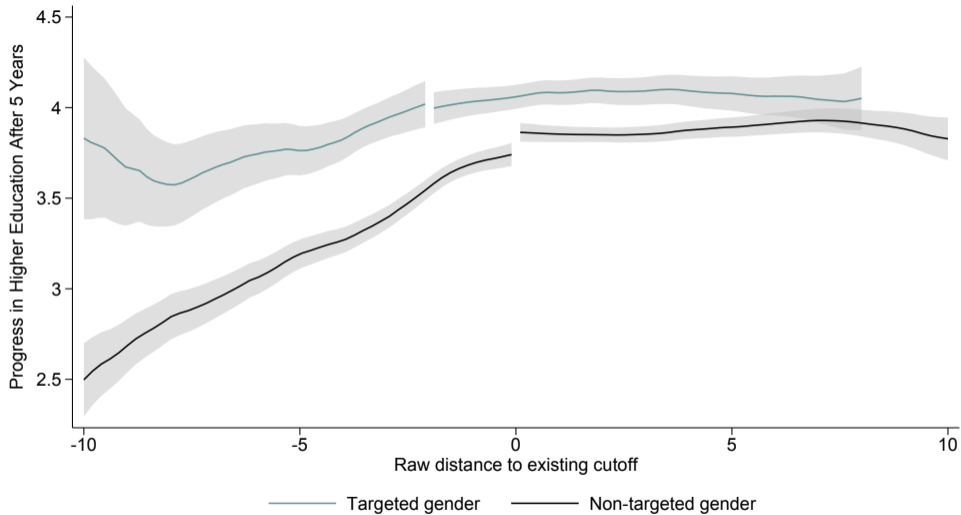


# Illustration



Distance to existing cutoff, minus any gender points

- Observed outcomes for targeted applicants
- Observed outcomes for non-targeted applicants



# Results

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	Progress after 5 years
Effect of AA for winners	-0.155
Effect of AA for losers:	-0.106
Applicants shifted per cohort	77

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## Conclusion and Roadmap

- Gender points lead to higher share of targeted students
  - Some effect likely runs through application responses
- Little evidence of mismatch
  - More gender balance at little or no cost to the program
  - Yet some cost to the displaced students
- Next: Model application behaviour

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## Example

### Applicant of targeted gender

	Program	Raw	Application Score	Cutoff	Offer
1	Civil and Environmental Engineering	54	<b>56</b>	54.8	<b>Yes</b>
2	Teaching	54	54	48	No

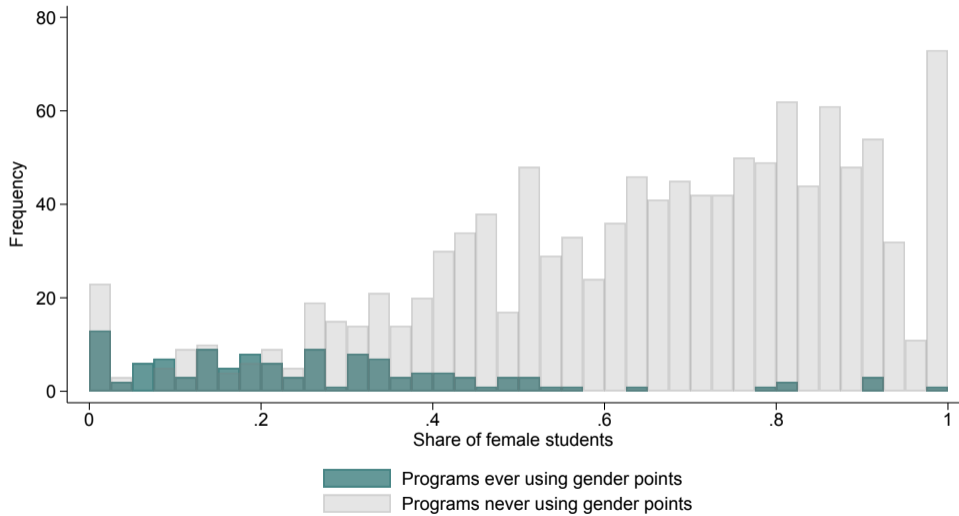
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### Applicant of non-targeted gender

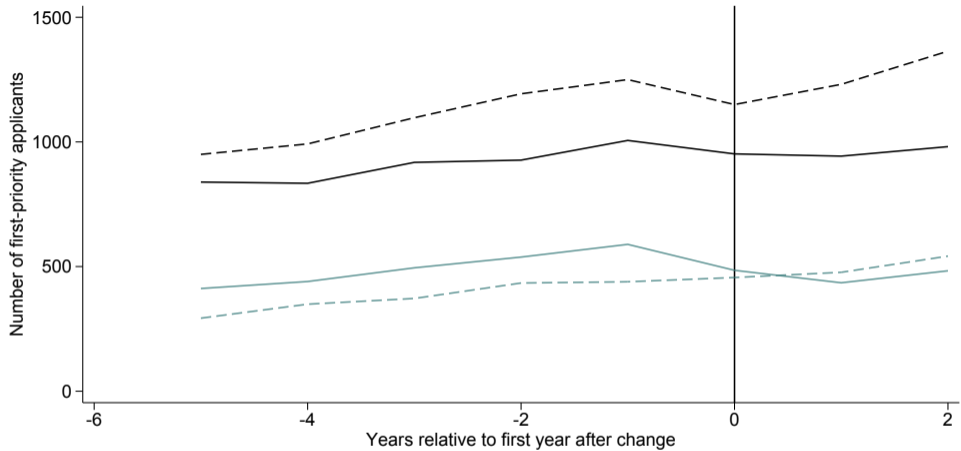
	Program	Raw	Application Score	Cutoff	Offer
1	Civil and Environmental Engineering	54	54	54.8	<b>No</b>
2	Teaching	54	54	48	Yes



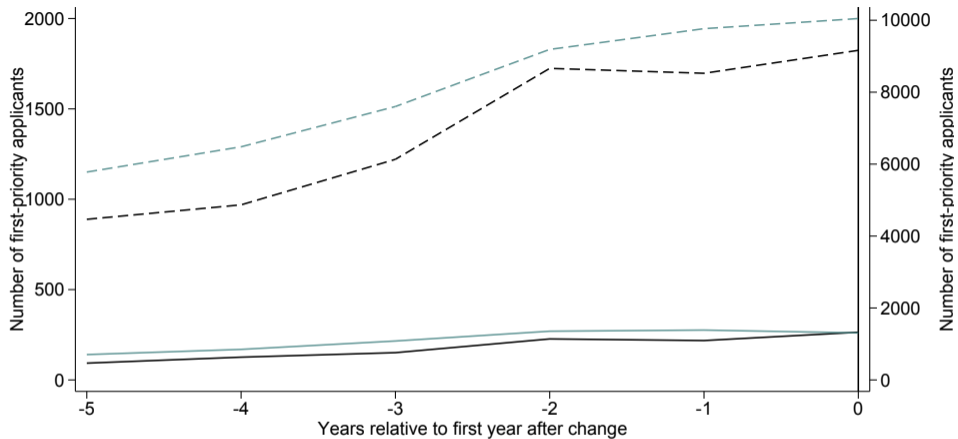
Programs by use of gender points

	Number of programs	Percent of total
Never	1181	91.20
Time-varying	19	1.47
Always	95	7.34
Total	1295	100.00



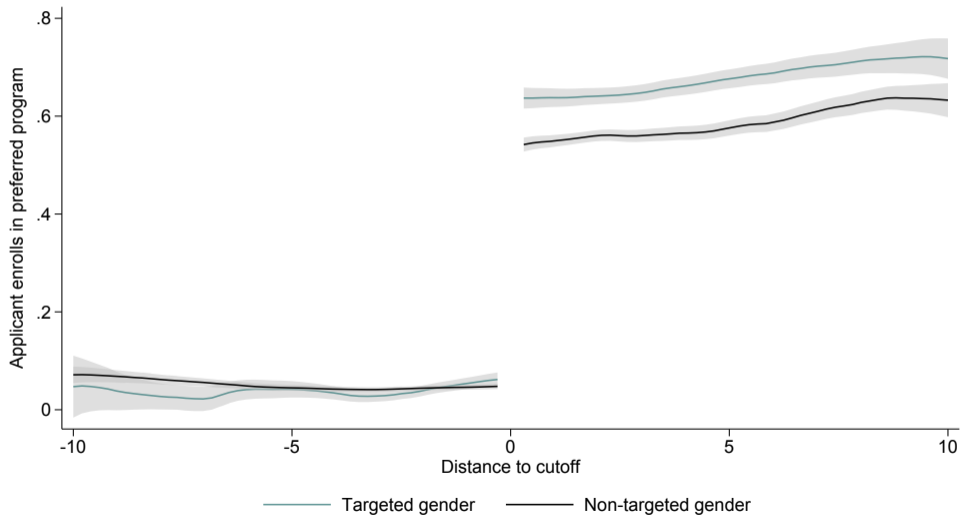


— Female applicants to programs abolishing AA    — Male applicants to programs abolishing AA  
- - - Female applicants to no-change programs    - - - Male applicants to no-change programs

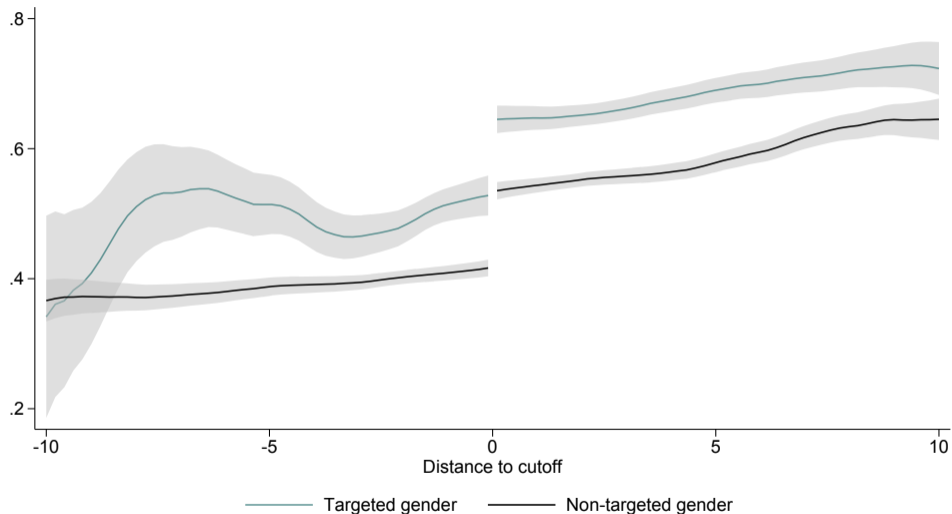


— Male applicants to programs introducing AA — — Male applicants to no-change programs  
 — Female applicants to programs introducing AA — — Female applicants to no-change programs

# First stage: Enrollment



# STEM enrollment



Difference in LATEs: 0.045 (t-statistic: 1.25)