The effect of confidence on college applications

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Unequal Access to College

Females disproportionately enter less highly paid fields and less selective colleges

- Boring and Brown (2016); Saygin (2016); Blau and Kahn (2017)

Access to college varies substantially across the income distribution:

- US (Chetty, 2022): Children with parents in the **top 1%** of the income distribution are **77 times** more likely to attend elite colleges and universities than children with parents in the **bottom 20%** of the income distribution

Number of reasons for this unequal access to colleges:

- **Financial constraints** (Angrist, Autor, and Pallais 2021; Barr et al. 2021; Bettinger et al. 2019; Dynarski 2008)
- **Information frictions** (Bettinger et al. 2012; Hoxby and Turner 2013; Larroucau et al. 2021)
- **Preferences regarding programs or peers** (Wiswall and Zafar, 2015, 2018; Patnaik et al.,2021)
- **Behavioral factors:**
  - **Complexity and uncertainty** in the admissions and aid process (Dynarski et al. 2021)
  - Self-confidence

Confidence in college applications

Potential costs of over- and under-confidence:

- Under-confidence: no application to prestigious programs
- Over-confidence: no inclusion of “safe” programs

Amplified when applications lists are restricted

- Standard with centralize assignment systems

Underconfidence in college selection is a central consideration for policy makers:

”Policy-makers are particularly concerned about ``self-censoring'', the observation that students who underplace themselves in terms of academic ability are less likely to apply to selective institutions” Guyon (2020)

“It is time to have in our Elite Schools (Grandes Ecoles) a better representation of our society, in its geographical and social diversity.” Frederique Vidal (2019), French Minister of Education

This paper

Research questions:

1. How large are social / gender differences in self-confidence?
2. How much do these differences contribute to inequalities in college applications and admission?
3. Can a "confidence-correcting" intervention reduce the (gender & social) college admission gap?

Method and results:

- We **measure self-confidence** of more than 2,000 French students (using incentivized experiment)
  >> Mis-calibrated beliefs correlate with college applications
  >> Best Female and low-SES students are less confident and apply to less prestigious programs

- We **correct self-confidence** using a randomized intervention
  >> Providing feedback significantly reduces the relevance of mis-calibrated beliefs for college applications
  >> Providing feedback significantly reduces (gender & social) college admission gap for high achieving students

Related literature and contributions

Confidence gender and social background gaps in the lab and in the field:

- Barber and Odean (2001); Niederle and Vesterlund (2007); Bordalo et al. (2019); Möbius et al. (2022); Guyon and Huillery (2020); Bandiera et al. (2021)

Differences in educational/career choices:

- **Gender differences:**
  - Buser et al. (2014); Saygin (2016); Reuben et al. (2017); Landaud et al. (2020); Sterling et al. (2020); Cortés et al. (2022)
- **Social differences:**
  - Dizon-Ross (2019); Guyon and Huillery (2020); Falk et al. (2020); Carlana et al. (forthcoming)

Related literature and contributions

Confidence/feedback in matching mechanisms:

- Pan (2019); Dargnies et al. (2019)
- Bobba and Frisancho (2019)

- **Frictions in college/school admissions:**
  - **Financial constraints:** Dynarski (2008); Angrist, Autor, and Pallais (2022); Barr et al. (2022); Bettinger et al. (2019)
  - **Preferences regarding programs or peers** Wiswall and Zafar (2015, 2018); Patnaik et al. (2021)
  - **Information on chances:** Larroucau et al. (2021); Arteaga et al. (forthcoming)
  - **Other information:** Hastings and Weinstein (2008); Hoxby and Turner (2013, 2015); Hastings et al. (2016)
  - **Uncertainty**: Dynarski et al. (2021)

Roadmap

1. Institutional background

3. Data

4. Under- and over-confidence

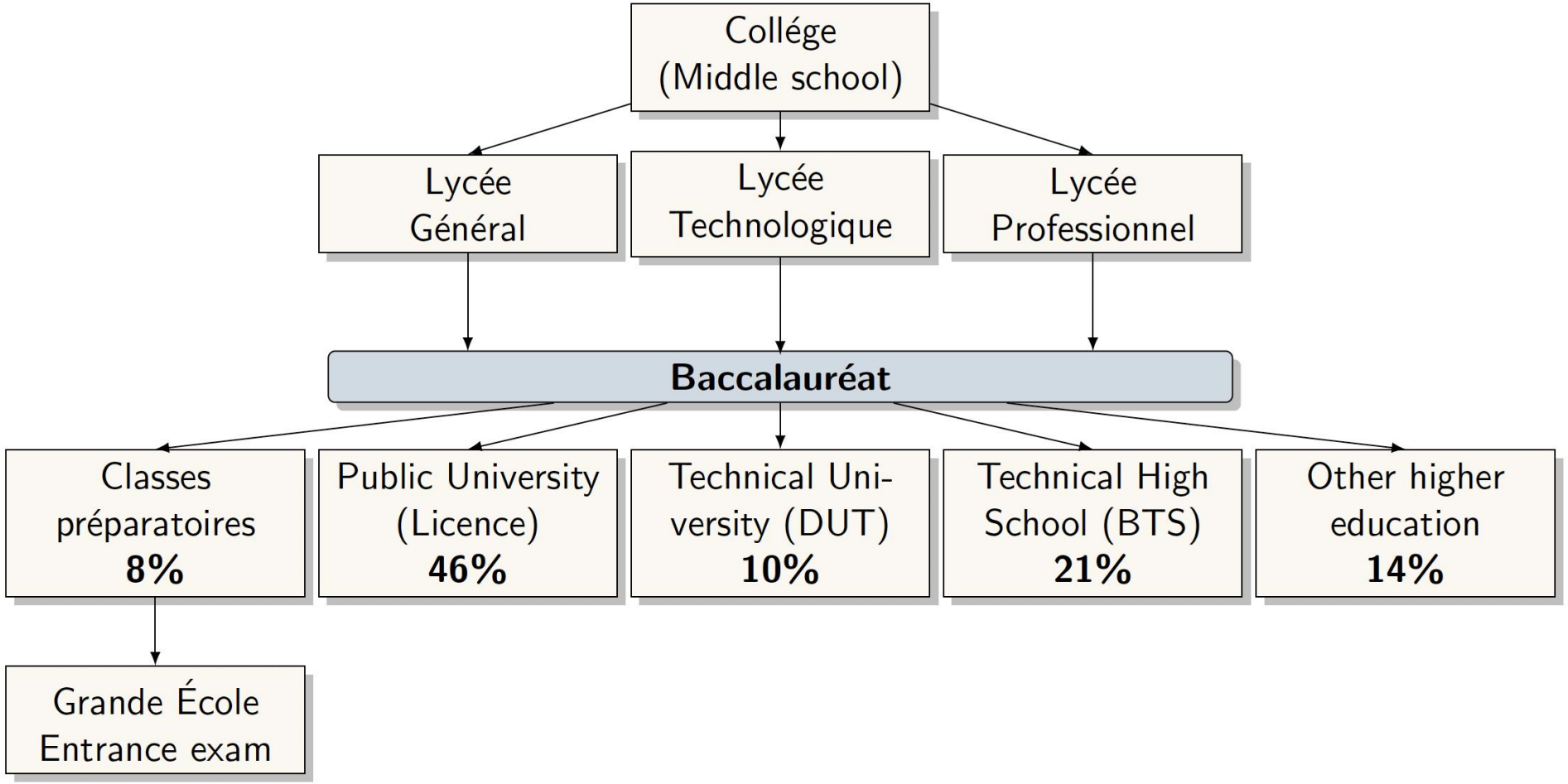
    Who is affected?

    Why does it matter?

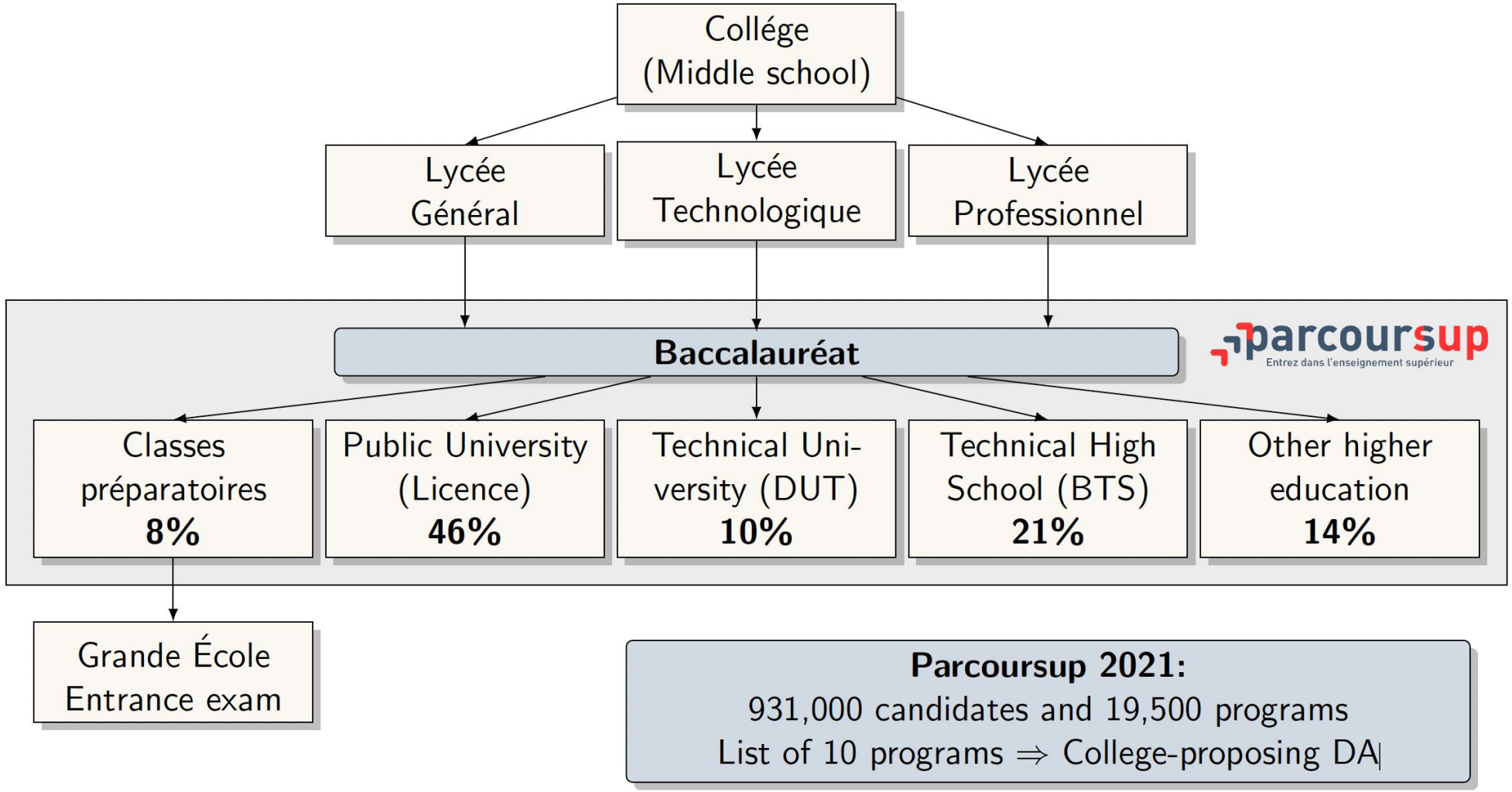
5. Can we correct under- and over-confidence?

Institutional Background

French education system



French education system



Student information and university criteria

- Student information on March 11
  - Final school exam is in June
  - Final literature exam is in June previous year
  - First trimester GPA with within-class rank

- College admission criteria
  - Programs are free to decide the admission criteria
  - No transparency but evidence that GPA is the major criterion (Cour des Comptes, 2020)
  - Last known ”performance” is GPA of the third trimester

Data

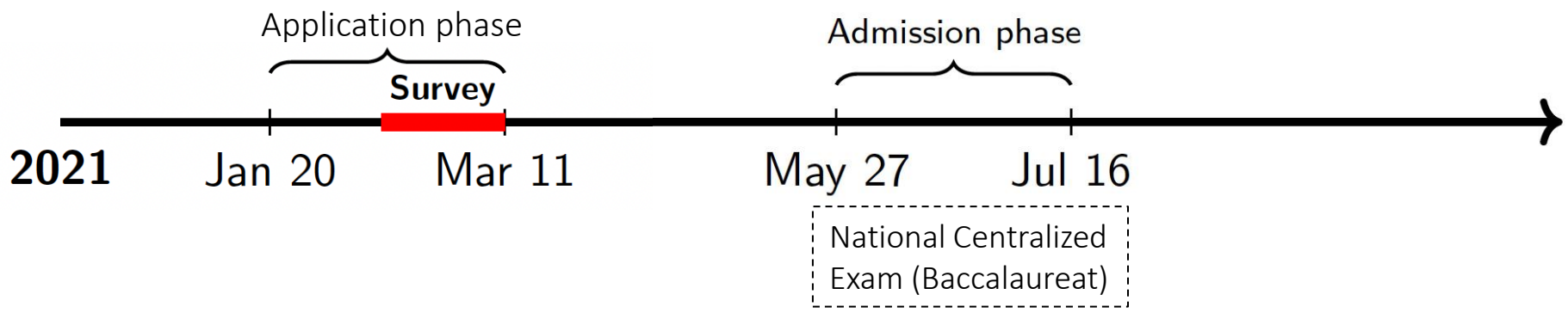
Data

Online survey

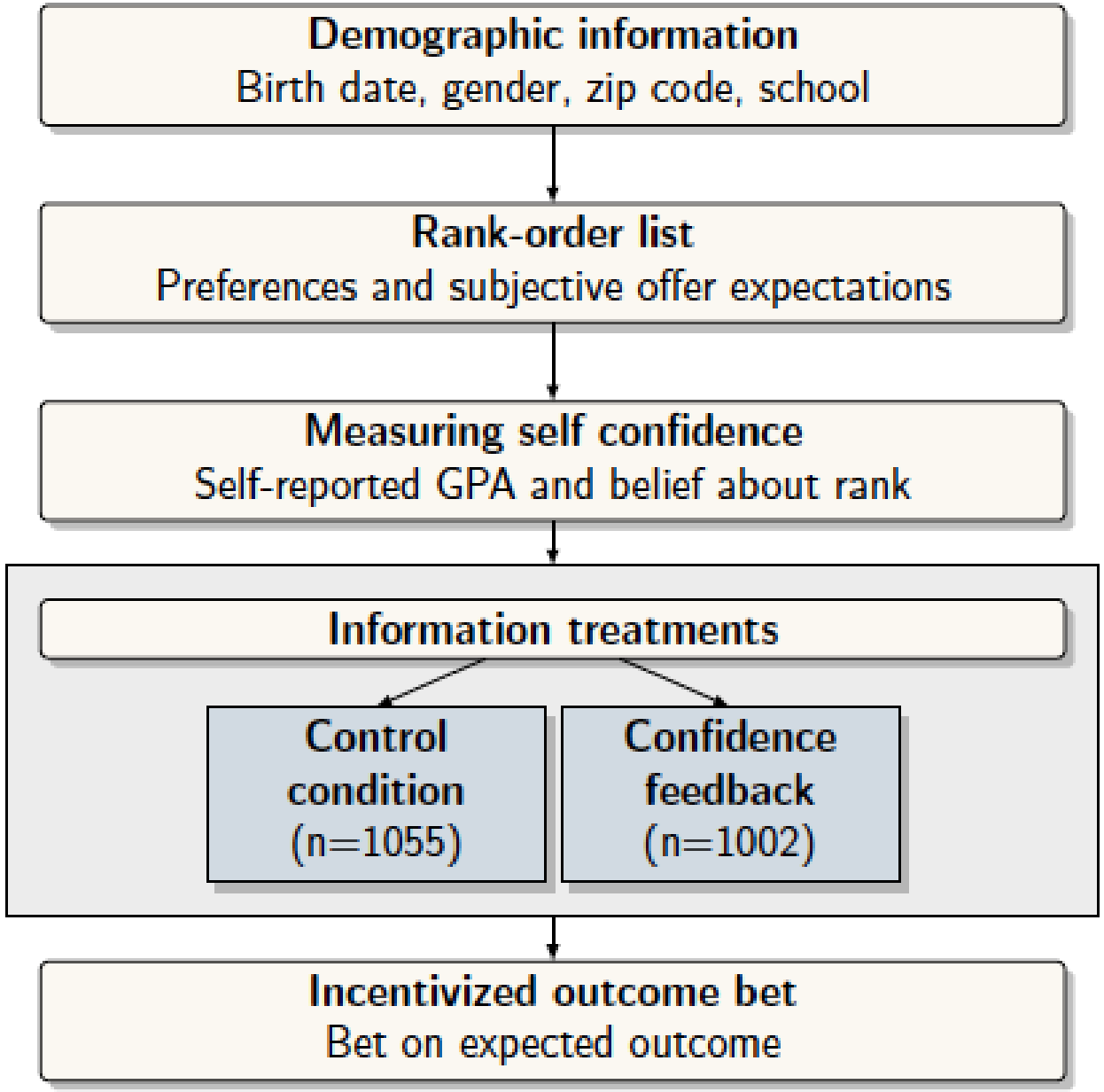
- 2,057 Parcoursup 2021 participants who finished Bac Generale (students in final high school year)
- Recruited via ads on Instagram, Snapchat, and Facebook
- Incentivized with Amazon.fr giftcards (for participation and incentivized questions)
- **Assessment of self-confidence**
- **Pre-registered "confidence-correcting" treatment**

Administrative data

- Information on applications and final college admission



Survey flow


Demographic information
Birth date, gender, zip code, school
Rank-order list
Preferences and subjective offer expectations
Measuring self confidence
Self-reported GPA and belief about rank
Information treatments
Control condition (n=1055)
Confidence feedback (n=1002)
Incentivized outcome bet
Bet on expected outcome

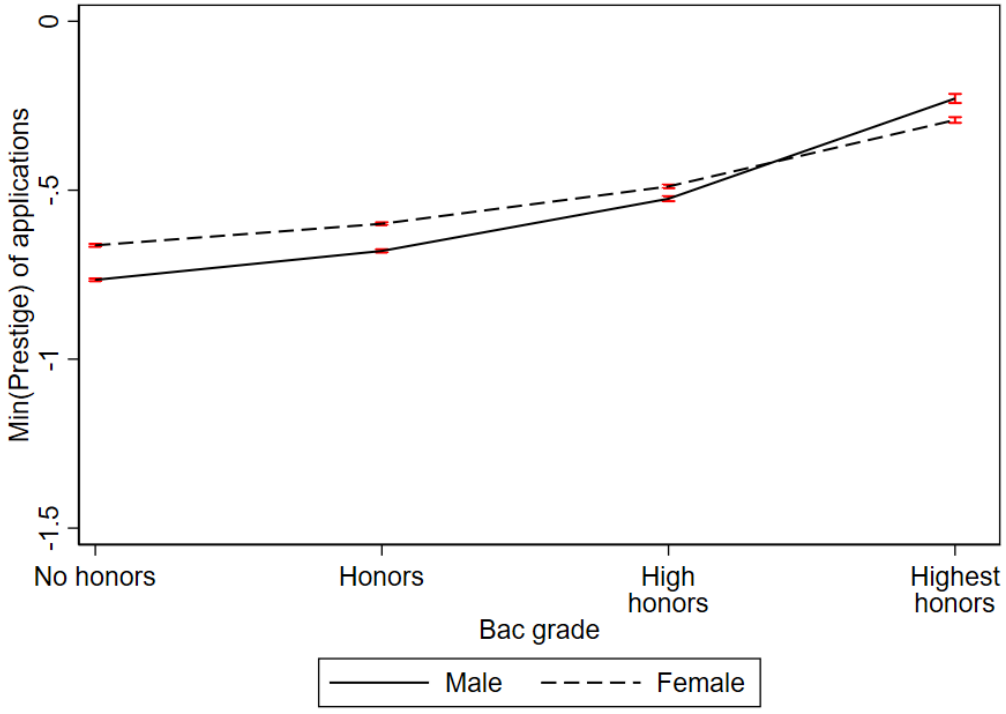
Representativeness of the survey sample

		Main survey			
	Admin data	Total	Control	Feedback	Difference (p-value)
Female	0.558	0.618	0.625	0.612	(0.717)
Age	17.539	17.525	17.518	17.532	(0.750)
Low SES	0.259	0.307	0.309	0.305	(0.873)
Risk preference		7.634	7.658	7.609	(0.603)
GPA		13.707	13.714	13.700	(0.882)
Honors (Bac)					
No honors	0.258	0.234	0.235	0.233	(0.873)
Honors	0.336	0.340	0.326	0.355	(0.184)
High honors	0.263	0.270	0.269	0.272	(0.831)
Highest honors	0.144	0.156	0.170	0.141	(0.071)
Region (*Académie*)					
Ile-de-France	0.195	0.209	0.197	0.222	(0.171)
Share disadvantaged	0.378	0.378	0.377	0.378	(0.762)
Survey pre-treatment					
Number of programs		4.969	4.960	4.959	(0.996)
Avg. offer probability		0.602	0.599	0.605	(0.530)
Number of observations	420,745	2,057	1,055	1,002	

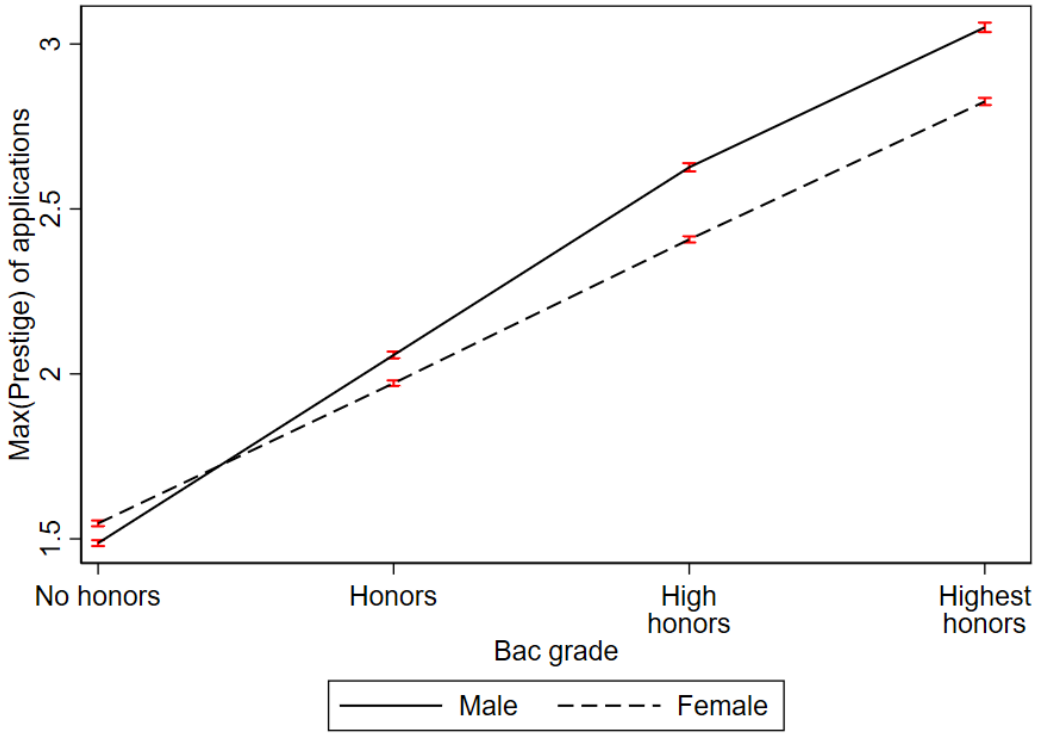
First signs of aspirations gender gap

Figure: Prestige of application by high-school grade

Minimum prestige of applications (safe choice)



Maximum prestige of applications (elite choice)



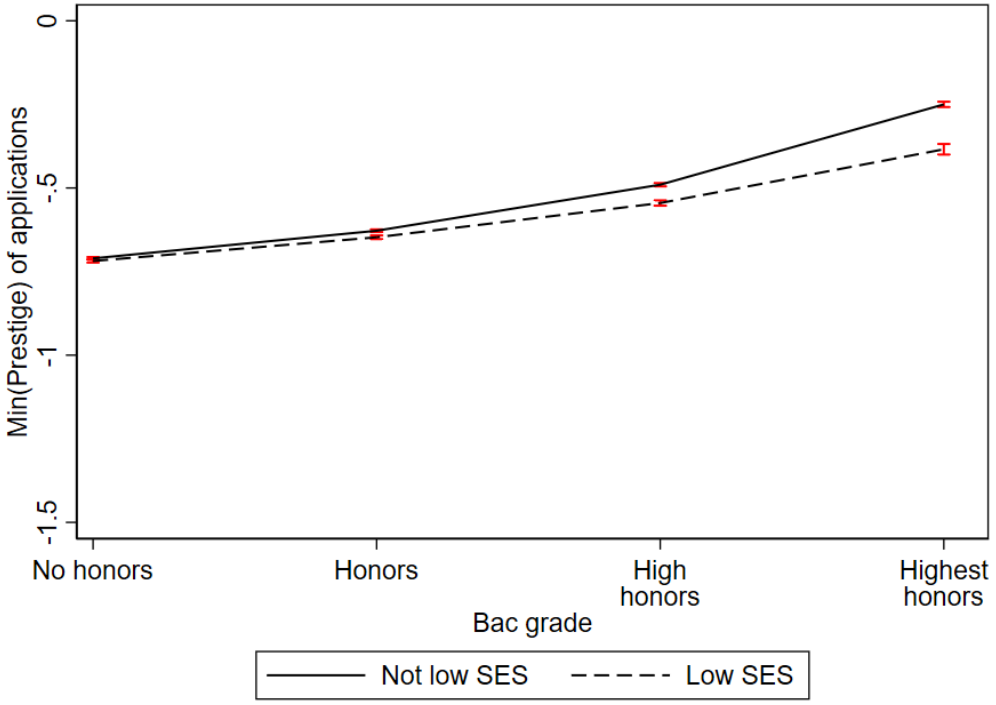
>> High-achieving females include safer choices

>> They have less ambitious application lists.

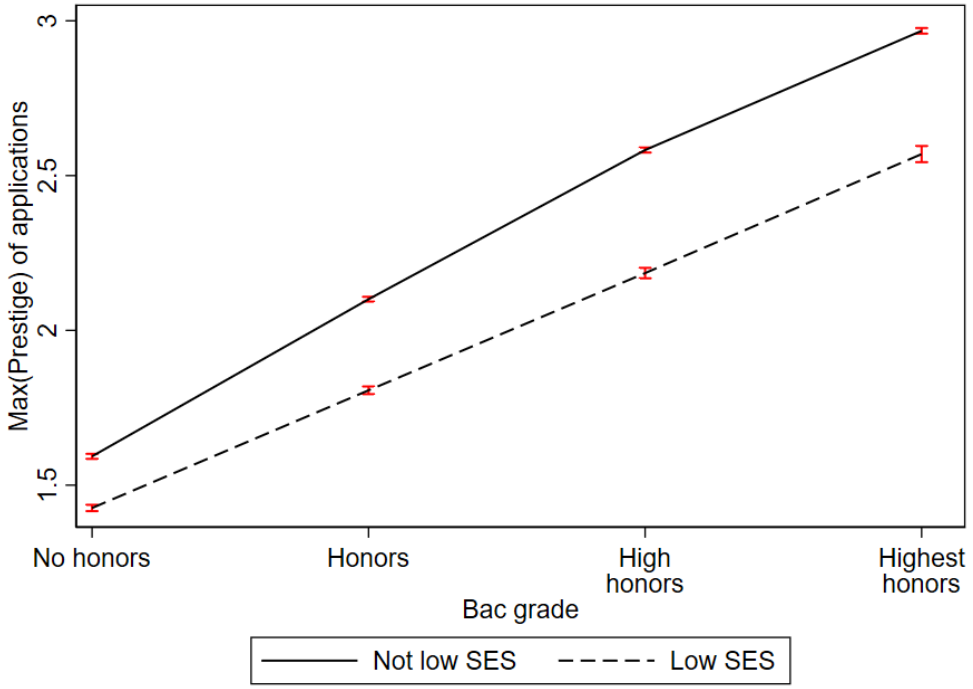
First signs of aspirations social gap

Figure: Prestige of application by high-school grade

Minimum prestige of applications (safe choice)



Maximum prestige of applications (elite choice)



>> High-achieving low-SES stud include safer choices

>> They have less ambitious application lists.

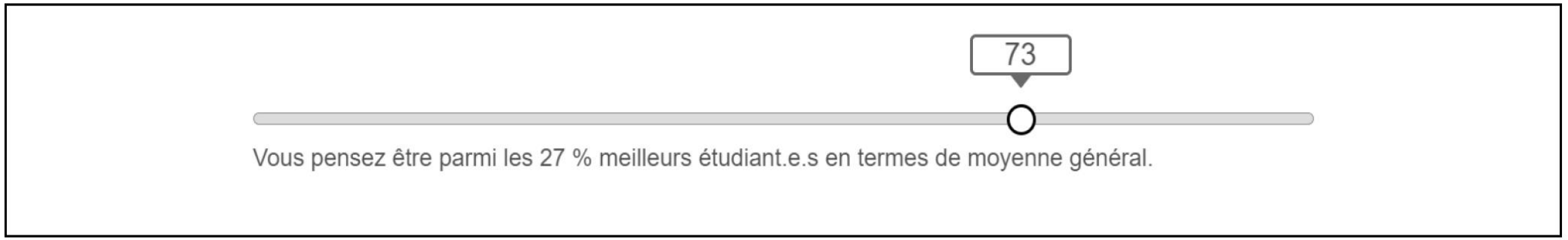
Measuring self-confidence

Measuring over- and under-confidence

- We ask students to guess their **GPA rank** relative to a **reference sample of students in the Bac general**.

"What was your GPA in the first term?" _____

"Out of 100 students, how many do you think have a lower GPA than you?"

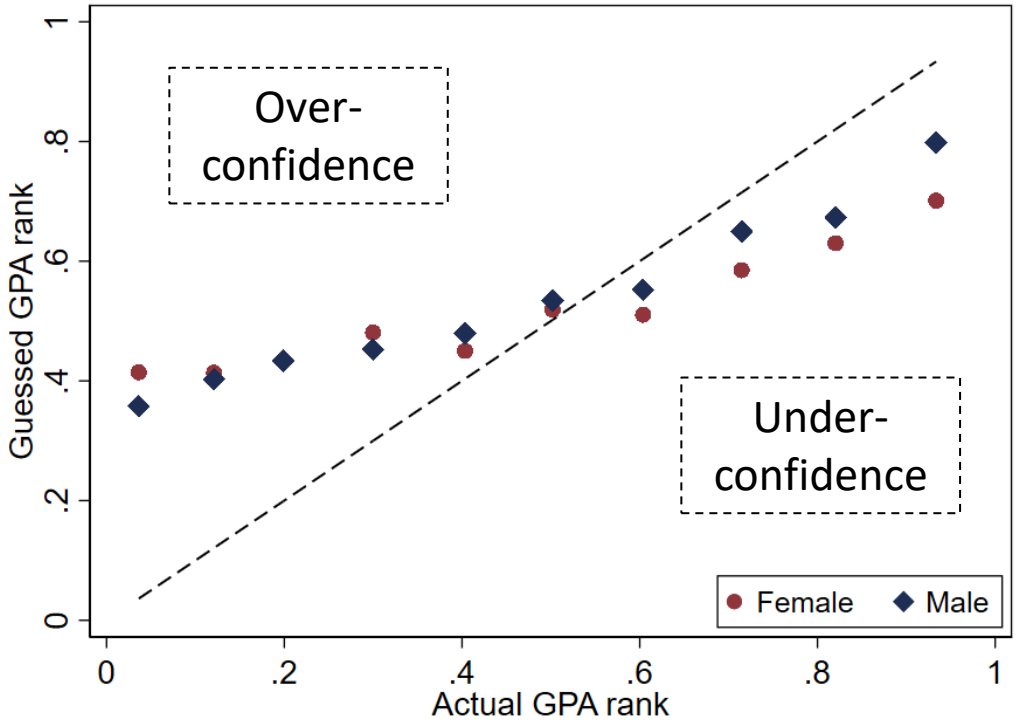


- Belief elicitation is incentivized (within +/- 3 ranks: raffle of ten 100 Euro Amazon.fr giftcards)

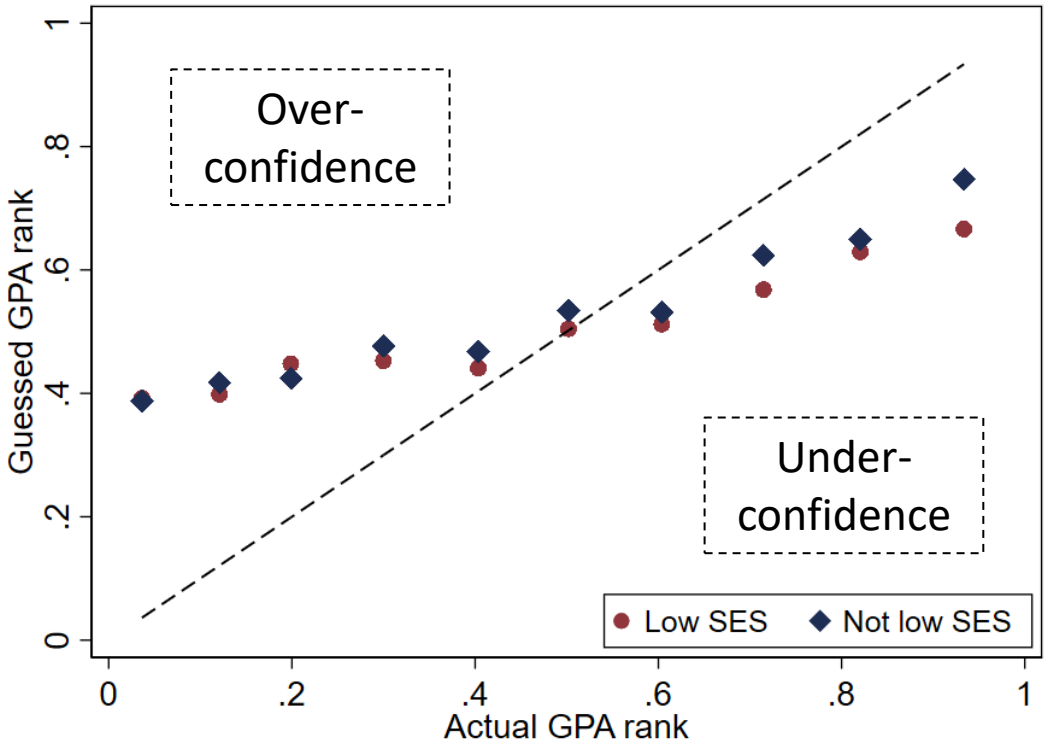
Good female and low-SES students are underconfident

Guessed GPA rank vs. real GPA rank

By gender



By social background

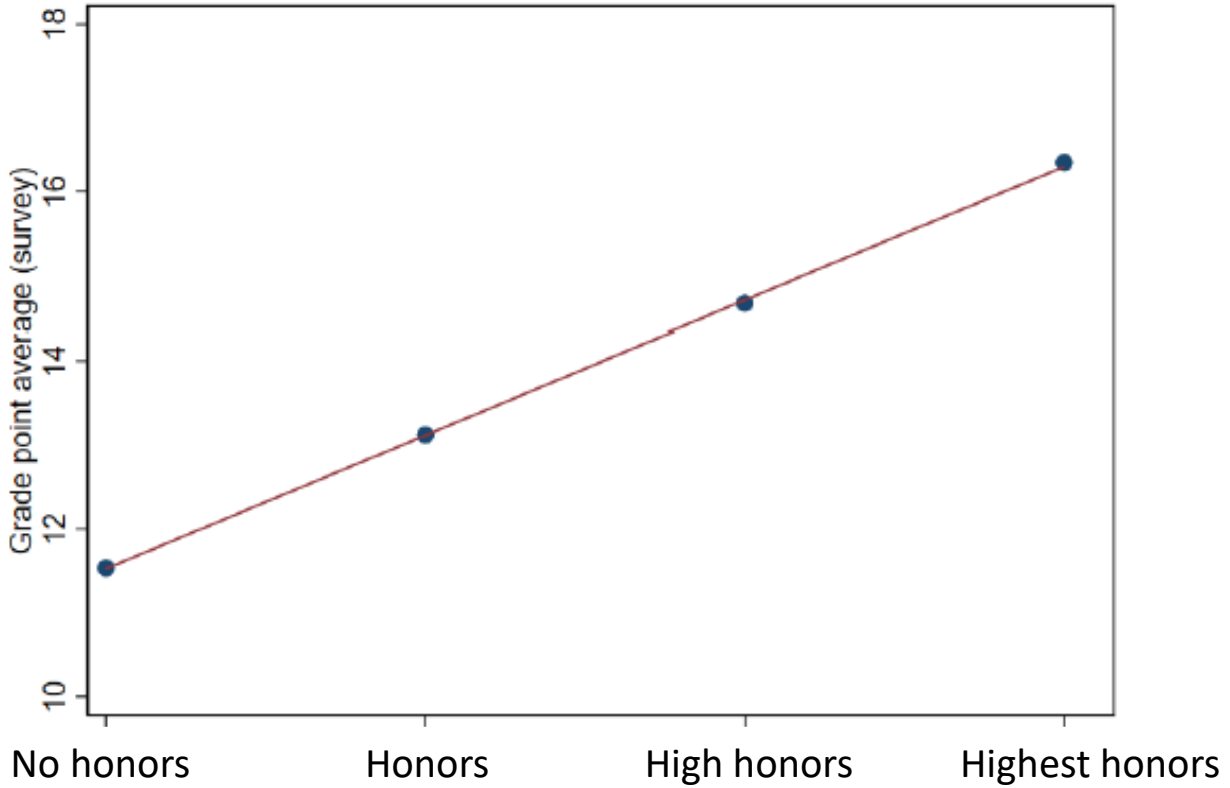


[Controlling for mean reversion] [Regression results]

Good female and low-SES students are underconfident

- In admin data we observe only the category (mention)

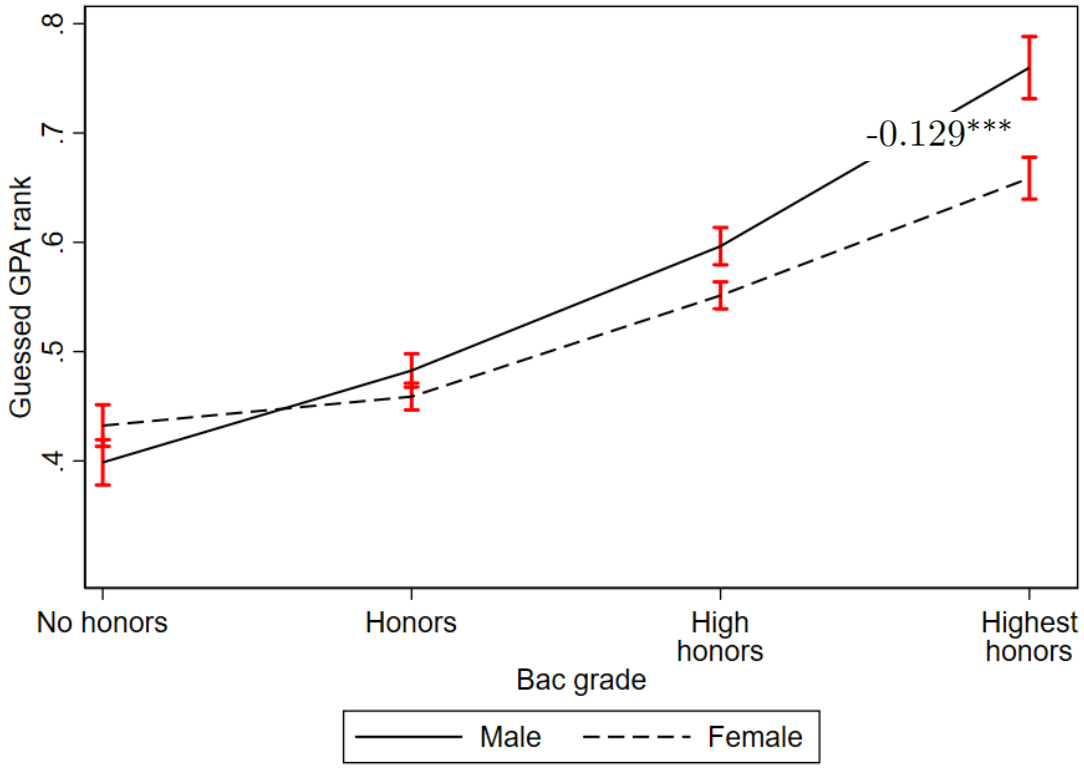
	No honors	Honors	High honors	Highest honors
Grades	10-12	12-14	14-16	16-20
Share	35%	30%	22%	13%



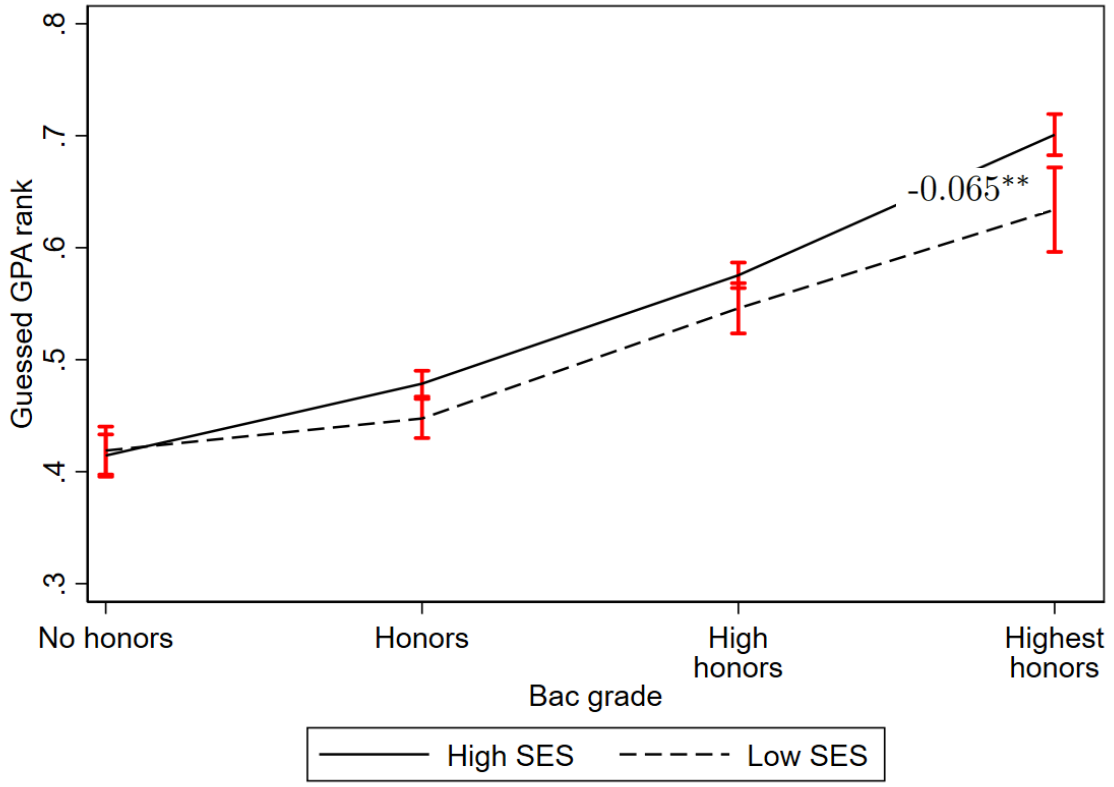
Top female and top low-SES students are underconfident

Guessed GPA rank by honor

By gender



By social background



Estimation of confidence by gender and grades

	Misconfidence		Only underconfidence		Only overconfidence	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: By gender						
Female	-0.020***	0.037**	0.021***	0.001	0.001	0.038**
	(0.007)	(0.016)	(0.004)	(0.003)	(0.005)	(0.016)
Honors	-0.010	0.021	-0.024***	-0.028***	-0.035***	-0.007
	(0.011)	(0.015)	(0.004)	(0.005)	(0.010)	(0.014)
High honors	0.008	0.052***	-0.033***	-0.049***	-0.025**	0.003
	(0.013)	(0.017)	(0.007)	(0.009)	(0.011)	(0.014)
Highest honors	0.058***	0.143***	-0.011	-0.063***	0.047***	0.080***
	(0.019)	(0.025)	(0.014)	(0.018)	(0.013)	(0.016)
Female × Honors		-0.055***		0.007		-0.049***
		(0.020)		(0.006)		(0.019)
Female × High honors		-0.073***		0.026**		-0.048***
		(0.020)		(0.011)		(0.017)
Female × Highest honors		-0.129***		0.076***		-0.053***
		(0.026)		(0.019)		(0.017)
True rank	-0.699***	-0.702***	0.252***	0.254***	-0.447***	-0.448***
	(0.022)	(0.022)	(0.015)	(0.015)	(0.017)	(0.017)
Constant	0.384***	0.353***	-0.042***	-0.032***	0.342***	0.321***
	(0.010)	(0.013)	(0.003)	(0.003)	(0.009)	(0.012)
Adj. R2	0.593	0.598	0.352	0.360	0.514	0.517
Observations	2034	2034	2034	2034	2034	2034

Estimation of confidence by SES and grades

	Misconfidence		Only underconfidence		Only overconfidence	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel B: By socioeconomic status						
Low SES	-0.020**	0.007	0.017***	0.001	-0.003	0.009
	(0.008)	(0.017)	(0.005)	(0.003)	(0.006)	(0.016)
Honors	-0.012	0.002	-0.020***	-0.027***	-0.033***	-0.026**
	(0.011)	(0.013)	(0.004)	(0.004)	(0.010)	(0.013)
High honors	0.004	0.019	-0.026***	-0.035***	-0.022**	-0.016
	(0.013)	(0.015)	(0.007)	(0.008)	(0.011)	(0.013)
Highest honors	0.051***	0.071***	-0.001	-0.015	0.050***	0.056***
	(0.019)	(0.020)	(0.014)	(0.014)	(0.013)	(0.015)
Low SES × Honors		-0.031		0.014**		-0.017
		(0.021)		(0.006)		(0.020)
Low SES × High honors		-0.036		0.020		-0.016
		(0.022)		(0.012)		(0.018)
Low SES × Highest honors		-0.065**		0.049**		-0.016
		(0.029)		(0.023)		(0.017)
True rank	-0.698***	-0.699***	0.249***	0.250***	-0.449***	-0.450***
	(0.022)	(0.022)	(0.015)	(0.015)	(0.017)	(0.017)
Constant	0.381***	0.369***	-0.038***	-0.031***	0.343***	0.338***
	(0.010)	(0.012)	(0.003)	(0.003)	(0.010)	(0.012)
Adj. R2	0.592	0.593	0.348	0.350	0.514	0.513
Observations	2000	2000	2000	2000	2000	2000

Why do differences in self-confidence matter?

…

Self-confidence predicts college applications

Outcomes

Prestige is defined as the (z-standardized) average bac grade level of the enrolled students

- **Application list:**
  1. Maximum prestige
  2. Minimum prestige
  3. Mean prestige
  4. Dummy for application to at least one elite school (CPGE)
- **Match:**
  5. Prestige of the final match
  6. Dummy for match to an elite school (CPGE)

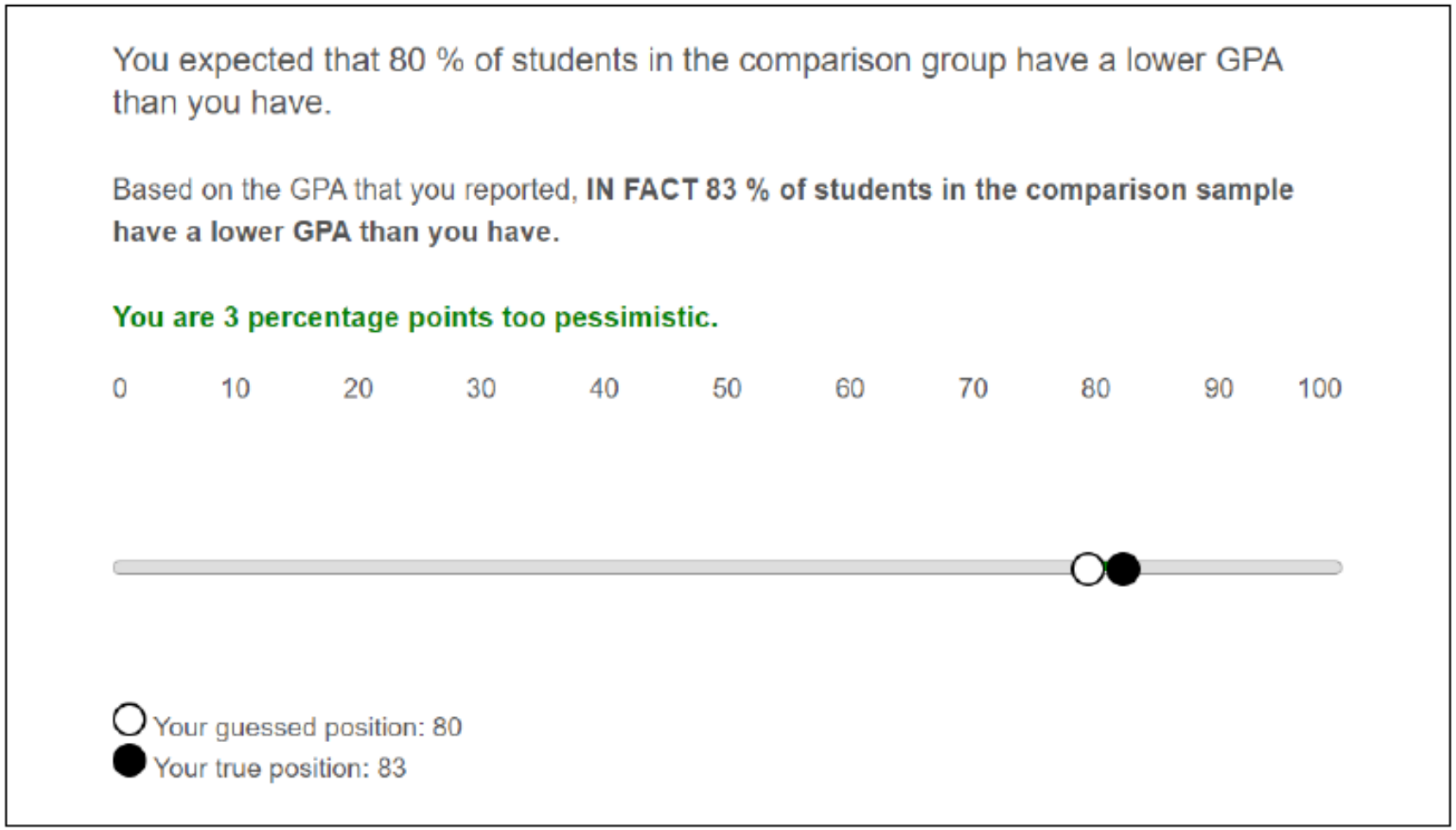
Misconfidence predicts applications and matches

	Application list				Final match	
	(1) Max Prestige	(2) Min Prestige	(3) Mean Prestige	(4) One CPGE	(5) Prestige	(6) CPGE
Panel A: Effect of misconfidence						
Misconfidence	0.712***	0.111	0.479***	0.326***	0.432**	0.159***
	(0.203)	(0.093)	(0.139)	(0.076)	(0.186)	(0.055)
True rank	1.798***	0.308**	1.363***	0.627***	1.934***	0.260***
	(0.268)	(0.123)	(0.188)	(0.098)	(0.237)	(0.073)
Panel B: Effect of underconfidence						
Underconfidence	-0.534*	-0.258	-0.522**	-0.531***	-0.477	-0.275***
	(0.306)	(0.175)	(0.265)	(0.145)	(0.345)	(0.098)
True rank	1.441***	0.297***	1.165***	0.536***	1.763***	0.224***
	(0.244)	(0.111)	(0.173)	(0.089)	(0.216)	(0.062)
Panel C: Effect of overconfidence						
Overconfidence	0.929***	0.021	0.508***	0.220***	0.465**	0.089*
	(0.286)	(0.109)	(0.161)	(0.080)	(0.207)	(0.049)
True rank	1.711***	0.240**	1.254***	0.497***	1.832***	0.188***
	(0.260)	(0.114)	(0.177)	(0.091)	(0.216)	(0.065)
Bac Grade FE	✓	✓	✓	✓	✓	✓
Observations	1047	1047	1047	1047	914	914

Effect of confidence-correcting treatment

Intervention: correcting miscalibrated beliefs

We give students information on their **real position in the GPA distribution** of comparison sample



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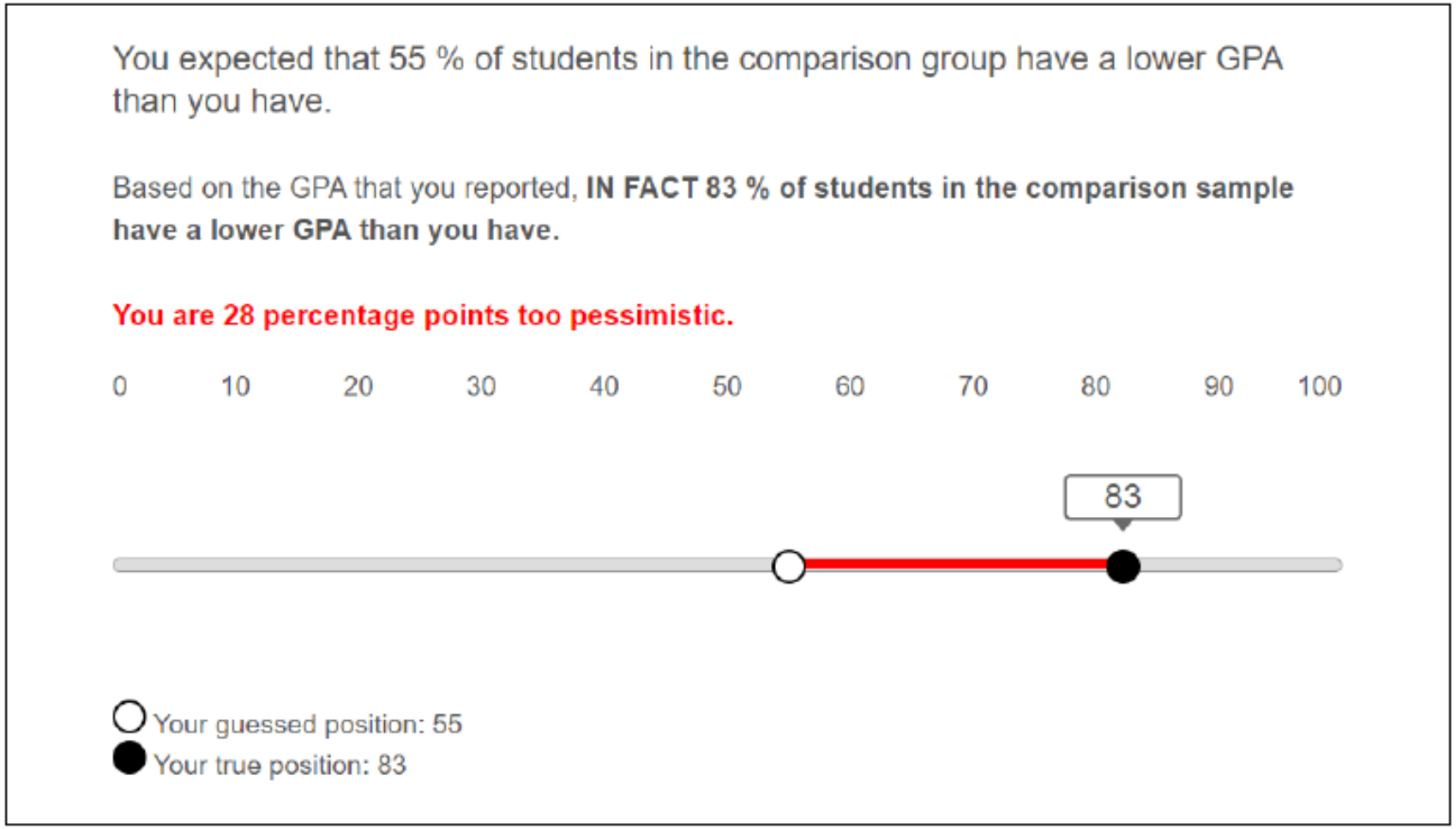


Correcting the confidence gap

	Application list				Final match	
	(1) Max Prestige	(2) Min Prestige	(3) Mean Prestige	(4) One CPGE	(5) Prestige	(6) CPGE
Misconfidence	0.634***	0.101	0.437***	0.274***	0.429***	0.149***
	(0.169)	(0.080)	(0.118)	(0.064)	(0.159)	(0.046)
Rank feedback	0.050	0.007	0.036	-0.010	0.002	0.025
	(0.044)	(0.024)	(0.034)	(0.019)	(0.045)	(0.015)
Rank feedback × Misconfidence	-0.505***	-0.024	-0.268**	-0.107	-0.105	-0.107**
	(0.180)	(0.085)	(0.127)	(0.069)	(0.175)	(0.054)
True rank	1.604***	0.268***	1.269***	0.520***	1.682***	0.220***
	(0.180)	(0.087)	(0.131)	(0.070)	(0.167)	(0.052)
Constant	1.390***	-0.812***	0.072	-0.057**	-0.547***	-0.066***
	(0.076)	(0.035)	(0.050)	(0.025)	(0.064)	(0.018)
Bac Grade FE	✓	✓	✓	✓	✓	✓
Adj. R2	0.219	0.120	0.330	0.198	0.464	0.102
Observations	2034	2034	2034	2034	1793	1793

Relevance of confidence for the treatment group

	Application list				Final match	
	(1) Max Prestige	(2) Min Prestige	(3) Mean Prestige	(4) One CPGE	(5) Prestige	(6) CPGE
Misconfidence	0.043	0.066	0.124	0.113	0.323	0.029
	(0.196)	(0.096)	(0.139)	(0.073)	(0.198)	(0.066)
True rank	1.414***	0.225*	1.175***	0.415***	1.441***	0.183**
	(0.241)	(0.122)	(0.181)	(0.100)	(0.236)	(0.073)
Constant	1.497***	-0.782***	0.142**	-0.038	-0.523***	-0.029
	(0.102)	(0.050)	(0.069)	(0.036)	(0.088)	(0.027)
Bac Grade FE	✓	✓	✓	✓	✓	✓
Adj. R2	0.244	0.116	0.341	0.198	0.471	0.111
Observations	987	987	987	987	879	879

Effect of correcting under- and over-confidence on highest achieving students highest

Next we concentrate on the highest achieving students

- Have the highest scope for treatment effect
    - the high-achieving low-SES students
    - the high-achieving girls

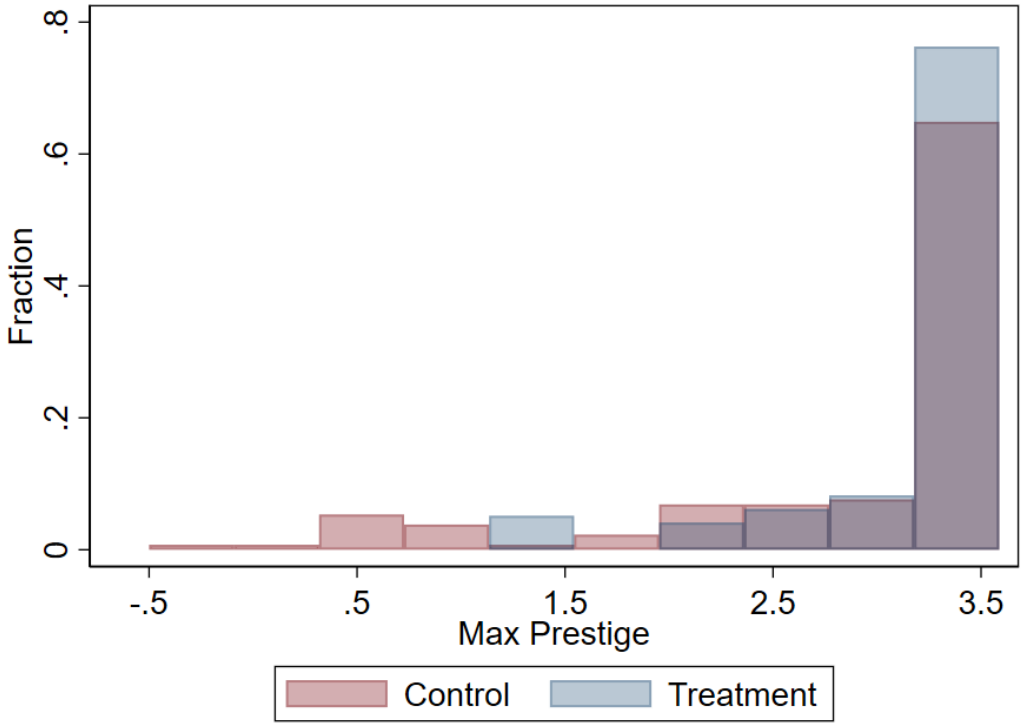
- The mis-calibration in beliefs is the most relevant for ”prestigious” programs

Treatment effect for high-achieving female students

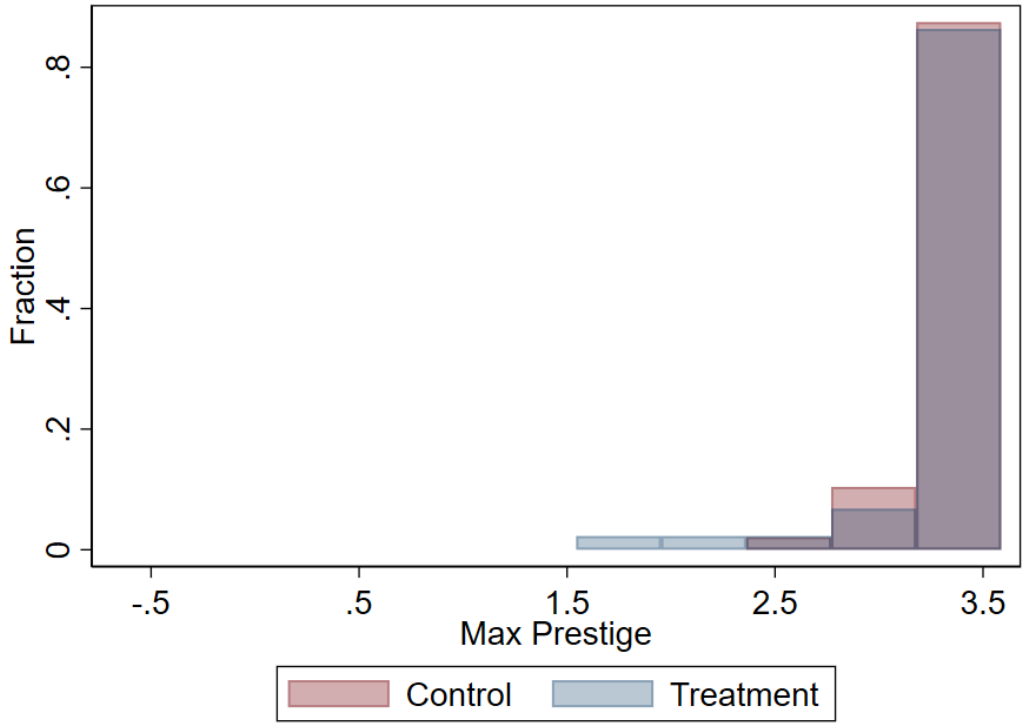
	Application list				Final match	
	(1) Max Prestige	(2) Min Prestige	(3) Mean Prestige	(4) One CPGE	(5) Prestige	(6) CPGE
Panel A: By gender						
Female	-0.505***	-0.100	-0.541***	-0.326***	-0.440***	-0.283***
	(0.087)	(0.125)	(0.122)	(0.065)	(0.168)	(0.080)
Grade feedback	-0.077	-0.041	-0.227	-0.121	-0.145	-0.066
	(0.063)	(0.149)	(0.138)	(0.078)	(0.206)	(0.104)
Grade feedback × Female	0.411***	0.037	0.467***	0.196*	0.374	0.206*
	(0.118)	(0.170)	(0.174)	(0.102)	(0.262)	(0.120)
True rank	1.625***	0.780***	2.145***	0.756***	3.442***	0.351
	(0.501)	(0.273)	(0.451)	(0.240)	(0.905)	(0.219)
Constant	2.026***	-0.796***	0.285	0.206	-0.595	0.136
	(0.447)	(0.228)	(0.417)	(0.223)	(0.819)	(0.206)
Observations	320	320	320	320	298	298

Treatment effect for high-achieving students by gender

Female highest honor students



Male highest honor students



+ Treatment closes 57% of the gender gap in elite track applications

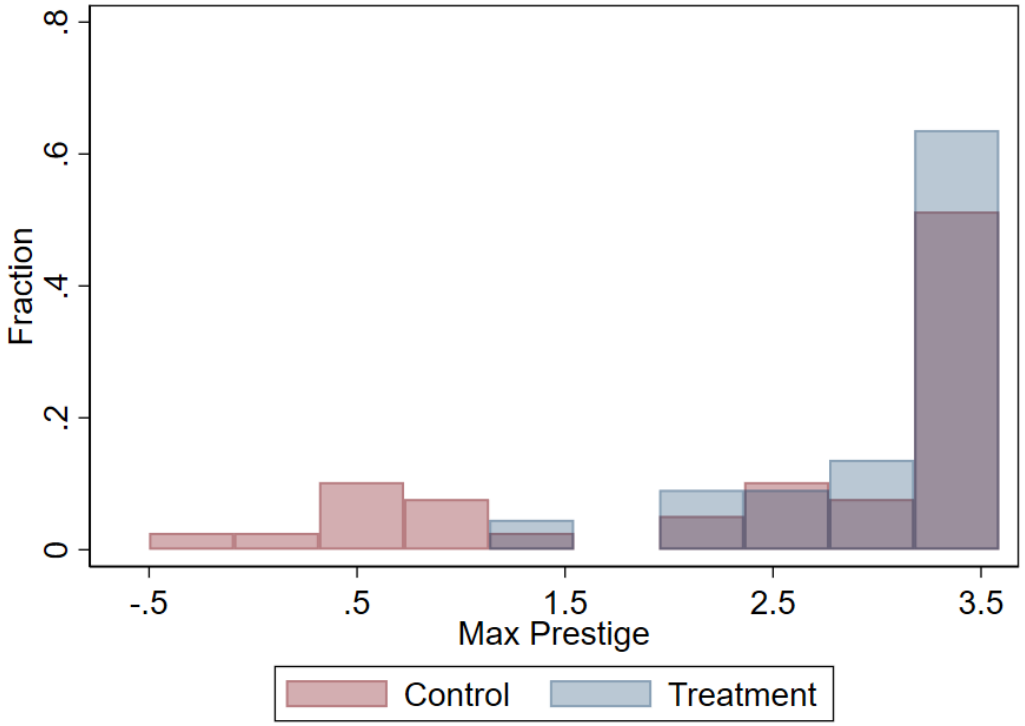
[Further evidence]

Treatment effect for high-achieving low-SES students

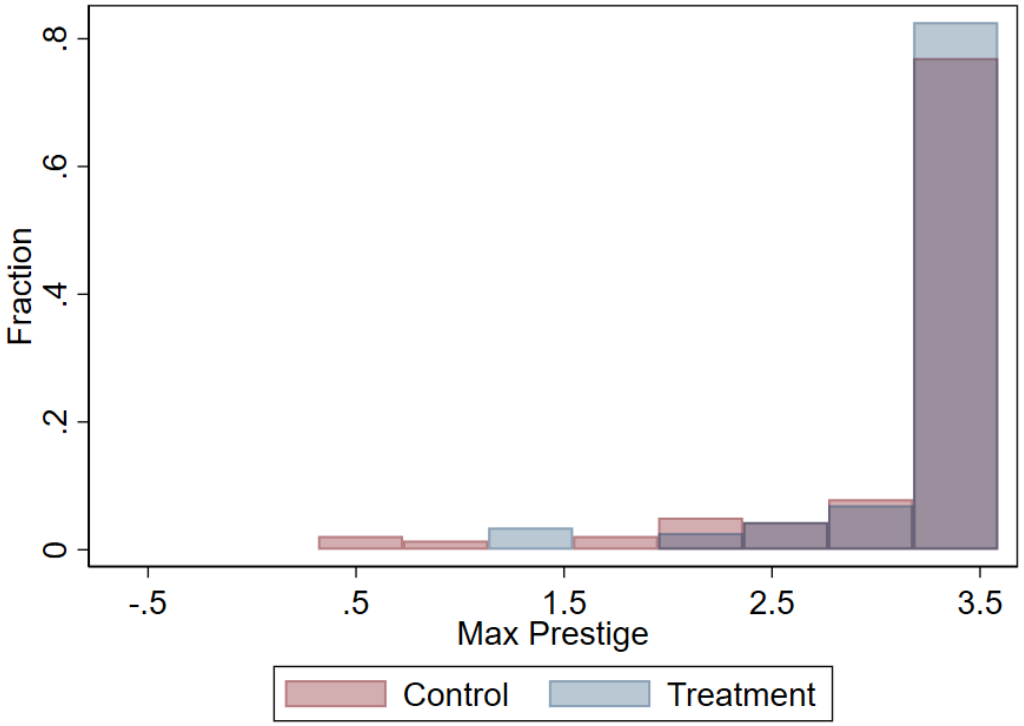
	Application list				Final match	
	(1) Max Prestige	(2) Min Prestige	(3) Mean Prestige	(4) One CPGE	(5) Prestige	(6) CPGE
Panel B: By SES						
Low SES	-0.643***	-0.266**	-0.693***	-0.299***	-0.829***	-0.226***
	(0.187)	(0.114)	(0.154)	(0.088)	(0.228)	(0.056)
Grade feedback	0.126*	-0.032	0.058	-0.043	0.021	0.042
	(0.072)	(0.081)	(0.092)	(0.059)	(0.138)	(0.061)
Grade feedback × Low SES	0.412*	-0.009	0.098	0.335**	0.278	0.214*
	(0.228)	(0.146)	(0.210)	(0.140)	(0.360)	(0.122)
True rank	1.573***	0.721**	2.052***	0.729***	3.329***	0.354
	(0.441)	(0.281)	(0.429)	(0.248)	(0.897)	(0.233)
Constant	1.843***	-0.757***	0.123	0.060	-0.622	-0.017
	(0.393)	(0.235)	(0.381)	(0.223)	(0.798)	(0.208)
Observations	315	315	315	315	294	294

Treatment effect for high-achieving female students

Low-SES highest honor students



High-SES highest honor students



+ Treatment closes the social gap in elite track applications

[Further evidence]

Mechanism: Offer probabilities

- **Offer beliefs**
  - (i) programs in the top 10% of the prestige distribution
  - (ii) elite track programs (CPGE)

- **Optimism**

$$\text{Optimism}_i = \frac{1}{j}\sum_j [\text{Belief on offer chance}_{ij} - \text{I(Offer received)}_{ij}],$$

- **Prestige of bet** from the survey

Mechanism

	(1) Belief (only Top10%)	(2) Belief (only CPGE)	(3) Overoptimism	(4) Prestige of bet
Misconfidence	14.714**	10.481	0.069*	0.594**
	(6.225)	(8.550)	(0.042)	(0.243)
True rank	22.546***	37.227***	0.127**	1.830***
	(8.703)	(10.580)	(0.049)	(0.309)
Honors	-1.153	-5.377	-0.071***	0.003
	(4.403)	(6.906)	(0.019)	(0.100)
High honors	-1.226	-4.206	-0.149***	0.163
	(5.362)	(7.775)	(0.027)	(0.154)
Highest honors	-2.210	-9.253	-0.254***	0.686***
	(6.640)	(9.090)	(0.037)	(0.226)
Constant	36.187***	37.566***	0.272***	-0.106
	(4.307)	(6.807)	(0.020)	(0.105)
Adj. R2	0.017	0.060	0.050	0.267
Observations	691	381	2034	832

Mechanism

	(1) Prestige of bet
Treatment grade feedback	0.073
	(0.057)
Misconfidence	0.577***
	(0.209)
Grade feedback	
× Misconfidence	-0.389*
	(0.222)
True rank	1.819***
	(0.219)
Bac Grade FE	✓
Observations	1567

Discussions

- External validity?
  - In France students know grade in the class, so effects are likely to be larger than in countries **without any feedback on relative standings** (Germany, Denmark, Finland)
  - Similar in countries with **no nationwide examination** score before submissions (Austria, Belgium, Canada, Italy (except some subjects), Mexico, the Netherlands…)
  - Smaller effects for countries **with nationwide examinations** (Hungary, Chile, China, Brazil, Australia)
- Under- vs overconfidence?
  - Depends on the college admission market
- Market level effects?
  - No normative stand on target gender/SES composition, but unambiguous shift towards more stable allocation

Conclusion

Our results:

- Large gender and SES gaps in self-confidence among high-achievers
- Mis-calibrated beliefs affect college applications
- Intervention that corrects self-confidence
  - reduces the relevance of mis-calibrated belief
  - leads to more ambitious applications and admissions among high-achieving low-SES students and girls

Implications

- Support of cheap, scalable and easy-to-implement policy of provision of relative rank
- Centralized admission after publishing of centralized scores

Thank you for your attention!

Your comments are more than welcome.

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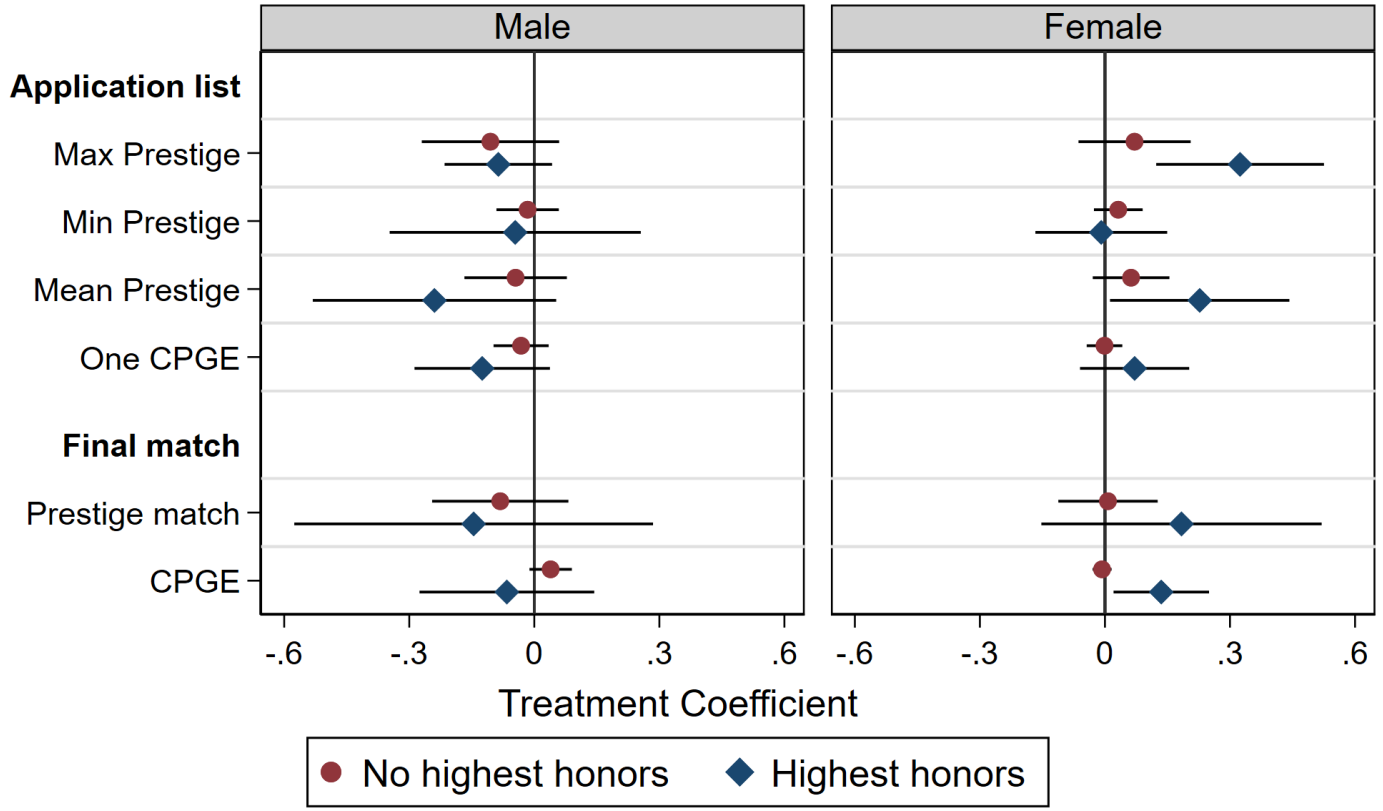
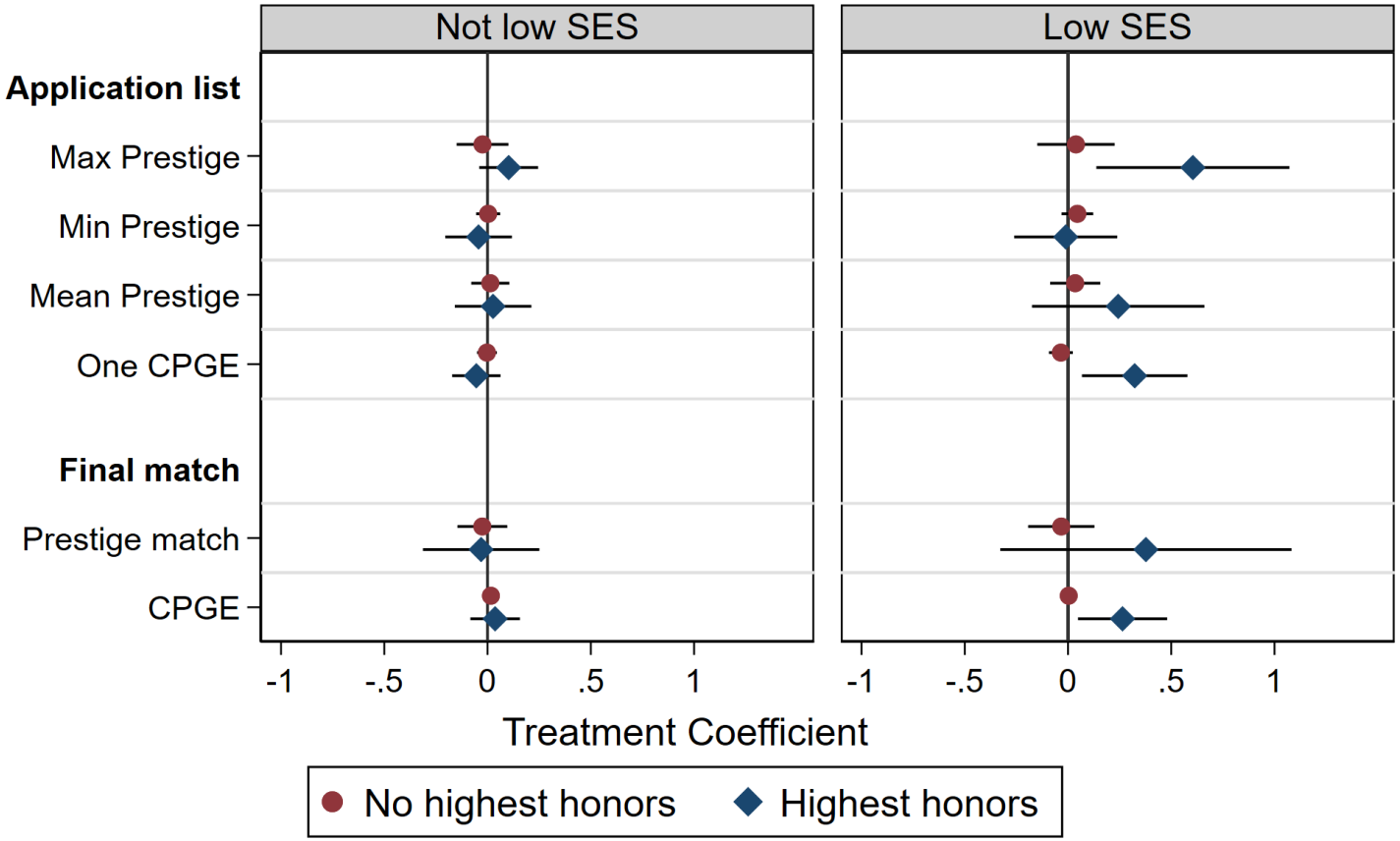
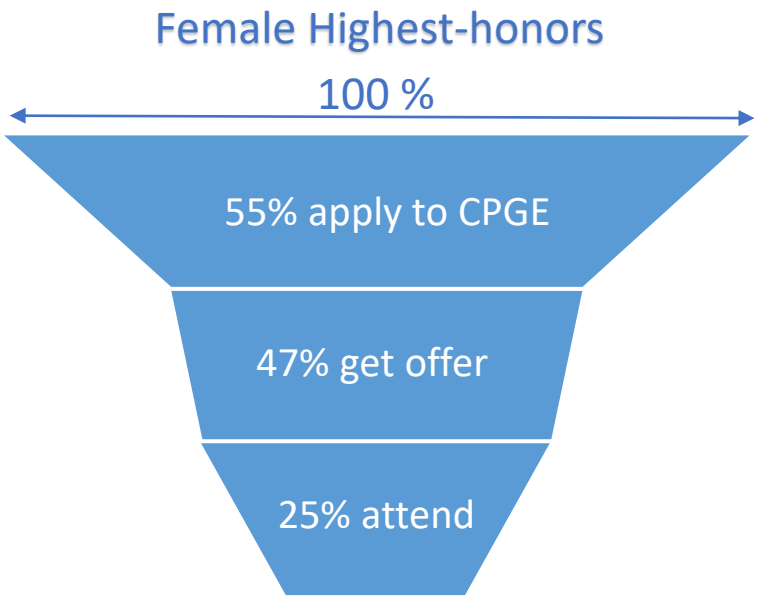
Appendix

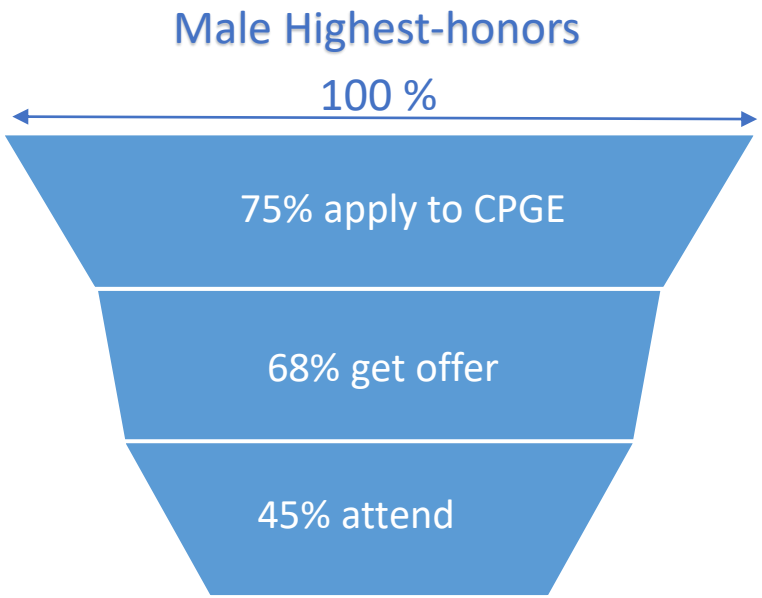
Treatment effect by gender

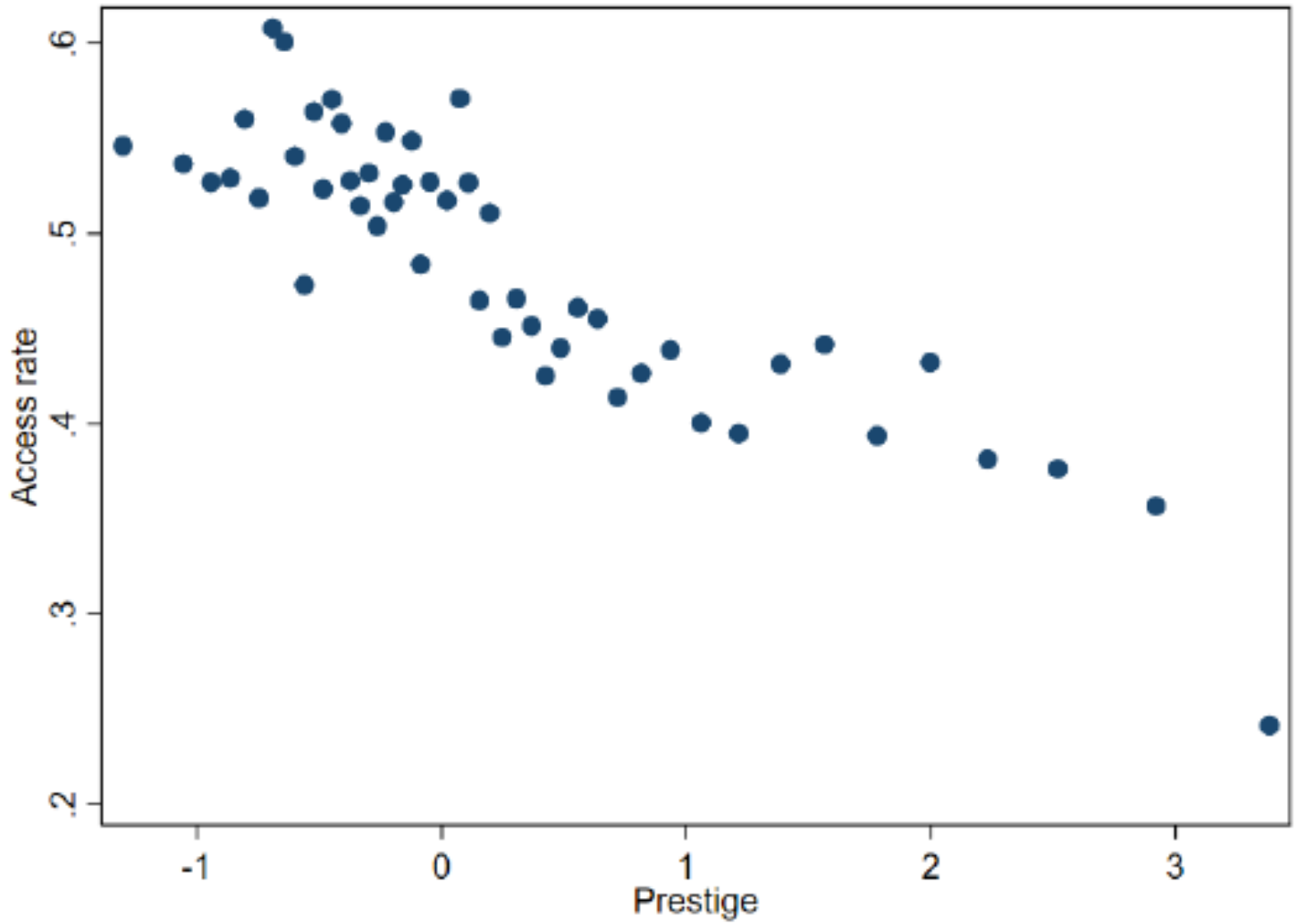


Treatment effect by social background




Female Highest-honors
100 %
55% apply to CPGE
47% get offer
25% attend


Male Highest-honors
100 %
75% apply to CPGE
68% get offer
45% attend



Notes: The figure shows a binned scatterplot of the access rate (number of applications by number of seats) as given on the Parcoursup platform by the prestige measure (z-transformed average Bac grade).