Affirmative Action in a Real Effort Tournament

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Motivation

In tournament-like situations Affirmative Action policies (AA) bias competition rules to reduce the disadvantage of discriminated groups

Intense public debate:

- Fairness properties
- **Economic effects on**
    - **participation**
    - **individual performance**
    - **the selected group of winners**

- AA "substitues" disadvantaged's effort
- Fustrates advantaged group
- The group of "selected" individuals will be worse
- …

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Tournaments

- Most situations in which AA is called for can be described as a tournament:

    - college admissions, job promotion, etc.

- In a competition between asymmetric players individuals perform poorly (Lazear and Rosen (1981) and Myerson (1981))

- AA biases the rules resulting in a more symmetric competition and therefore in a better individual performance (Fu (2006), Franke (2008) and Balart (2009), except Hickman (2009))

- We provide a simple model of a pairwise tournament between asymmetric players where AA improves performance if it is not *too large* (similar to Schotter and Weigelt (1992))

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Empirical evidence?

Surprisingly, there is very little empirical evidence:

- AA and entry decisions: Niederle, Segal and Vesterlund (2009) Krasnokutskaya and Seim (2007) Marion (2007)

- AA in tournaments in the lab: Schotter and Weigelt (1992)

Experimental Design: subject pool

- 400 students aged 10-12 from two private schools in Barcelona

- Schools are similar except for one crucial difference:
  - Experienced: solve *sudokus* in math classes
  - Non-experienced: *do not* solve *sudokus* in math classes

The Task: Solving 4x4 Sudokus

3	4	1	2
2	1	3	4
4	3	2	1
1	2	4	3

- Numbers in a column cannot be repeated

- Numbers in a row cannot be repeated

- Numbers in a square cannot be repeated

- All four numbers in each column, each row and each square

The Task: Solving 4x4 Sudokus

3	**4**	**1**	**2**
2	**1**	**3**	**4**
4	**3**	**2**	**1**
1	**2**	**4**	**3**

- Easy to explain but requires logical reasoning

- Generated randomly with same level of difficulty

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Conducting the Experiment

- Students conducted to separate rooms according to pre-specified group structure

- Students got written and oral instructions which included:

  - Explanation of sudokus rules

  - Trials

  - Prize: 7 Euro voucher

  - Biased tournament rule with numerical examples

  - Information on Max, Min and Average correct sudokus

- 30 minute competition against pair from other school

- Post-Experiment questionnaire: Experience with sudokus

    Prediction of winner

    Appropriateness of AA

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Treatments

Benchmark Treatment: Unbiased tournament rule

Info (K): student was informed about the opponent's experience in solving sudokus

No Info (NK): student was *not* informed about opponent's experience in solving sudokus

Lump-sum Bonus:

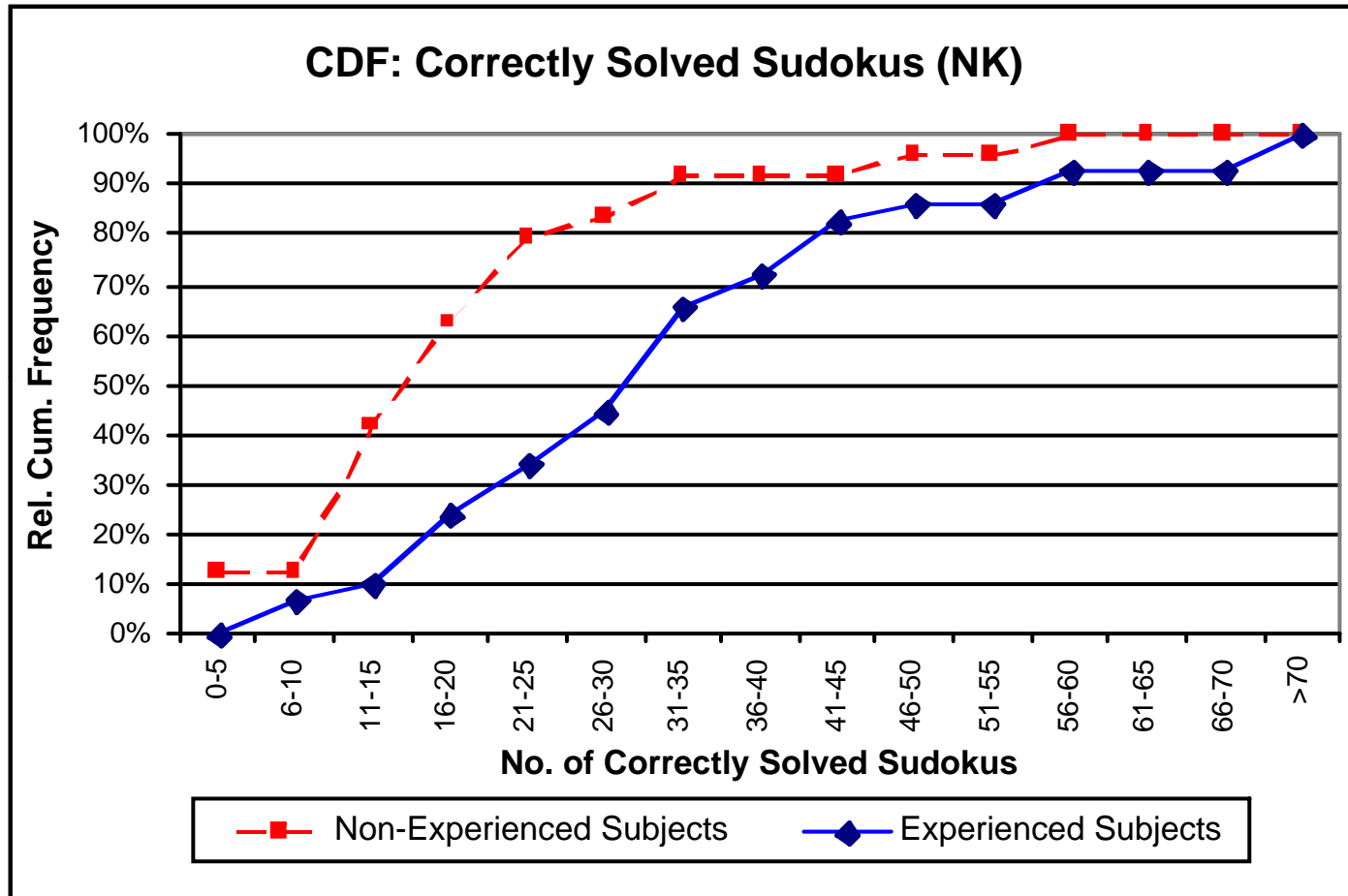**Low (LL):** Non-experienced gets bonus of **8** sudokus

High (LH): Non-experienced gets bonus of **20** sudokus
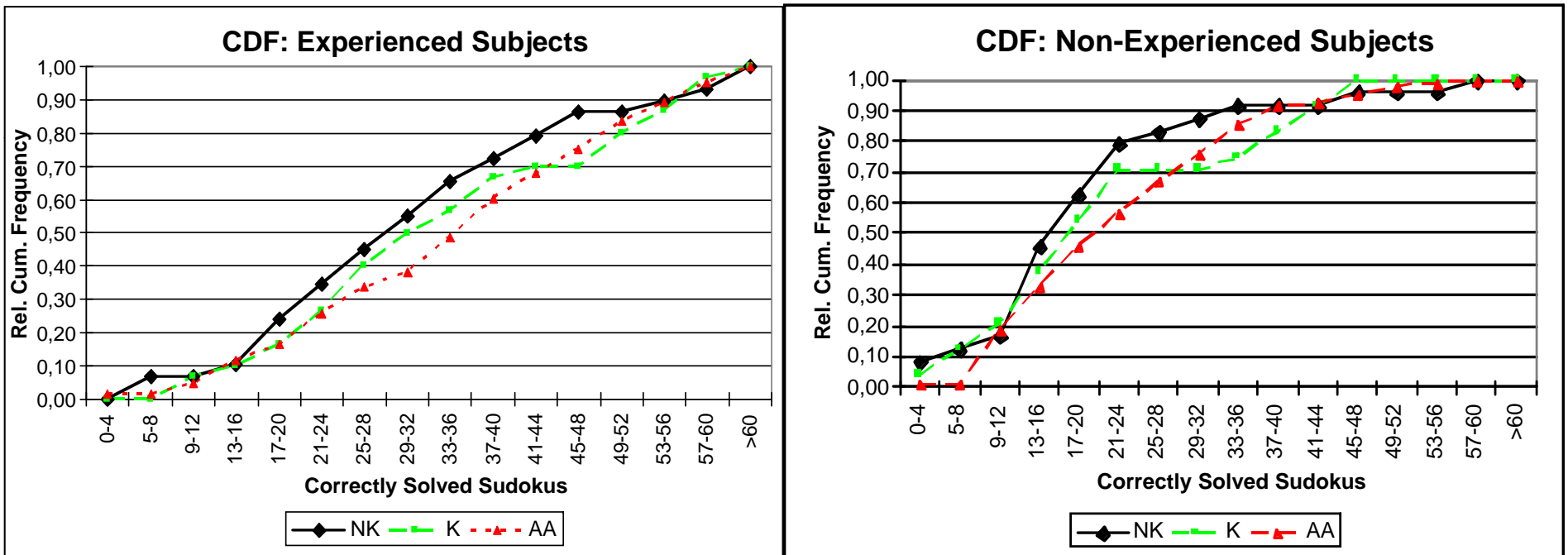
Proportional Bonus:

Low (PL): Non-experienced gets **1** for every **2** correct

High (PH): Non-experienced gets **1** for every **1** correct

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Results: Experience matters

CDF: Correctly Solved Sudokus (NK)

Results: Information and AA

Results

1) Ex-ante information about experience does not significantly affect subjects' behavior

2) AA does not worsen neither advantaged nor disadvantaged individuals' performance.

3) Once we control for explanatory variables such as ability we find that performance improves more

- the lower the ability of the advantaged (10%)

- the higher the ability of the disadvantaged (5%)

Winners

Who do we want to select?

Performance= Ability+Experience+Effort

- Those with highest ability

      - if ability is distributed equally among the two groups, selecting a representative proportion of each group would be the goal.

Percentage of Non-Experienced Winners			
	4th Year	6th Year	Overall
NK	**25**	**23.81**	**24.42**
K	**21.27**	**27.27**	**23.94**
AA	**58.29**	**45.81**	**51.81**
LH	83.42	57.14	72.32
LL	49.51	10.49	31.84
PH	61.43	55.03	58.40
PL	40.27	53.68	45.96

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Winners

-Those who perform better:

- with AA we select more non-experienced but we induce more effort

Average Correct Sudokus by Winners in Each Treatment			
	4th Year	6th Year	Overall
NK	**30** (13.541)	**42.04** (15.52)	**35.81** (15.71)
K	**31.83** (11.62)	**46.91** (13.03)	**37.75** (14.23)
AA	**29.70** (13.35)	**43.36** (12.53)	**36.53** (14.63)
LH	28.20 (11.98)	42.91 (12.58)	36.22 (14.31)
LL	29.75 (12.79)	51.09 (11.12)	38.54 (16.04)
PH	27.94 (11.00)	41.30 (12.80)	33.90 (13.56)
PL	32.56 (16.27)	41.08 (11.51)	37.36 (14.41)

Conclusion

- Affirmative Action policies do not discourage Experienced or Non-Experienced individuals.

- Affirmative Action policies encourage more Experienced with lower ability and Non-experienced with higher ability

- While AA managed to equal the playing field, it did not do so at the expense of a large loss in performance by the tournament winners

OLS

Table 4: Correct Sudokus, Information and Affirmative Action				
	Experienced		Non-Experienced	
	OLS (1) Dep. Var: # Correct Sudokus	OLS (2) Dep. Var: # Correct Sudokus	OLS (3) Dep. Var: # Correct Sudokus	OLS (4) Dep. Var: # Correct Sudokus
Constant	-12.96 (4.43)***	-13.12 (4.42)***	5.16 (3.29)	5.22 (3.34)
NK	2.73 (2.49)	2.75 (2.49)	0.40 (2.15)	0.40 (2.19)
AA	**8.31 (4.80)***	**-**	**-1.59 (2.68)**	-
AA*Pretest	**-1.64 (0.96)***	**-**	**1.45 (0.56)****	-
LH	-	11.10 (5.96)*	-	-3.83 (4.10)
LL	-	-1.66 (8.19)	-	-2.01 (4.02)
PH	-	13.38 (6.02)**	-	-0.38 (3.55)
PL	-	1.39 (7.20)	-	-0.66 (3.51)
LH*Pretest	-	-2.29 (1.24)*	-	2.12 (0.88)**
LL*Pretest	-	0.31 (1.62)	-	1.58 (1.03)
PH*Pretest	-	-2.17 (1.23)*	-	1.01 (0.87)
PL*Pretest	-	-0.58 (1.45)	-	1.12 (0.81)
Pretest (0=Min, 6=Max in E) (0=Min, 12=Max in E)	6.96 (0.81)***	6.95 (0.81)***	3.34 (0.42)***	3.34 (0.43)***
Grade (1=Worst,5=Best)	3.33 (0.72)***	3.43 (0.72)***	0.45 (0.70)	0.45 (0.71)
Year (0=4th,1=6th)	12.03 (1.63)***	11.77 (1.65)***	4.14 (1.24)***	4.28 (1.28)***
Gender (0=Male,1=Female)	1.99 (1.40)	2.05 (1.41)	1.04 (1.19)	0.76 (1.25)
Adj. R^2	0.65	0.66	0.65	0.64

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Table 6: Expected Winning Probability, Affirmative Action and Ability

	Experienced	Non-Experienced
	OLS (7) Dep. Var.: Win Prob.	OLS (8) Dep. Var.: Win Prob.
Constant	1.40 (0.214)***	1.43 (0.177)***
AA	-0.121 (0.143)	0.344 (0.155)**
Pretest	0.182 (0.042)***	0.098 (0.033)***
Adj. R^2	0.086	0.069

AA and Gender

	Experienced	Non-Experienced
	OLS (5) Dep. Var: # Correct Sudokus	OLS (6) Dep. Var: # Correct Sudokus
Const	10.497 (5.342)*	11.084 (3.556)***
AA	4.419 (6.513)	-5.846 (3.235)*
AA*Pretest	-0.783 (1.333)	2.888 (0.727)***
AA*Female	8.265 (8.856)	8.318 (4.491)*
AA*Female*Pretest	1.841 (1.916)	-2.779 (1.070)***
Pretest*Female	1.315 (1.567)	3.262 (0.796)***
Pretest	6.425 (1.036)***	1.762 (0.554)***
Female (0=Male,1=Female)	-3.769 (7.068)	-9.484 (3.568)***
NK	2.722 (2.502)	-0.820 (2.069)
Year	12.032 (1.643)***	3.640 (1.192)***
Grade	3.301 (0.722)***	0.283 (0.672)
Adj. R^2	0.650	0.680

Table 5: Correct Sudokus, Affirmative Action and Gender

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Table 7: Expected Winning Probability, Affirmative Action and Gender		
	Experienced	Non-Experienced
	OLS (9) Dep. Var.: Win Prob.	OLS (10) Dep. Var.: Win Prob.
Constant	1.00 (0.306) 0.000 ***	1.373 (0.230) 0.000 ***
AA	-0.238 (0.193) 0.217	0.501 (0.213) 0.020 **
Female	0.694 (0.427) 0.106	0.160 (0.360) 0.657
AA*Female	0.245 (0.286) 0.393	-0.345 (0.313) 0.272
Pretest	0.289 (0.062) 0.000 ***	0.106 (0.045) 0.021 **
Pretest*Female	-0.198 (0.084) 0.020 **	-0.024 (0.068) 0.724
Adj. R^2	0.100	0.066

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