

The Incentive Effects of Affirmative Action in a Real Effort Tournament

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Motivation

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

Intense public debate:

- Fairness criteria
- **Economic effect: effects on performance of individuals and on the “selected” group**
 - AA “substitutes” disadvantaged effort
 - The group of “selected” individuals will be worse

Tournaments

- Most situations where AA is called for can be described as a tournament:
 - college admissions, job promotions, etc.
- In a tournament between asymmetric players individuals perform poorly (Lazear and Rosen (1981) and Myerson (1981))
- AA biases the rules creating competitive pressure:
more symmetric competition => better performance
(Fu (2006), Franke (2008) and Balart (2009))

Empirical evidence?

Surprisingly, there is very little empirical evidence:

- Size of the prize: Prendergast (1999)
- AA in auctions: Krasnokutskaya and Seim (2007) Marion (2007)
- AA in tournaments in the lab: Schotter and Weigelt (1992)
- AA and entry decisions: Niederle, Segal and Vesterlund (2009): **Quotas**

Experimental Setup

- **Pairwise tournaments** between students from two different schools based on real effort task
- **Key difference between subjects:** Ex-ante experience with the task, induced in a **natural and systematic way**
- AA is implemented as **biased tournament rules** (treatments) in favor of non-experienced subjects
- We also study the **effects of information** about the existence of the disadvantage.
- **Performance between pairs** of students is compared

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

- **Simple:** Easy to explain but requires logical reasoning
- Generated randomly with **same level of difficulty** (pilot)
- Experience increases performance (pilot)
- **Measures** of performance: 1) **Correct** 2) **Incomplete** 3) **Total**

Subject Pool

- 337 students aged 10-12 from two private schools in Barcelona
- Schools are similar with one crucial difference:
 - **School 1:** (Experienced) Students learn to solve sudokus in math class
 - **School 2:** (Unexperienced) Solving sudokus no part of regular class activity

⇒ **Naturally induced disadvantage**

- Ex-ante information on:

Gender

Grades

Birth date

⇒ **Allowed homogeneous assignment of subjects to treatments**

Conducting the Experiment

- Students conducted to separate rooms according to pre-specified group structure
- Students got written and oral instructions which included:
 - Explanation of sudoku rules
 - Trials
 - Showing the Prize: 7 Euro voucher
 - Explanation of (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

Experimental Design

Benchmark Treatment: Unbiased tournament rule

Info: Student was informed that opponent was ex-ante experienced in solving sudokus (or not)

No Info: Student was not informed about ex-ante experience of opponent

Lump-sum Bonus:

Low: Non-experienced gets bonus of **8** sudokus

High: Non-experienced gets bonus of **20** sudokus

Proportional Bonus:

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

High: Non-experienced gets **1** for every **1** correct

Testable Hypothesis: Effects of Information

Experienced Individuals:

Performance Gains: Pressure to prove yourself

Performance Losses: No competitive pressure

Non-experienced Individuals:

Performance Gains: Challenged by provided information

Performance Losses: Discouragement, stereotype threat

Testable Hypothesis: Effects of AA

Experienced Individuals:

Performance Gains: Higher competitive pressure

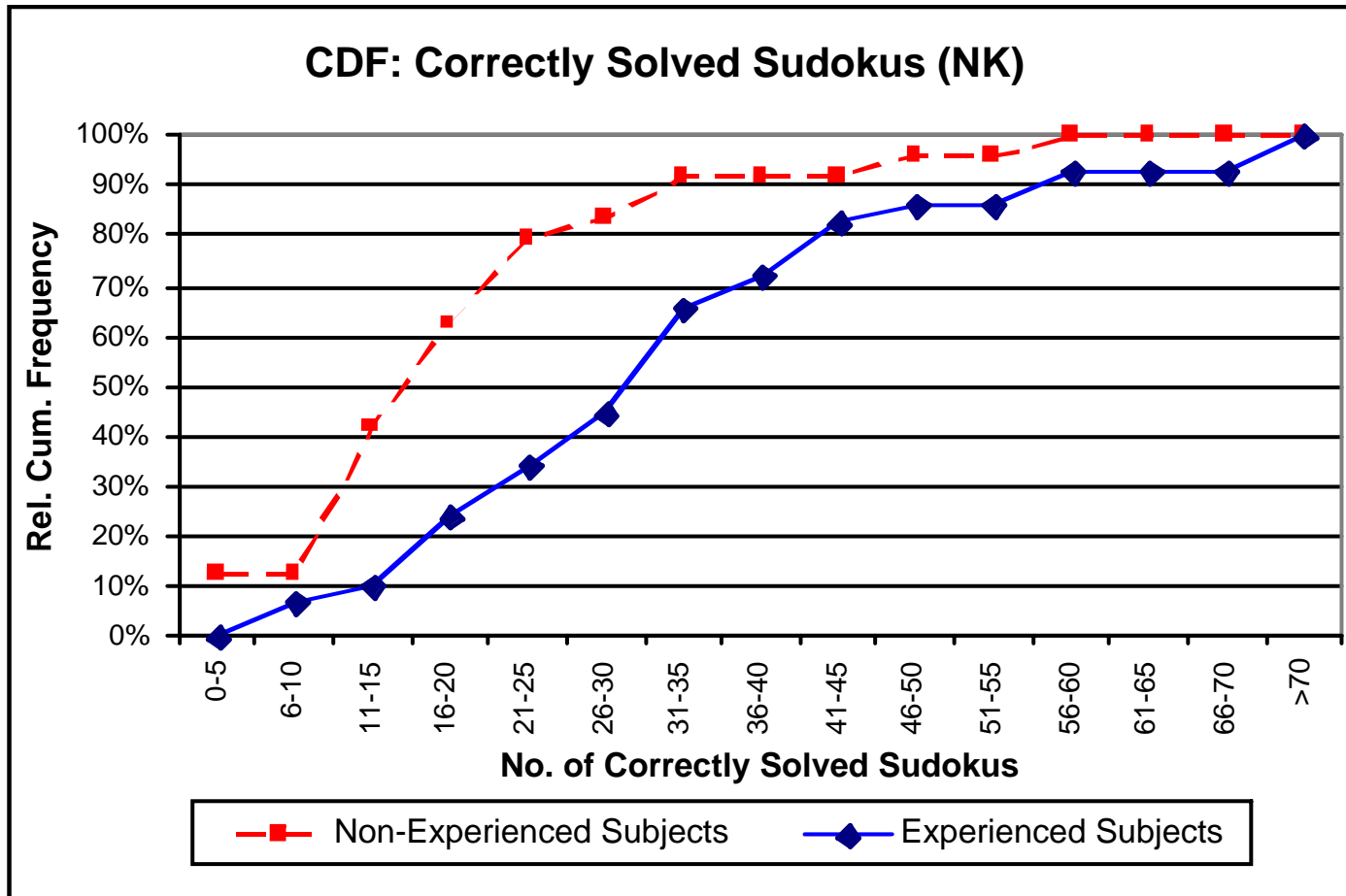
Performance Losses: Frustration due to compensated opponents

Non-Experienced Individuals:

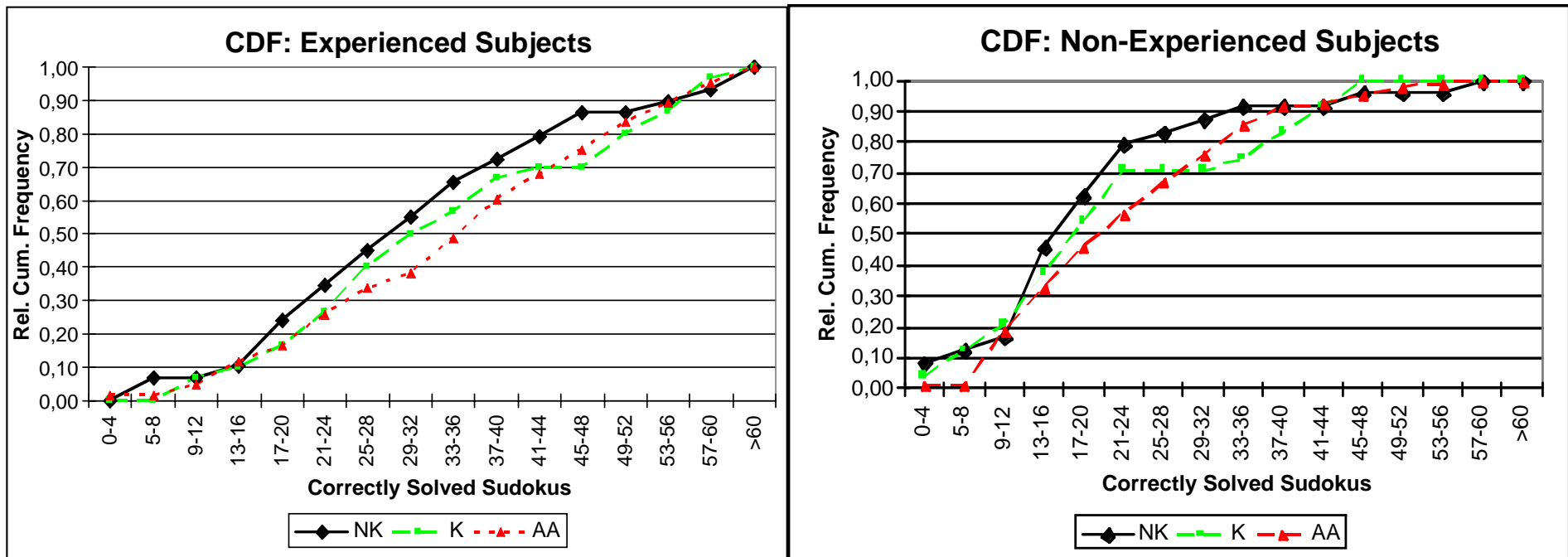
Performance Gains: Level playing field

Performance Losses: Compensation substitutes effort

Results: Experience matters



Results: Information and AA



Results

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=4 th ,1=6 th)	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

% of Winners

Percentage of Non-Experienced Tournament Winners by Treatment and School Year			
	4 th Year	6 th 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

Quality of the winners

Table 9: Average Correct Sudokus by All Possible Tournament Winners in Each Treatment and School Year

	4 th Year	6 th 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)

% change in the quality of winners

	4 th Year	6 th Year	Overall
NK Vs. K	-5.76**	-10.38***	-5.14**
NK Vs. AA	1.02	-3.05**	-1.95*
K Vs. AA	7.19**	8.17***	3.36

Conclusion

- Information weakly increases performance, although the effect is non significant
- Affirmative Action policies do not discourage Experienced and Non-Experienced individuals.
- Affirmative Action policies enhances performance of 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



Additional Slides

AA and Gender

Table 5: Correct Sudokus, Affirmative Action 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*Gender	8.265 (8.856)	8.318 (4.491)*
AA*Gender*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)***
Gender (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

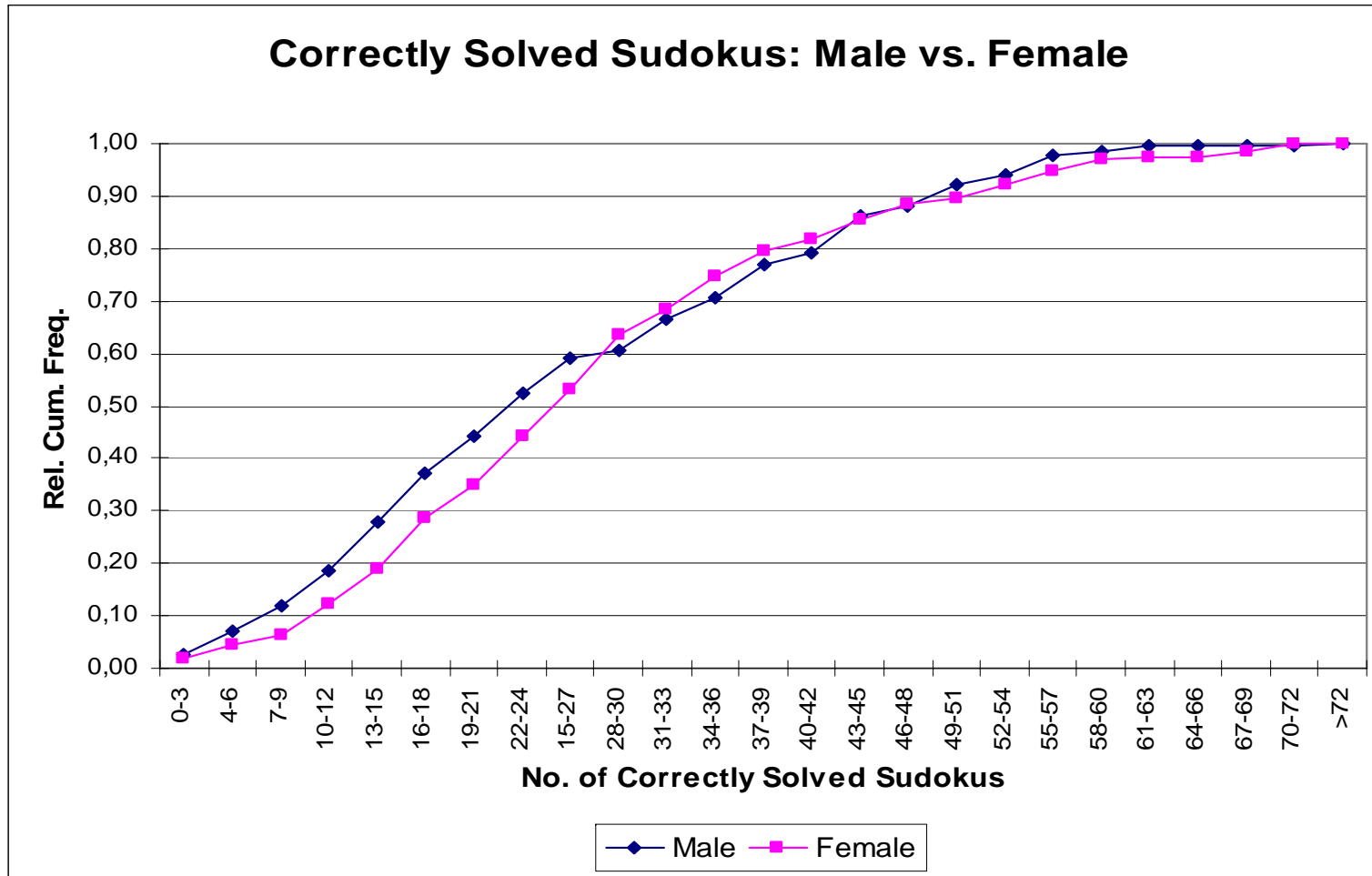
AA and Confidence

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	2.49 (0.214)***	2.43 (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

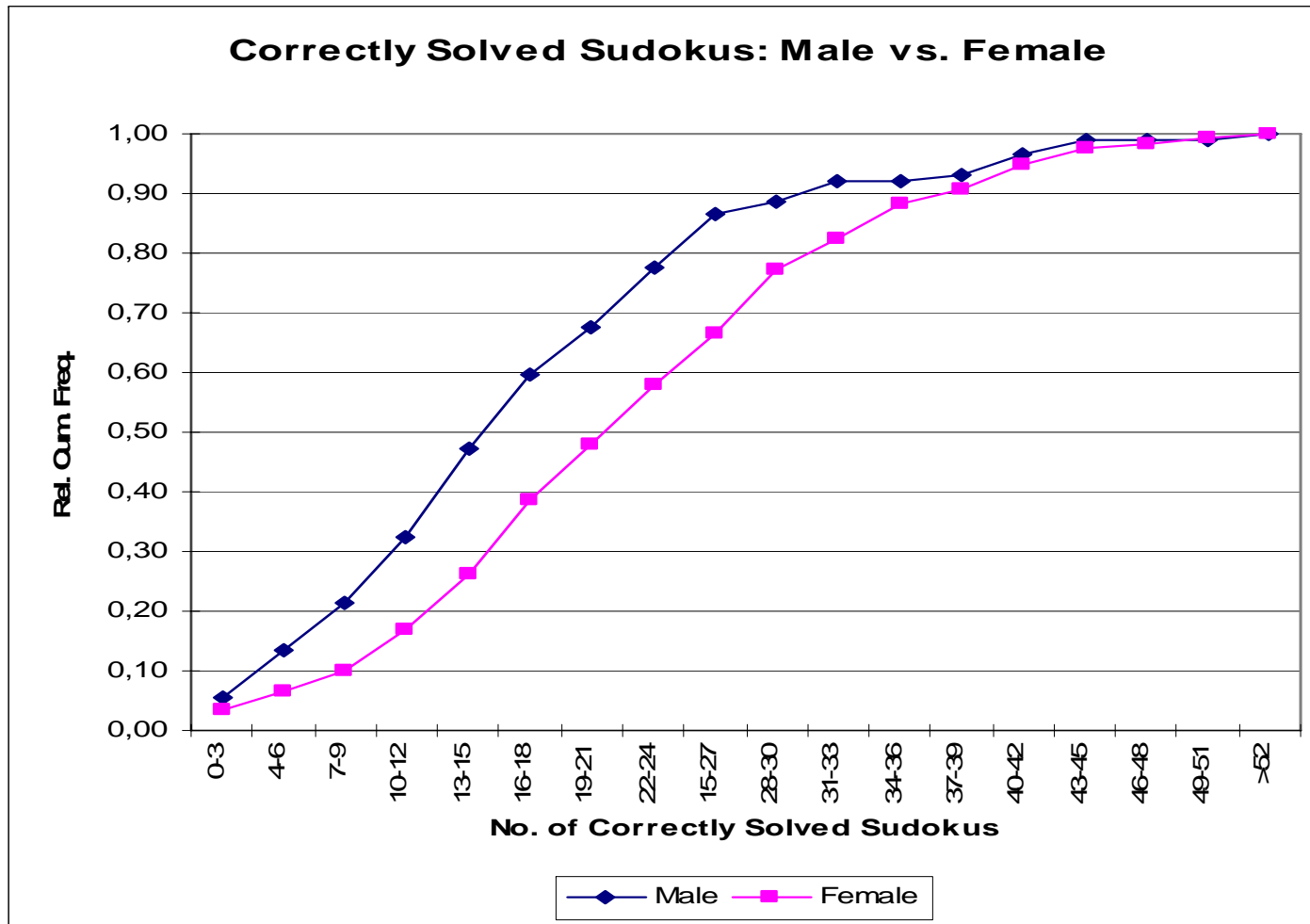
Confidence and Gender

	Experienced	Non-Experienced
	OLS (9) Dep. Var.: Win Prob.	OLS (10) Dep. Var.: Win Prob.
Constant	2.00 (0.306) 0.000 ***	2.373 (0.230) 0.000 ***
AA	-0.238 (0.193) 0.217	0.501 (0.213) 0.020 **
Gender	0.694 (0.427) 0.106	0.160 (0.360) 0.657
AA*Gender	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* Gender	-0.198 (0.084) 0.020 **	-0.024 (0.068) 0.724
Adj. R ²	0.100	0.066

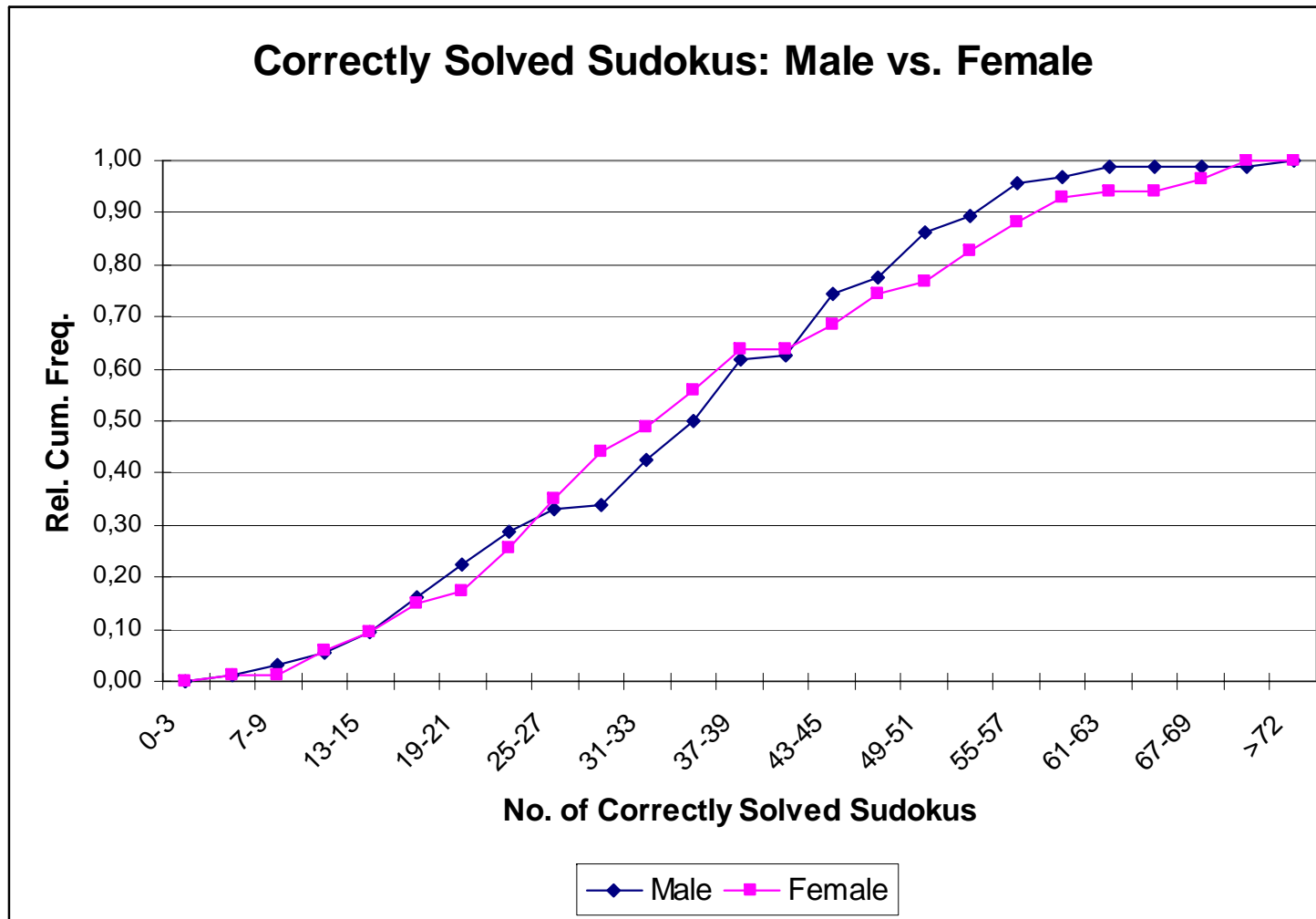
Gender Effects (Aggregated)



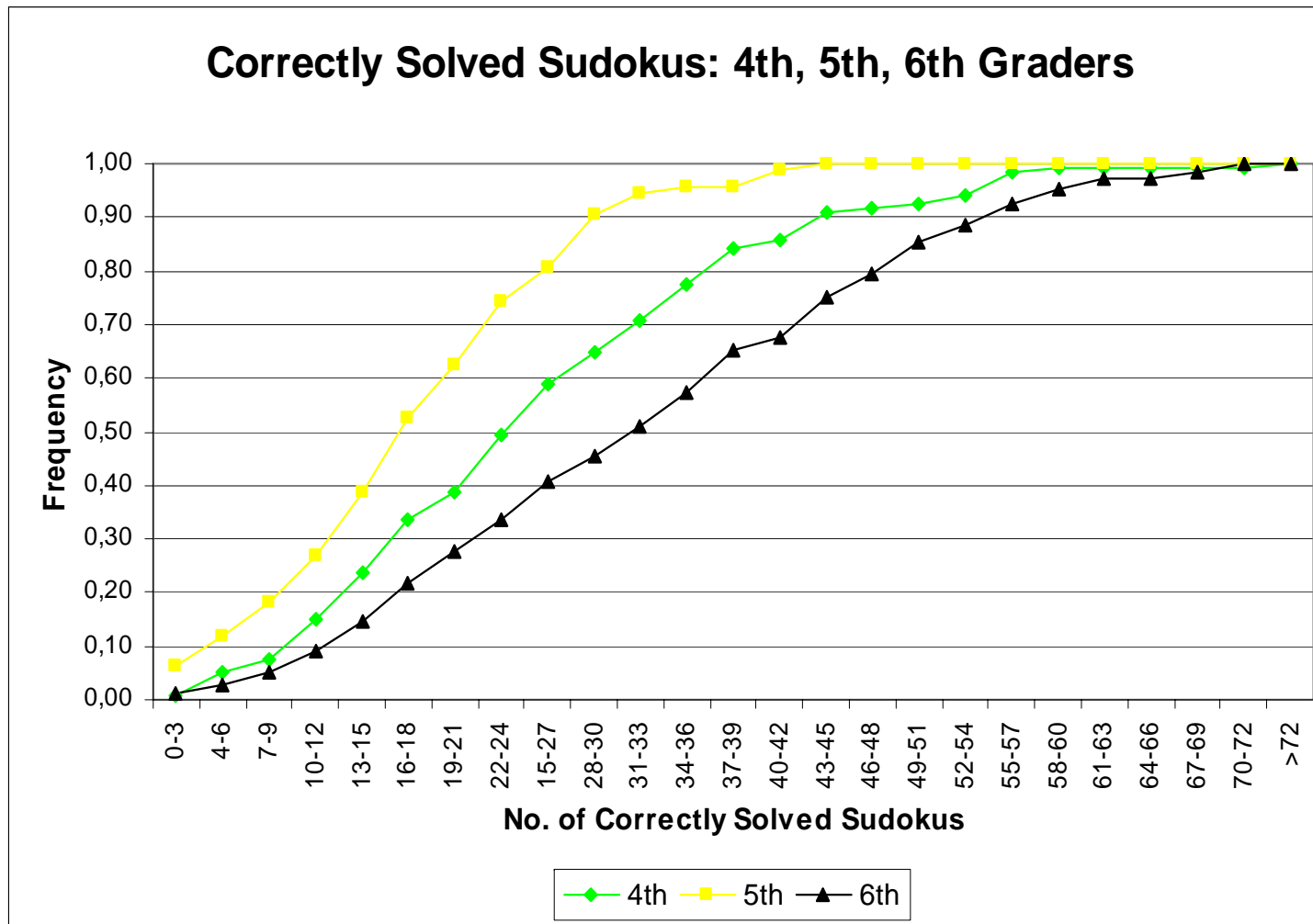
Gender Effects (Non-Experienced)



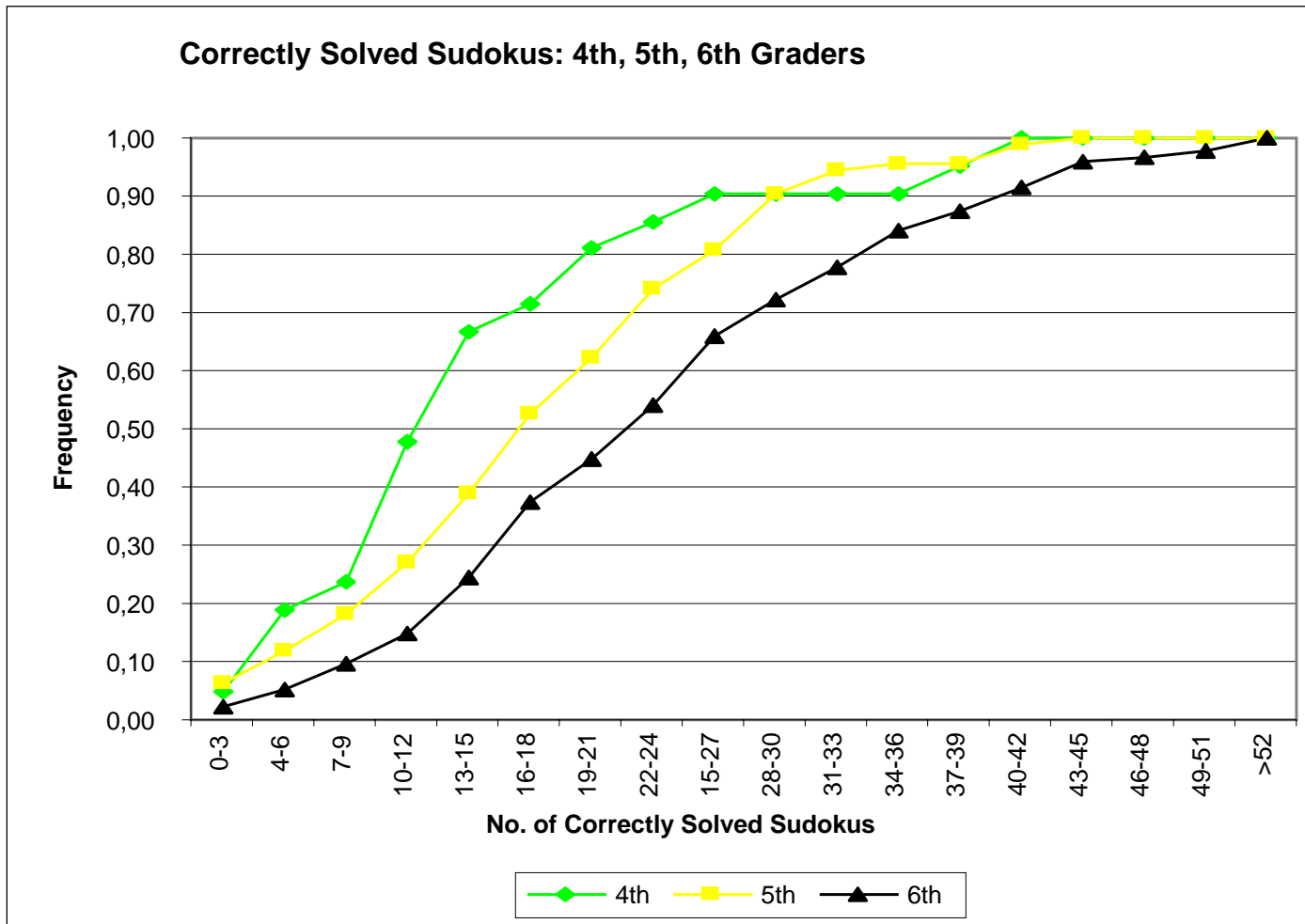
Gender Effects (Experienced)



Age Effects (Aggregated)



Age Effects (Non-Experienced)



Age Effects (Experienced)

