Discrimination from Below: Experimental Evidence on Female Leadership in Ethiopia

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Motivation

- Women are under represented in senior management globally
  - 13 percent of board seats of major African companies were held by women in 2013
- Women are under represented in leadership positions more generally
- Raises concerns about gender equity and lost productivity

Research Question

- Existing explanations focus on:
  - Supply-side differences between men and women ("leaning in", differences in preferences, human capital)
  - Discrimination in hiring and promotion (i.e., discrimination from above)
- Alternative mechanism: discrimination from below
  - In management and leadership, how others adhere to one's direction and advice is required for success
  - Could discrimination by *subordinates* reduce female leader's performance?

Research questions

- **Even if women and men are equally skilled and have similar leadership styles, does a differential response to women as leaders or managers reduce their performance?**
- **Does information on ability mitigate any differential response?**
- **Source of discrimination: Statistical or taste based?**

Approach

- Lab-in-the-field experiment: Subjects randomly matched to a leader who provides advice on a logic game (Cooper and Kagel 2005)
- Cross randomize leader **gender** and information on **high ability**
  - Leader is unseen and all interactions are identical
- Does subject follow the leader's advice?
- Hypothetical resume evaluation for senior management position in which candidate gender is randomized

Literature and Policy Implications

- Differential response to female expertise, advice, and businesses is documented in well-identified natural experiments in low income countries (Yishay et al. 2018, Macchiavello et al. 2014, Hardy 2018)
- Push for increased female representation in many development policies: e.g., increased female health workers, female teachers, female agricultural extension trainers
- What drives the documented gaps?
  - Supply-side differences: women are less educated? younger? less confident?
  - Discrimination due to distaste for women: violation of gender norms?
  - Discrimination due to inability to infer quality: statistical discrimination?
- The answer suggests different policy solutions

Literature and Policy Implications

- What drives the documented gaps?
  - Supply-side differences: **Increase inputs to equalize women**
  - Discrimination due to distaste for women: **Relax gender norms and change gender attitudes**
  - Discrimination due to inability to infer quality: **Provide credible signals of quality**

Outline

Application of a standard theory of discrimination

- Each manager has some ability $\theta \sim N(\bar{\theta}_g, \sigma_g^2)$
- Simplified, employees follow the manager if:

$$f(\tilde{E}(\theta|g)) > c(g)$$

where:

- $g \in \{\mathbf{m}ale\ manager, \mathbf{f}emale\ manager\}$
- f is a payoff that depends on the employee's beliefs

- First argument captures statistical discrimination
- Second argument captures taste-based discrimination

The role of ability signals

- Let s be a noisy signal of ability: $s = \theta + u$
  where u is independent of θ and distributed $u \sim N(0, \eta^2)$
- Under Bayesian updating:

$$\tilde{E}(\theta|s, g) = \lambda_g \bar{\theta}_g + (1 - \lambda_g)s$$

  where $\lambda_g = \frac{\eta^2}{\sigma_g^2 + \eta_g^2}$
- Consider a high signal $s \geq \theta_g \ \forall g$:
  - $\tilde{E}(\theta|s, g) \geq \tilde{E}(\theta|g)$ so the expected payoff from following the manager increases

Implications of statistical discrimination from below

- Teams led by qualified female managers will perform worse
- Thus, female managers may be less likely to be promoted, even by an unbiased employer
    - Model follows Coate & Loury (1993), where team performance is taken as a signal of manager ability

Outline

Adama University

- Adama Science and Technology University (ASTU) in Adama, Ethiopia
- ASTU is one of the oldest and largest public universities in Ethiopia

- Sample selected from employees with BA or higher
- Sample is employees who are most likely unfamiliar with research

Overview of design

1. Subject is randomly matched to a leader, whose role is to provide advice
2. Signaling Game - 10 rounds (adapted from Cooper and Kagel, 2005)

Table: 2X2 design

Male leader & Control	Female leader & Control
Male leader & Ability signal	Female leader & Ability signal

Signaling game

- Goal: explore responses to leadership in a problem with a clear correct answer that is difficult to guess
- Subject chooses a number 1 through 5
- Most initially select 3, but the expected payoff is higher when selecting 4 or 5

▸ Game Details

Team leaders

- Each subject was randomly matched to a team leader
- Leaders were administrative employees at another university (Arsi, 100km away)
- Leaders were given detailed training on the best plays, and had the opportunity to practice before playing
- They could send **pre-scripted** advice to team members
- We selected 1 male and 1 female leader with identical histories in game play and messages sent

Team Leaders

- Subjects never see leaders
- Prior to playing, subjects observe leader's play and result
- In pre-scripted messages, leader:
  - Advises subject to play "strategically" by playing 5
  - Provides explanations as to why 3 does not yield the highest expected payoff
- All interactions and characteristics of the Team Leader are identical, except for gender and information on high ability

Leader gender treatment: Gender salience

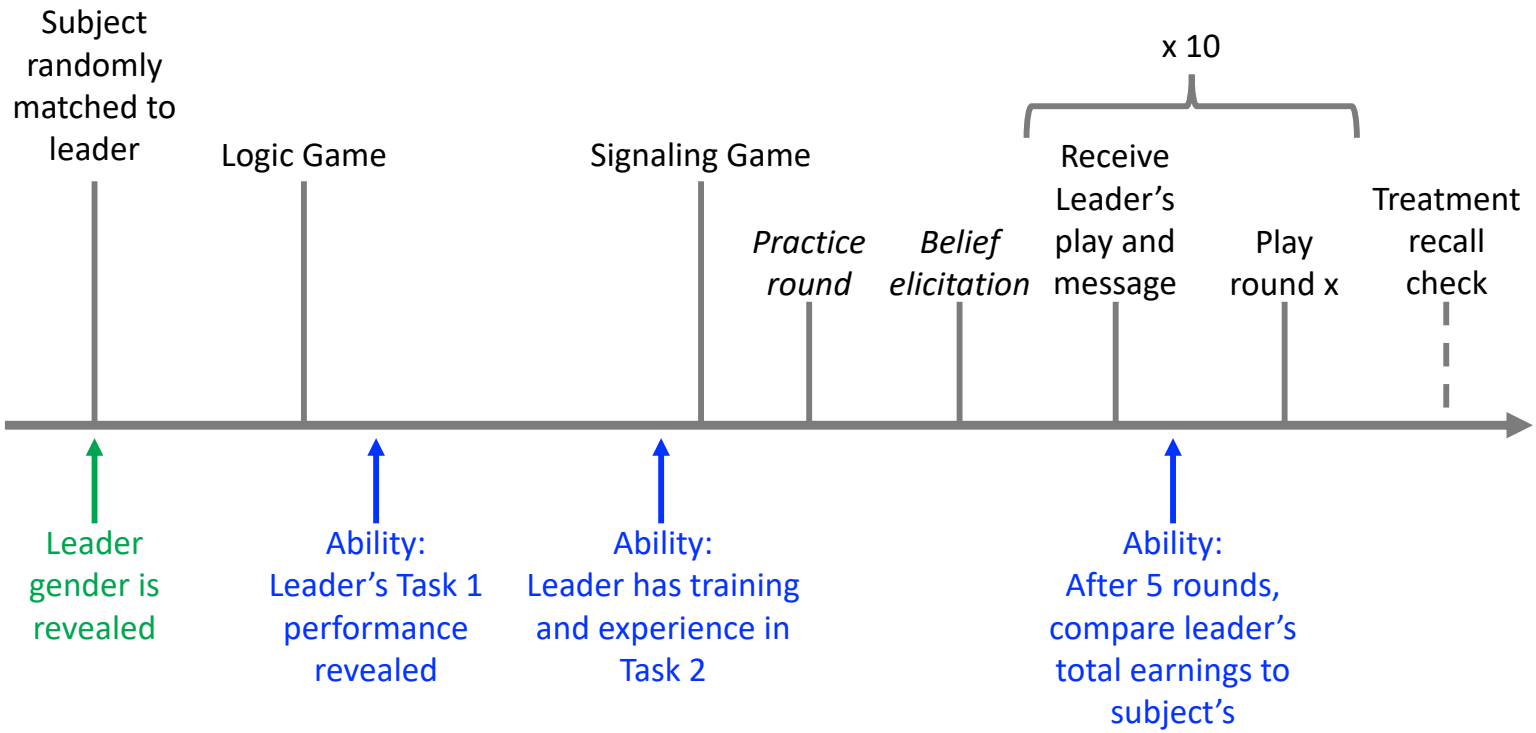
- Inform subjects of leader's gender
- In Amharic, all grammar is gendered: e.g., verbs are conjugated according to the gender of the leader
- Randomly used a different gendered pseudonym for each subject
  - Drawn from a large household survey (n=12,687) in Ethiopia
  - Used each time the leader was mentioned
- In subsample (n=102) asked to recall leader gender at end of study, 95.1% recalled correctly

▸ Pseudonym Balance

Ability signal

- Subject learned leader's performance on an initial logic game
- Subject told leader had training and experience playing signaling game
- After 5 rounds, enumerator added up the leader's total earnings and compared to subject's total earnings up to that point

Experiment timeline



Estimating Equation

Table: 2X2 design

Male leader & Control	Female leader & Control
Male leader & Ability signal	Female leader & Ability signal

Estimating equation:

$$R_{ir} = \alpha + \beta_1 Fem\_Lead_i + \beta_2 Ability_i + \beta_3 Fem\_Lead_i \times Ability_{ir} + \epsilon_{ir}$$

where R is strategic play (play 4 or 5)

Hypotheses

- Estimating equation:

$$R_{ir} = \alpha + \beta_1 Fem\_Lead_i + \beta_2 Ability_i + \beta_3 Fem\_Lead_i \times Ability_{ir} + \epsilon_{ir}$$

- Parameters of Interest
  - β_1: Differential response to female leader's advice (in the absence of information on ability)
  - β_3: Differential response of the ability signal for female leaders relative to male leaders
- Also of interest:
  - $\beta_1 + \beta_3$: Differential response to female leadership conditional on ability information
    - If $\beta_1 < 0$, taste-based discrimination implies $\beta_1 + \beta_3 <= 0$
    - If $\beta_1 < 0$ and $\beta_2 = 0$, simple statistical discrimination models also implies $\beta_1 + \beta_3 <= 0$

Leader gender and ability effects

Dependent Variable:	Strategic Play		
	(1) All Rounds	(2) Round 1	(3) Rounds 1-5
(β_1) Fem. Leader	-0.0590*	-0.0573	-0.0813**
	(0.0352)	(0.0822)	(0.0406)
(β_2) Ability	-0.00301	-0.0353	-0.0461
	(0.0350)	(0.0781)	(0.0399)
(β_3) Fem. leader $\times$ Ability	0.115**	0.274**	0.147***
	(0.0479)	(0.113)	(0.0551)
Day FE	X	X	X
Round FE	X		X
Practice round	X	X	X
Observations	3020	302	1510
Control group mean	0.618	0.479	0.614
$\beta_1 + \beta_3$	0.0561	0.217	0.0657
P-val.: $\beta_1 + \beta_3$	0.0891	0.00583	0.0825

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses, clustered at subject level. Strategic play is defined as playing 4 or 5. 5 is the highest expected value play, and the leader played 5 in every round.

Leader gender and expectations

Dependent Variable:	Leader's performance
	(1)
(β_1) Fem. Leader	-5.812
	(9.056)
(β_2) Ability	6.362
	(9.527)
(β_3) Fem. leader $\times$ Ability	14.39
	(12.98)
Day FE	X
Observations	301

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors in parentheses.

Gender Discrimination Reversal

- Consistent with statistical discrimination, not standard taste-based discrimination
- Inconsistent with standard model of statistical discrimination: beliefs are normally distributed, ability signals are uncorrelated with gender, and subjects update beliefs using Baye's Rule
- Bohren et al. (2017) find similar discrimination reversal in model of dynamic discrimination: subjects accounted for discrimination in obtaining the ability signal
- Our results suggests that signals of ability are being interpreted differently for each gender, even in the absence of dynamic discrimination

Outline

Resume Example

I. Personal Information

Name: ----------
Sex: [Randomly Determined: Female/Male]
Birthdate: 21/07/1984

Personal Summary:

I am an outgoing, ambitious, and confident individual, whose passion for the HR sector is equally matched by my experience in it. For the previous 6 years, my primary role at ----- has been to provide HR support, guidance, advice, and services to all company staff. This has taught me to translate corporate goals into human resource development programs, as well as given me extensive knowledge of HR administration, principles, practices, and laws. I have experience sourcing candidates, overseeing hiring processes, and resolving employee relations issues. This has given me experience interacting with many different types of people and I have developed strong interpersonal skills for resolving conflicts. I am always looking for ways to improve systems in human resources, consistently complete tasks to their natural end, work well under pressure and deadlines, and adapt to changing environments.

II. Work Experience

Discrimination in Evaluation

	(1) Competence	(2) Likeability	(3) Likelihood of Hire	(4) Log Salary Offer
Female Resume	-0.0732	-0.0286	-0.152	-0.124**
	(0.118)	(0.108)	(0.142)	(0.0518)
Observations	225	225	225	225

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors in parentheses.

Outline

Contribution: Summary of Findings

- Well-identified evidence of discrimination from below, an understudied form of discrimination
  - Having a female reduces strategic play by 10% and female-led subjects perform worse
  - Reduced evaluation of hypothetical senior management candidates
- Documenting patterns and explanations for discrimination in a low-income country context, where literature is scarce
- Identifying source as being statistical discrimination
- Document a reversal of the gender gap that is not in a dynamic setting
  - Suggests discrimination may lessen at the "top" of the labor market due to signal inference differing by gender
  - Dynamic gender discrimination in one setting may transfer to other contexts

Policy Implications

- What drives the documented gaps?
  - Supply-side differences: Increase inputs to equalize women
  - Discrimination due to distaste for women: Relax gender norms and change gender attitudes
  - Discrimination due to inability to infer quality: **Provide credible signals of quality**
- Our results suggests:
  - Credible signals of quality may be an important policy solution to close the gaps documented in more natural settings
  - Equalizing gender differences may not be sufficient
  - Policies geared towards reducing gender discrimination should be widespread

Signaling Game

- 2 player game: Player 1 selects number, Player 2 responds
- Player 2 is played by a computer and does not know Player 1's Type
- All subjects play as Player 1, Type B

Player 1

Type A				Type B			
A's choice	In	Out		B's choice	In	Our	*Expected Payoff (not shown)*
1	168	444		1	276	568	*299*
2	150	426		2	330	606	*395*
3	132	426		3	352	628	*466*
4	56	182		4	334	610	*525*
5	-188	-38		5	316	592	*573*

Player 2 (Computer)

Computer's choice	Type A	Type B
In	500	200
Out	250	250

Lab-in-the-Field Pseudonym Balance

	(1) Amhara	(2) Oromo	(3) Age	(4) Grade	(5) Orthodox
Female leader only (F)	-0.0188	-0.00914	0.670	0.219	-0.0220
	(0.0554)	(0.0708)	(2.365)	(0.263)	(0.0700)
Ability signal only (A)	-0.0537	-0.0104	-0.932	0.145	-0.0689
	(0.0568)	(0.0697)	(2.278)	(0.227)	(0.0665)
Female leader & Ability (FA)	-0.0265	0.00721	-0.409	0.160	-0.0477
	(0.0597)	(0.0754)	(2.517)	(0.270)	(0.0712)
Day FE	Yes	Yes	Yes	Yes	Yes
Observations	304	304	304	304	304
p-val: F = A	0.544	0.985	0.444	0.781	0.466
p-val: A = FA	0.658	0.807	0.816	0.956	0.743
p-val: F = FA	0.900	0.826	0.648	0.848	0.700

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors in parentheses. Pseudonym characteristics are assigned based on the characteristics of actual individuals with a given name, drawn from a listing exercise conducted for another study in Ethiopia. The ethnicities and and religion are equal to 1 if there was at least one individual with the relevant characteristic. Age and grade represent the average age and educational attainment of all individuals with a given name.

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Lab-in-the-Field Computer Balance

	(1) Error	(2) Error
Female leader only (F)	0.00622	0.00267
	(0.0183)	(0.0129)
Ability signal only (A)	0.0124	0.0127
	(0.0182)	(0.0123)
Female leader & Ability (FA)	0.0190	0.0113
	(0.0193)	(0.0138)
Day FE	Yes	Yes
Round FE	Yes	Yes
Play FE	No	Yes
Observations	3344	3339
p-val: F = A	0.730	0.420
p-val: A = FA	0.724	0.916
p-val: F = FA	0.500	0.536

Standard errors in parentheses

$^{*}\ p < 0.1,\ ^{**}\ p < 0.05,\ ^{***}\ p < 0.01$

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Lab-in-the-Field Subject Balance

	(1) Fem. subject	(2) ln(Salary)	(3) Level	(4) Years Ed.	(5) MA or higher	(6) Job tenure
Female leader only (F)	0.0173	-0.0213	-0.145	0.00175	0.00848	238.2
	(0.0817)	(0.0634)	(0.446)	(0.0813)	(0.0401)	(328.3)
Ability signal only (A)	-0.0189	-0.00813	0.151	0.0556	0.0354	71.63
	(0.0803)	(0.0597)	(0.424)	(0.0865)	(0.0427)	(335.7)
Female leader & Ability (FA)	-0.0383	-0.00636	-0.149	0.117	0.0587	-276.9
	(0.0840)	(0.0610)	(0.420)	(0.100)	(0.0494)	(342.2)
Day FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	304	304	304	304	304	304
p-val: F = A	0.649	0.839	0.510	0.535	0.535	0.586
p-val: A = FA	0.812	0.977	0.481	0.554	0.650	0.268
p-val: F = FA	0.503	0.821	0.994	0.251	0.312	0.0959
Sample Mean	0.484	8.092	13.45	16.17	0.0822	3020.7

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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