Discriminatory Lending: Evidence from Bankers in the Lab

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Views presented are those of the authors and not necessarily of the EBRD.

Motivation

- Low- and middle- income countries often have large gender gap in account ownership and use of bank credit.
  - 54% (83%) of Turkish women (men) own a bank account
  - 63% (43%) of Turkish female (male) firms report being credit constrained
- Access to finance improves firm performance (Beck Demirguc-Kunt, 2006).
- Financial inclusion is important for reducing poverty and income inequality (Park and Mercado, 2015; Bruhn and Love, 2014).

Motivation

Cause?

- Demand: Selection into small firms, less capital-intensive sectors, differential response to competition or failure
- Supply: Institutional barriers and gender discrimination by banks

Gender discrimination is inefficient: female firms credit constrained $\rightarrow$ productive capacity underutilized

Research question

Do loan officers discriminate against female loan applicants and, if so, how?

1. Is discrimination direct or indirect?
2. Is discrimination implicit, taste-based, or statistical?
3. Is discrimination widespread or concentrated among certain types of loan officers?

Gender bias literature

- Economics of discrimination
  - Taste-based (Becker, 1957); statistical (Phelps, 1972); implicit (Bertrand et al., 2005)
  - Different efficiency implications
- Experience can mitigate belief-based (statistical) discrimination (Bohren et al., 2019)
- Extensive empirical literature on discrimination in labor and rental markets using correspondence studies (e.g., Bertrand and Mullainathan, 2004)

Empirical finance literature

Recent studies based on administrative data provide suggestive but inconclusive evidence of gender discrimination in lending.

- omitted variable bias
- disentangling supply and demand
- loan officer characteristics unobserved
- ignore rejection rates

1. Alesina, Lotti, and Mistrulli (2013): Stricter guarantor requirements and higher interest rates for women
2. Bellucci, Borisov, and Zazzaro (2010): Tighter credit availability and higher collateral requirements for women
3. United States: Racial but no gender discrimination (e.g. Blanchflower et al., 2003)

Our contribution: Lab-in-the-field

How gender bias works in small business lending

1. Controlled setting: Randomize applicant gender (no OVB)
2. Observe lending on extensive and intensive margin (guarantors)
3. Psychometrics: key personality traits that usually are unobserved
4. Vary available information to understand nature of discrimination
5. Realistic setting with population of interest
6. Real not fictitious applications: Track loans in real life

Turkey

- Large and growing emerging market with a competitive banking system
- Scores well on *de jure* gender equality (Klapper et al., 2014)
- *De facto* very conservative gender norms (WEF, 2018: 130th out of 149)

Everyday decision-making at a large Turkish bank

- Loan officers interview client, collect info, check credit registry, populate electronic application form
- Are also allowed to add subjective notes to the electronic form
- Pass electronic form on to supervisor (typically branch manager) with proposed maximum credit amount and view on whether guarantor is required
- Supervisor formally signs off

The experiment

Experimental design

Sessions were framed as general training exercise about lending effectiveness.

- Subjects: 192 loan officers, 142 supervisors
- Task: review (real) credit applications, accept/reject, set terms, subjective assessment
- Subjects paid based on real life performance of accepted applications Incentive
- 22 sessions, 8 cities Map

Experimental design

- Gender was randomly assigned to each application.
  - Ali; Emine; Mustafa; Mehmet; Zeynep; Fatma; Ahmet; Ayse
  - allows for within-file estimate of gender discrimination
- 2 rounds, 4 files per subject round: [good, bad] x [female, male]
- 100 real-life applications, each file reviewed by on average 13.4 subjects per round
  - sampled from all first-time borrower applications from 2012-2015: Stratified by region, gender, firm size, performance
  - "gender-neutral" industries

Experimental design

Second round of the experiment

1. Control: all information available
2. Treatment 1: no credit bureau score
3. Treatment 2: no subjective information

Measuring implicit gender bias

- Implicit Association Test
  - Sorting "Female" words with "Family" words and "Male" words with "Career" words (**stereotypical task**)
  - Sorting "Female" words with "Career" words and "Male" words with "Family" words (**non-stereotypical task)**
- Record time in milliseconds
- IAT score: Normalized difference in mean response time between both tasks
- Higher score = higher implicit bias

Data and estimation

Summary statistics

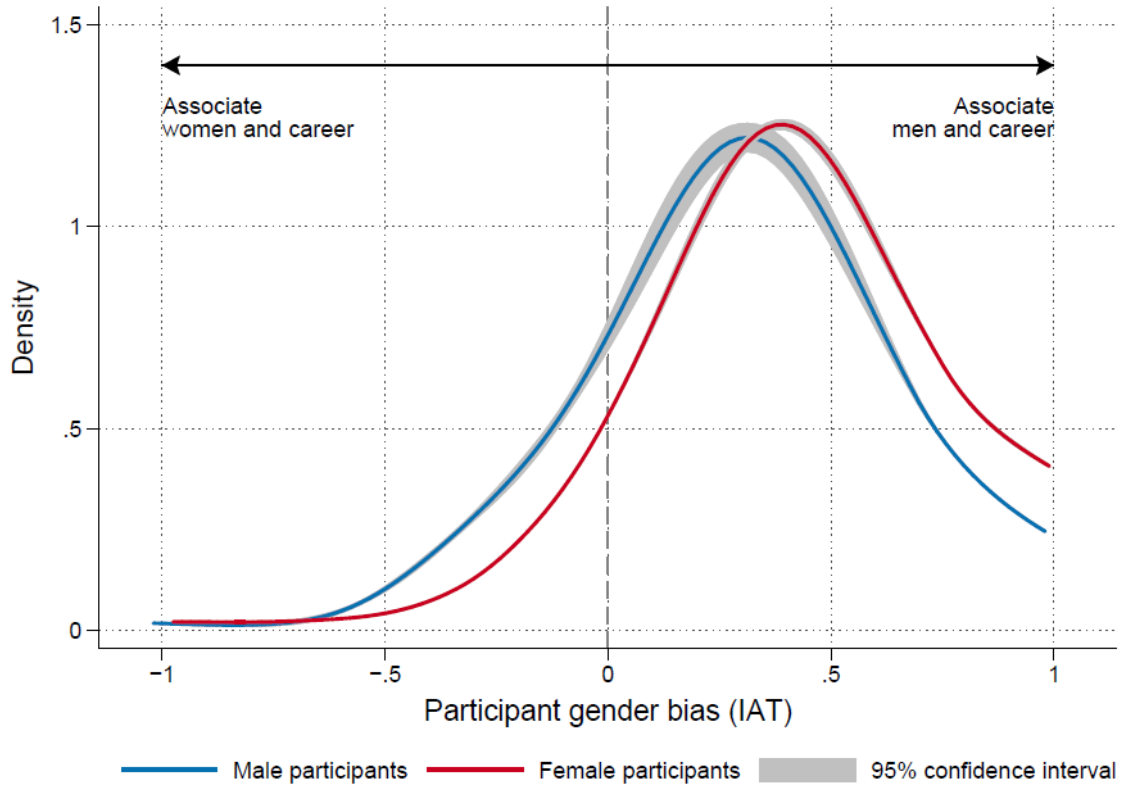
Table 1: Summary statistics

	N	Mean	Median	Sd.	Min	Max
Panel A: Participant characteristics						
Participant is female	332	0.47	0.00	0.50	0	1
Participant experience (years)	324	4.99	4.00	3.89	0	19
Participant age (years)	321	37.30	36.00	5.84	26	53
Participant is supervisor	334	0.43	0.00	0.50	0	1
Participant risk aversion	333	4.11	4.00	1.37	1	6
Participant gender bias (IAT)	325	0.33	0.34	0.32	-0.93	1.00
Panel B: Loan-file characteristics						
Real life performing	100	0.50	0.5	0.50	0	1
Real life non-performing (NPL)	100	0.25	0	0.44	0	1
Real life declined	100	0.25	0	0.44	0	1
Panel C: Decision characteristics						
First round						
Rejection dummy	1,336	0.39	0.00	0.49	0	1
Guarantor dummy	814	0.27	0.00	0.44	0	1
Subjective repayment probability	1,329	60.11	70.00	30.81	0	100

IAT curve

Implicit gender bias: male vs. female loan officers

Figure 2: Participant gender bias (IAT), by participant sex



Notes: This figure shows a local polynomial smooth with 95 per cent confidence intervals of the variable *Participant gender bias (IAT)* for male (blue) and female (red) participants, respectively. The combined two-sample Kolmogorov-Smirnov test statistic is 0.181 and has a p-value of 0.01.

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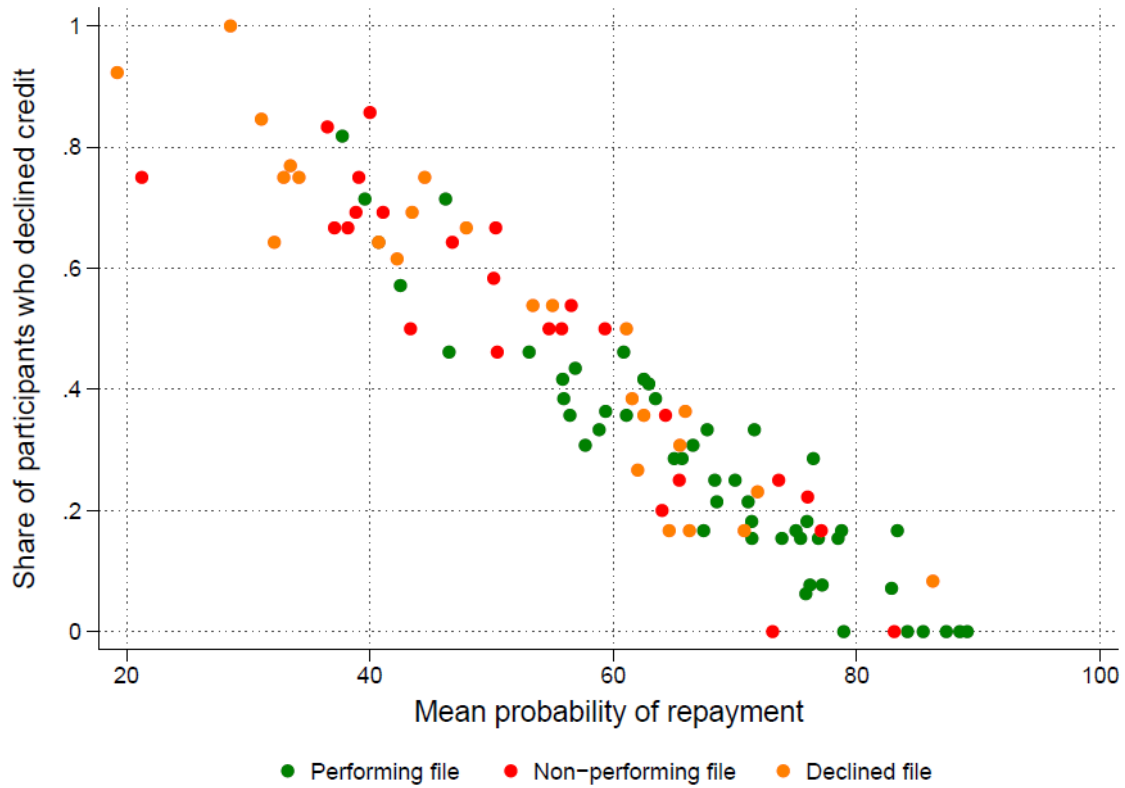
Expected repayment and loan rejection rates

Figure 3: Expected repayment and loan rejection rates



Notes: The x-axis is the within-file mean, across participants, of the subjective repayment probability. The y-axis is the share of participants who declined the loan application. The figure is based on the first round of the experiment only.

Estimation strategy

- y_{il} Outcome when officer i evaluates file l
- G_{il} Randomized gender for file l seen by officer i
- X_i K officer traits (gender, experience, age, supervisor, risk aversion, IAT)
- ϕ_l File FE
- ϕ_c City FE
- ϵ_{il} Error term. Standard robust variance estimator yields correct inferences

  (Abadie et al., 2017)

$$y_{il} = \alpha + \beta \cdot G_{il} + \sum_{k=1}^{K} \gamma_k \cdot X_i + \varphi_l + \varphi_c + \varepsilon_{il}$$

Results

Direct discrimination: Baseline results

Table 2: Applicant gender and loan rejection

Dependent variable: Rejection dummy				
	[1]	[2]	[3]	[4]
Female applicant	-0.013	-0.013	-0.010	-0.010
	(0.023)	(0.023)	(0.024)	(0.024)
Participant is female	0.023	0.029	0.021	0.026
	(0.023)	(0.023)	(0.024)	(0.024)
Participant experience (years)	-0.002	-0.003	-0.003	-0.003
	(0.004)	(0.004)	(0.004)	(0.005)
Participant age (years)	-0.005*	-0.005*	-0.005*	-0.005*
	(0.003)	(0.003)	(0.003)	(0.003)
Participant is supervisor	0.100***	0.101***	0.099***	0.100***
	(0.032)	(0.032)	(0.032)	(0.032)
Participant risk aversion		-0.012		-0.012
		(0.010)		(0.010)
Participant IAT score			-0.000	-0.003
			(0.044)	(0.044)
Constant	0.552***	0.604***	0.553***	0.607***
	(0.098)	(0.103)	(0.101)	(0.107)
File FE	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes
R-squared	0.014	0.015	0.014	0.015
N	1,272	1,272	1,240	1,240

Indirect discrimination: Baseline results

Table 4: Applicant gender and guarantor requirements

Dependent variable: Guarantor dummy				
	[1]	[2]	[3]	[4]
Female applicant	0.068**	0.068**	0.069**	0.070**
	(0.029)	(0.029)	(0.030)	(0.030)
Participant is female	-0.026	-0.033	-0.020	-0.027
	(0.032)	(0.031)	(0.033)	(0.032)
Participant experience (years)	0.002	0.003	0.003	0.003
	(0.005)	(0.005)	(0.006)	(0.006)
Participant age (years)	0.002	0.002	0.001	0.002
	(0.004)	(0.004)	(0.004)	(0.004)
Participant is supervisor	0.036	0.035	0.044	0.042
	(0.042)	(0.042)	(0.043)	(0.043)
Participant risk aversion		0.014		0.015
		(0.012)		(0.013)
Participant gender bias (IAT)			-0.038	-0.038
			(0.063)	(0.062)
Constant	0.036	-0.031	0.065	-0.007
	(0.120)	(0.137)	(0.121)	(0.138)
File FE	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes
R-squared	0.064	0.063	0.062	0.061
N	772	772	752	752

City variation

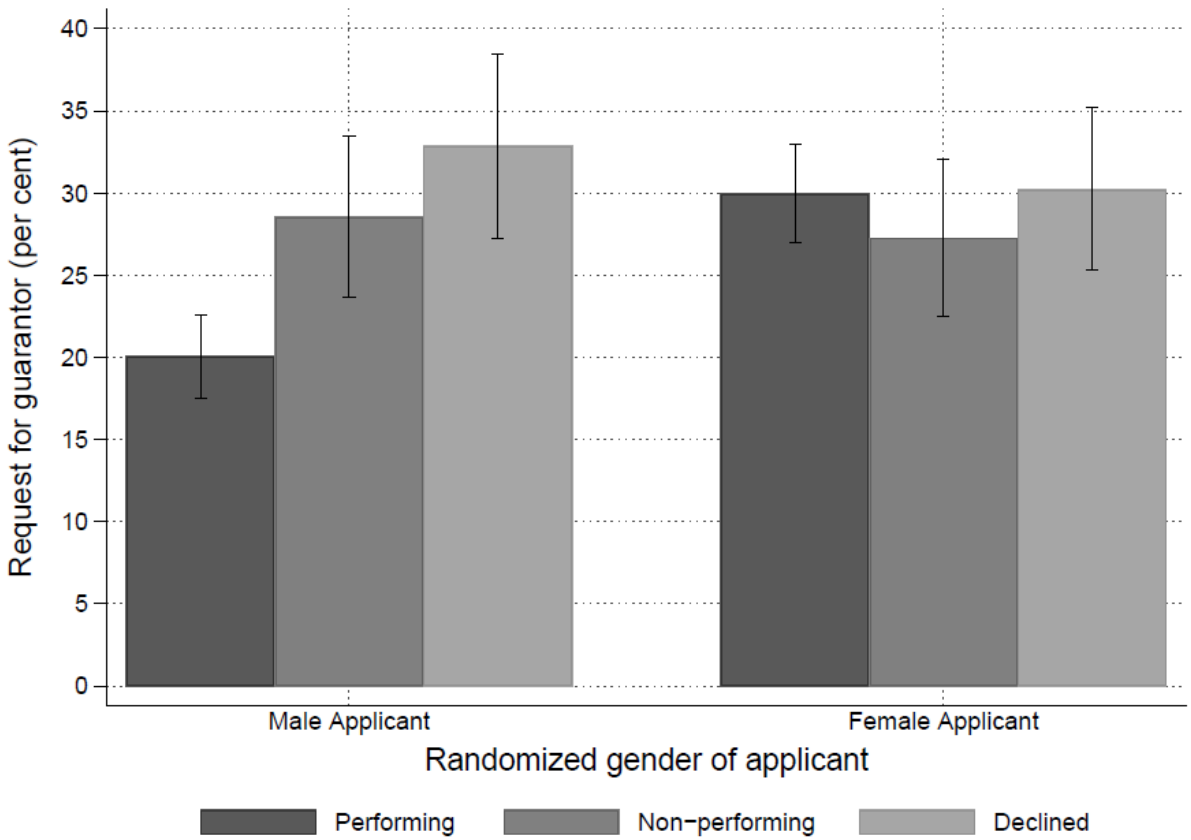
Indirect discrimination: Loan officer heterogeneity

Table 4: Applicant gender and guarantor requirements: Participant heterogeneity

Dependent variable: Guarantor dummy						
	Participant gender		Participant experience		Participant age	
	Female	Male	Below median	Above median	Below median	Above median
	[1]	[2]	[3]	[4]	[5]	[6]
Female applicant	0.082	0.078	0.106**	0.032	0.121**	0.013
	(0.052)	(0.049)	(0.052)	(0.046)	(0.050)	(0.040)
R-squared	0.107	0.080	0.097	0.077	0.136	0.037
N	338	414	341	411	325	427
t-test p-value	0.473		0.108		0.035	
	Participant position		Participant risk aversion		Participant gender bias	
	Officer	Supervisor	Below median	Above median	Below median	Above median
	[7]	[8]	[9]	[10]	[11]	[12]
Female applicant	0.130***	-0.022	0.067	0.087*	0.022	0.119**
	(0.038)	(0.061)	(0.065)	(0.044)	(0.051)	(0.046)
R-squared	0.117	0.034	0.161	0.041	0.063	0.090
N	471	281	214	538	381	371
t-test p-value	0.008		0.389		0.055	
Participant covariates	Yes	Yes	Yes	Yes	Yes	Yes
File FE	Yes	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes	Yes

Indirect discrimination affects loans that perform well

Figure 4: Guarantor requirements, by loan quality and applicant sex



Specific types of loan officers hold women to a higher standard

Table 5: Applicant gender, guarantor requirements, and real-life loan performance

Dependent variable: Guarantor dummy								
	All		Performing loans					
	Loan in real life		Participant gender		Participant experience		Participant age	
	Performing	NPL & Declined	Female	Male	Below median	Above median	Below median	Above median
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Female applicant	0.124***	-0.022	0.119**	0.113	0.145**	0.076	0.157**	0.092*
	(0.040)	(0.047)	(0.057)	(0.071)	(0.063)	(0.057)	(0.069)	(0.049)
R-squared	0.083	0.064	0.139	0.114	0.132	0.100	0.170	0.063
N	449	303	207	242	208	241	201	248
t-test p-value	0.008		0.466		0.175		0.196	

	Participant position		Participant risk aversion		Participant gender bias	
	Officer	Supervisor	Below median	Above median	Below median	Above median
	[9]	[10]	[11]	[12]	[13]	[14]
Female applicant	0.161***	0.035	0.059	0.137**	0.102	0.161***
	(0.051)	(0.077)	(0.078)	(0.057)	(0.063)	(0.053)
R-squared	0.174	0.062	0.243	0.059	0.105	0.130
N	280	169	122	327	217	232
t-test p-value	0.060		0.171		0.207	
Participant covariates	Yes	Yes	Yes	Yes	Yes	Yes
File FE	Yes	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes	Yes

To sum up

- Lab-in-the-field experiment with 334 Turkish loan officers
- No evidence of direct gender discrimination...
- ... but strong evidence of gender-biased guarantor requirements (+30%)
- Concentrated among young, inexperienced, and gender-biased loan officers
- Costly to the bank...

Implications

- Evidence points mostly to implicit discrimination
  1. Biased guarantor decisions correlate with IAT score
  2. Taste-based? No impact on direct lending decisions...
  3. Statistical? Info availability has no gendered impact and discrimination does not improve loan quality (but: experience matters)

- *"not only the institutional and governance structure of financial institutions matters, but also the gender of the people operating in a given bank structure"* (Beck et al., 2013, p.5)

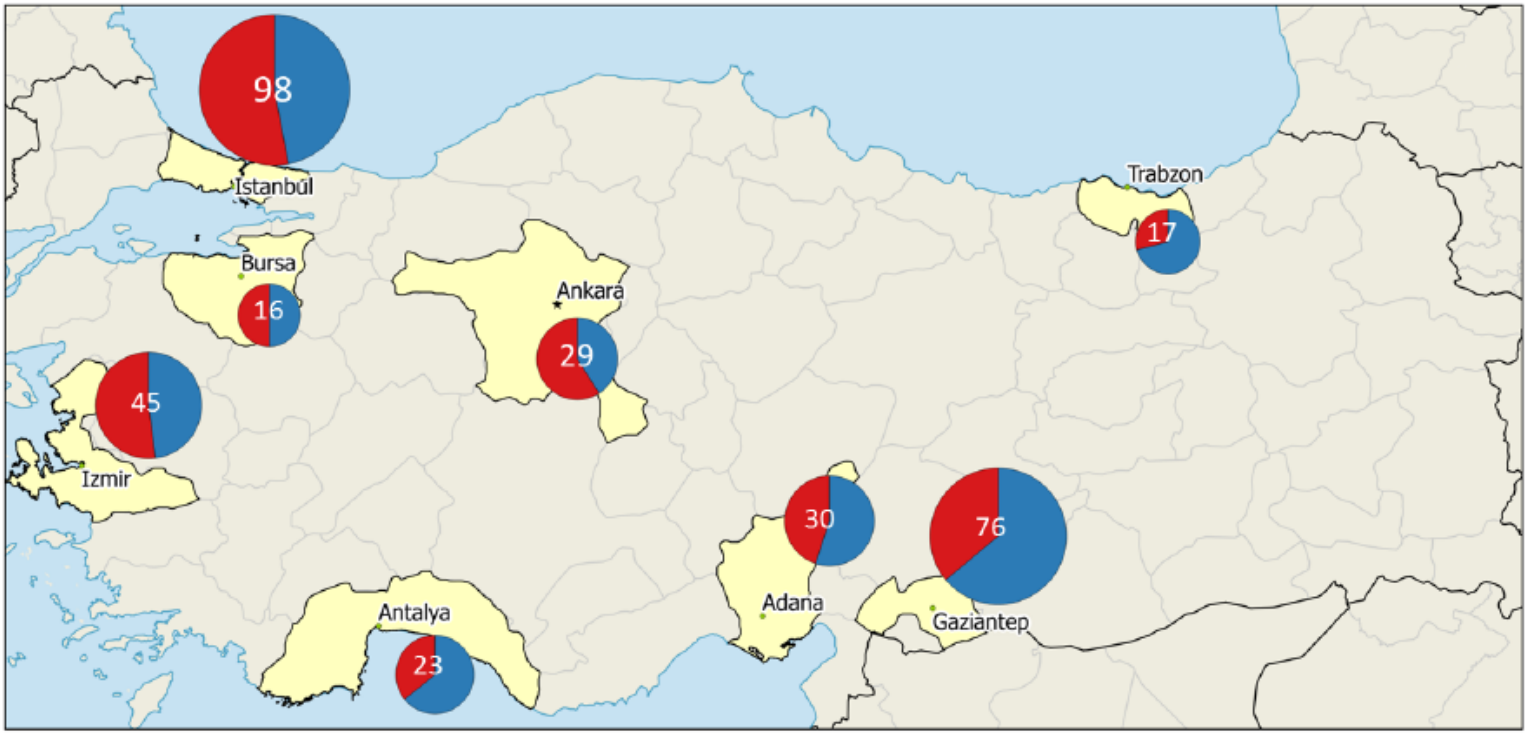
- Our results: Underlying officer traits–implicit gender bias and experience, which correlate with gender–are more important than gender as such

Thank you!

For further comments and suggestions: brockm@ebrd.com

Field setting

Figure 1: Geographical distribution of participants across the Turkish bank branches



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Incentive scheme (I)

- Each review completed: 10 lira
- Correct approval of a performing loan: 5 lira
- Incorrect approval of NPL: -5 lira
- Approval of declined file: 50/50 chance of earning 5 lira
- At the end, earnings summed and participants ranked
- Depending on earnings quartile, higher valued prized could be picked in local "shop"

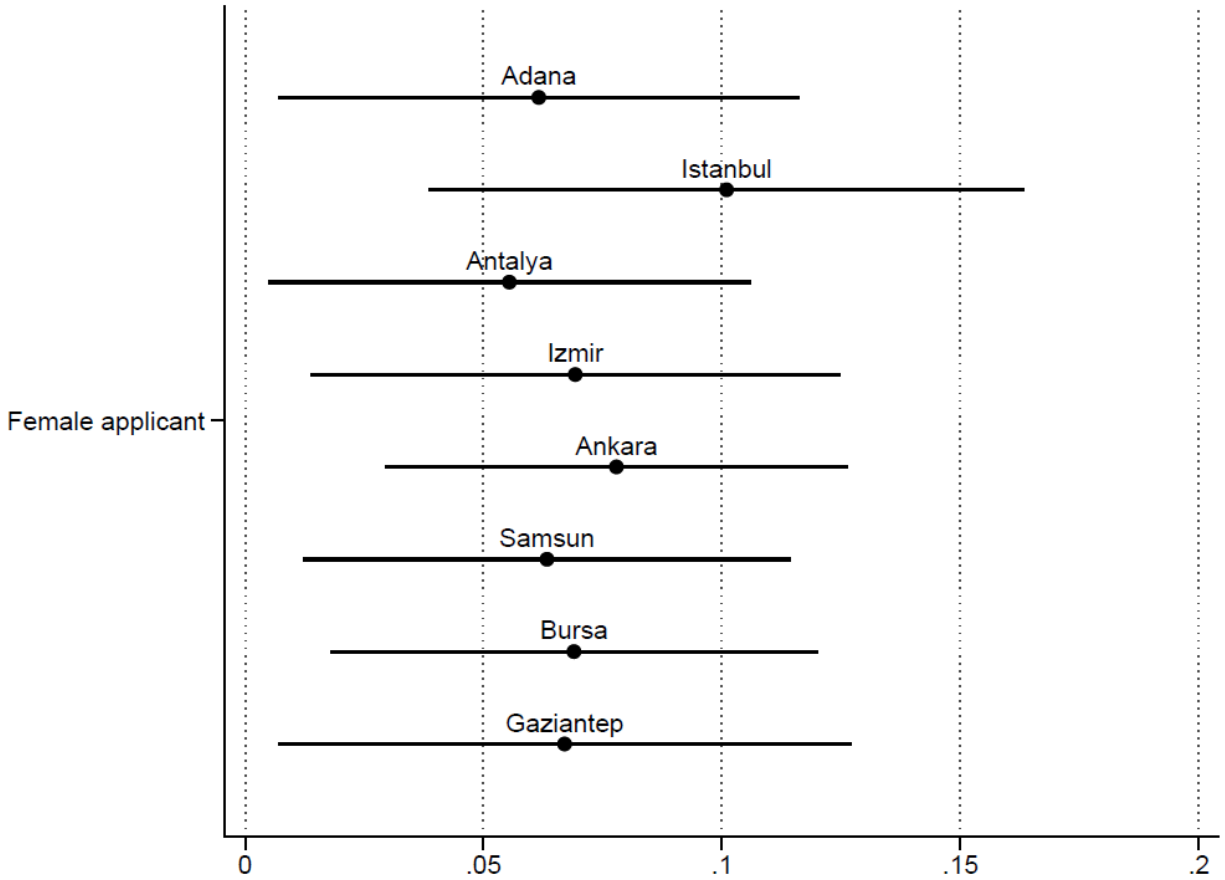
Return

Incentive scheme (II)

Return

Indirect discrimination: City variation

Figure A2: Indirect gender discrimination: City variation



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