

Gender Bias in SME Lending

Experimental Evidence from Turkey

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Africa Gender Innovation Lab

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Abstract

Gender disparities in small and medium-size enterprise lending exist around the world and impede the growth of millions of women-led firms. This paper examines a potential driver of these disparities: gender-biased loan officers. Officer bias is measured through a novel loan application experiment conducted with 77 loan officers in Turkish banks. The analysis finds that 35 percent of the loan officers are biased against female applicants, with women receiving loan amounts \$14,000 lower on average

compared with men. Experience in the banking sector can attenuate this bias, with each year of experience reducing gender biased loan allocations by 6 percent. The results suggest that loan officers may use gender bias as a heuristic device given limited information and risk aversion. Helping newly recruited and lesser experienced loan officers to better discern loan application quality may thus improve financing of business loans to women and reduce gender gaps in entrepreneurship.

This paper is a product of the Africa Gender Innovation Lab and the Finance, Competitiveness and Innovation Global Practice. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at <http://www.worldbank.org/prwp>. The authors may be contacted at adonald@worldbank.org.

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Gender Bias in SME Lending: Experimental Evidence from Turkey

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1 Introduction

A gender gap in access to finance between male- and female-owned businesses has persisted for decades. Some 70% of formal women-owned SMEs in developing countries are either shut out by financial institutions or unable to receive financial services on adequate terms to meet their needs, facing an estimated annual credit shortage of \$1.5 trillion (IFC 2017). Women-owned businesses are more likely to be rejected for loans and receive smaller loans on average compared to their male counterparts (Demirgüç-Kunt et al. 2018). This lack of capital not only impedes women-owned firms from reaching their full growth potential but constrains economic growth as well.

In many countries, adverse policy, legal and regulatory environments, along with discriminatory social and cultural norms, constrain access to finance for women-owned SMEs. Among these many drivers, one of the potential causes of the gender gap is that women are discriminated against by financial institutions. That is, women may be less likely to receive a loan of similar size given the same traits and business characteristics as male counterparts (henceforth referred to as “gender bias”). However, the evidence to verify this belief has largely come from discrimination as a “residual” unexplained factor driving gender gaps in the data (Oaxaca 1973), from female bank clients’ reports of discrimination (e.g., Oxfam 2018) or from observational studies.

Existing observational studies focus on higher-income countries. Cavalluzzo and Cavalluzzo (1998) use data from the National Survey of Small Business Finances and find no gender discrimination in the probability to be granted a credit or in the probability of a higher interest rate in the U.S. credit market. Riding and Swift (1990) use a Canadian national survey and find no discrimination in rates of loan approvals or interest rates, but they do find evidence for gender bias in collateral requirements. In the United Kingdom, Coleman (2000) also finds that women are more likely to be asked to pledge collateral and that credit is granted at a higher price.

Bellucci et al. (2010) use data from a major Italian regional bank and find that female-owned businesses are not discriminated against in the pricing terms of their loan contracts, but they

are disadvantaged vis-à-vis their male counterparts in terms of collateral requirements and credit availability. Likewise, Alesina, Lotti and Mistrulli (2013), working with Italian banks, show that women pay higher interest rates even when they have a better credit history. Agier and Szafarz (2013), using a database comprising 34,000 loan applications from a Brazilian microfinance institution, revealed no gender bias concerning credit denial but found a “glass ceiling” effect: the inequalities between the amounts of loans granted to women and men increased with the size of the applicant’s project.

To the best of our knowledge, the only existing experimental evidence on this topic is a study by Fay and Williams (1993), who mailed constructed scenarios of applications for loan finance to loan officers of major trading bank branches in New Zealand. The scenarios were identical in all respects except for the sex and education level of applicants, and loan officers were asked whether they would approve loan finance for the proposed business purchase and to indicate factors that contributed to their decisions. They find that education was considered a more important factor for women than for men among educated applicants, and that among applicants with a high school degree, women were less likely to be granted a loan.

To know how to address gender bias in loan allocation, we need to understand its causes. To date, the primary driver explored in the empirical literature is that of the gender of the loan officer. This line of research concerns “taste-based” discrimination (Becker 1971), and centers on loan officers (and in particular, male loan officers) having unfavorable attitudes towards female applicants *because* they are women. Wilson et al. (2007) find no significant differences between men and women loan officers’ perceptions of borrowers, while Carter et al. (2007) find that male and female loan officers do not pay the same attention to loan application criteria. Ravina (2012) found that borrowers are more likely to be granted loans if they deal with a loan officer of the same sex. Lastly, Beck et al. (2018) find that borrowers matched with opposite-sex loan officers pay higher interest rates.

Another relevant body of literature for understanding potential drivers of gender bias in loan allocation comes from behavioral science and psychology. This literature shows that individuals make biased decisions in estimating probabilities of an event in the context of uncertainty (Tversky and Kahneman 1974). One of these biases is that of representativeness, where in the absence of information on the probability of an event, people rely on believing that two similar things or events are more closely correlated than they are. In the case of loan

officer decision making, a loan officer cannot know with certainty whether a loan to a potential borrower is going to be performing or non-performing. Loan officers could then associate the applicant entrepreneur to a given, visible category ('female entrepreneur') and assign to this applicant generalized attitudes towards female entrepreneurs, resulting in a biased estimation of the probability of default. This estimation is biased when the loan officer has incorrect information on the true underlying distribution of creditworthiness by gender. Over time, this information may be updated to be closer to the true distribution, resulting in less discrimination. Although this phenomenon has not been explicitly investigated in the context of gender bias and loan officers, lab studies in psychology have found that individuals use gender as a heuristic when they lack a database of concrete situational experiences on which to base their judgments (e.g., Robinson et al. 1998). This implies that loan officers with less experience may rely more on rule-of-thumb heuristics, such as female borrowers being riskier or less deserving of a large loan.

We test this hypothesis in what follows, presenting results from an experimental study of gender bias among loan officers in Turkey. The experiment was conducted under the aegis of a World Bank lending operation, the Inclusive Access to Finance Project, which incentivizes commercial banks to lend to small and medium-size enterprises (SMEs). The project was designed to improve access to longer-term finance for women-owned and women-managed SMEs in Turkey. By conducting a lab-style experiment with a sample of loan officers in Turkish banks, we test whether gender bias is present in loan officer decision-making and examine which bank and loan-officer characteristics drive this gender bias.

We find that 35% of loan officers are biased against female applicants, with women applicants receiving approximately \$14,000 lower loan amounts on average compared to male applicants. Experience in the banking sector can however attenuate this bias, with each year of experience reducing gender biased loan allocations by 6 percent, but only among lower-risk applications in which gender bias is most prevalent. This result remains robust to controlling for a host of officer- and bank branch-characteristics as well as regional fixed effects. It does not appear to be driven by more experienced officers' age or managerial status, or survivorship bias (i.e., less biased loan officers staying on the job longer).

Our results suggest that loan officers may use gender bias as a heuristic device given limited information and risk aversion. Helping newly recruited and lesser experienced loan officers to

better discern loan application quality may thus improve financing of business loans to women and reduce gender gaps in entrepreneurship. We proceed as follows. Section 2 provides background on the Turkish banking sector and gender gaps in access to finance. Section 3 presents the data and empirical strategy. Section 4 presents the main results, while Section 5 provides additional robustness checks. Section 6 discusses and concludes.

2 Context

While Turkey's financial sector has made significant strides in outreach to SMEs over the past two decades, a significant gender gap persists between male and female owned SMEs' access to finance. In general, the Turkish financial sector is dominated by banks, and lacks the breadth one would expect given the size of the economy and compared to peers. Banks account for around 90 percent of total assets in the financial sector, growing rapidly over the past decade with assets reaching 104 percent of GDP at the end of 2017. Non-bank financial institutions are small by peer emerging market levels—insurance and pension fund assets each constitute around 2 percent of the financial sector. Banks therefore are the dominant player in Turkey's financial sector and are for this the reason the focus of the present study. Overall, capital market intermediation remains low, and all lenders face several structural constraints, including maturity and currency mismatches, which limit their liquidity and appetite to lend to SMEs.

The Turkish economy can benefit from enhanced access to finance to underserved segments which would enable more firms to grow and increase employment and productivity. Although there have been some reform efforts in recent years, access to finance is reported as the biggest obstacle to firms' operations by 19.5 percent of firms of all sizes, more frequently than all other business environment obstacles except tax rates (WBG Enterprise Survey (ES) 2015). Another recent survey (2018 SAFE) by the EU shows that only 29 percent of firms in Turkey received the full amount of the loan they asked for.

Turkey's female-led enterprises most acutely face access to finance constraints. Data show that they have fewer open lines of credit or outstanding loans amounting to lower values, facing stricter collateral requirements, and citing access to finance more frequently as a serious obstacle (ES 2015). The enterprise sector in Turkey is male dominated. According to the World Bank Enterprise Survey 2015, of a sample of 5,994 businesses, only 7 percent have a female top manager, and only close to 13 percent have at least one female owner. Mirroring the gender

gap in access to finance among individuals in the country (25 percentage points difference between women and men in terms of owning an account at a financial institution, and 10 percentage points difference in borrowing from a financial institution), female-owned enterprises have lower access to finance compared with male-owned enterprises.

The gender differences in access to finance are pronounced when looking at firms which have at least one female owner. Regardless of the share of women, these enterprises are disadvantaged in several aspects. When compared to male-only-owned firms, on average they are less likely to have a checking or savings account, overdraft facilities and active loans from a financial institution. Moreover, male-owned firms have an overall larger value of outstanding loans. Female businesses are also less likely to have applied for a new loan or line of credit in the past year. Fewer applications may be partially explained by the fact that although there is no significant difference in the share of female and male enterprises reporting collateral as the reason for not applying for a new loan, women-owned business require a substantially larger amount of collateral (ES 2015). All these factors depict an unfavorable environment in terms of access to financial instruments for women-owned businesses.¹

The differences outlined above are partly a result of structural differences between male-owned and female-led firms in Turkey – the latter are typically smaller in size and younger. However, explicit or implicit bias by loan officers may play a role in credit allocation decisions, based on the international experience reviewed in Section 1 (in particular, Beck et al. 2018, Calcagnini et al. 2015, Alesina et al. 2013). The nation-wide survey of bank loan officers commissioned by the World Bank suggests that women-owned enterprises in Turkey are more likely to suffer from bias in the credit market compared with men-owned enterprises, independent of their credit risk. Alleviating this bias can help ease access to finance constraints for women-owned businesses and close the gender business performance gap both in Turkey and more broadly in countries across the world which face similar gender gaps in SME lending.

¹ An important caveat from the Enterprise Survey data is that firms managed but not owned by women do not appear to face similar constraints. There is no significant difference between male and female-managed firms when it comes to having a savings account, an overdraft facility or a line of credit with a financial institution. The number of loans requested and the loan approval rate are also similar, as well as the number of days waited to receive the loan and the collateral requested (ES, 2015).

3 Experimental Design

The sampling frame for this study consists of a database of loan officers in banks across Turkey.² Bank branches were randomly selected after stratification by region (NUTS-1) and then one loan officer per branch was randomly selected and contacted. Seventy-seven officers in charge of assessing credit applications of small and medium enterprises (SMEs) in branches of commercial public or private banks in Turkey were surveyed through this process. While the initial random sample of 150 bank branches was constructed to be nationally representative, we do not make claims of representativeness in this paper due to the 51% response rate observed, which may be driven by attributes related to our outcome of interest. However, it is worth noting that bank branches and loan officers were not informed before starting the survey that they would be asked about gender differences in loan allocation.

Loan officers were invited to take the survey via email, and then prompted via telephone reminders to minimize nonresponse. Modules included questions on the socio-demographic characteristics of the banker (age, gender, marital status, education, years working in the banking sector and in the current bank, seniority), as well as questions on the gender of their manager, loan application and revision volume, and criteria they use when reviewing loan applications. Summary statistics for the sampled loan officers are provided in Table 1. Of the 77 loan officers, 15 are women and 62 are men. They are relatively experienced, having worked in the banking sector for approximately 10 years on average. However, the distribution of experience is wide and ranges from 1 year to 22 years. Moreover, we observe that most of the sampled officers have spent much of their career in the same bank, having worked in the bank where they are currently working for an average of 8 years.

Table 1 also provides context on the bank branches in which the loan officers operate. Women-owned SMEs account on average for 16% of applications (as self-reported by loan officers). On average, 64% of applications are granted a loan; among women-owned SME applications this is 47%. Of the sample under study, 18% considers Turkish banks to be biased against granting credit to female entrepreneurs vs. male entrepreneurs. This percentage rises to 33.3% among women and decreases to 14.5% among male respondents.

² Information on the bank branches was retrieved from the Banks Association of Turkey's website at <https://www.tbb.org.tr/tr/bankacilik/banka-ve-sektor-bilgileri/banka-bilgileri/subeler/65>.

Table 1. Summary Statistics – Loan Officers

	Mean	SD	N
Panel A: Demographics			
% Female officers	19.48	0.40	77
Age	34.49	4.52	77
Married [yes=1]	0.83	0.38	77
N. years of Education	16.18	1.60	77
Panel B: Sector Experience			
N. years in banking sector	9.98	4.77	77
N. years in current bank	7.77	4.95	77
% of officers with managerial level position	31.17	0.47	77
Panel C: Gender Bias			
% of loan officers who consider Turkish loan officers gender biased against female owned SMEs	18.18	0.39	77
% of female loan officers who consider Turkish loan officers to be gender biased against female owned SMEs	33.33	0.49	15
% of male loan officers who considers Turkish loan officers to be gender biased against female owned SMEs	14.51	0.36	62
Panel D: SME Loans			
Av. no of loan applications made to branch monthly in last 12 months	182.39	253.79	77
Av. no of SME loan applications assessed by loan officer monthly in the last 12 months	98.13	218.22	77
% of SME loans submitted by majority women-owned firms	15.97	24.97	77
% of SME loan applications made to branch and granted credit	63.88	22.71	77
% of women-owned SME loan applications made to branch and granted credit	47.12	32.76	77

Note: Position level in current bank is a categorical variable which takes the following values: 1 Entry level, 2 Intermediate level and 3 Managerial level. The mode and median for position are 2 and 2 respectively. Amount of credit requested is reported in Turkish Lira.

The survey also included a loan application experiment to test the loan officer's degree of implicit gender bias. This test consisted of presenting four fictional loan applications to loan officers (Appendix Figure 1). These included two applications submitted by women and two submitted by men; within each, one application was for a high-risk business and one for a low-

risk business, allowing us to estimate gender bias for different risk profiles. Within the risk group, the applications were constructed to be virtually identical except for the gender of the applicant. The participants were asked to evaluate the cases and to distribute up to TRY 2,000,000 (approximately \$350,000) across the four applications. The experiment was administered at the start of the survey, just after the demographic information section and before the questions on the commercial credit process and gender.

The officers could reject an application completely by granting it TRY 0 of credit. Loan officer gender bias is then measured as the difference between the loan amount granted to men and to women in the loan experiment described above. Our empirical strategy consists of regressing the degree of gender bias on loan officer and bank branch characteristics as follows:

$$Y_{ij} = \alpha + \delta X_{ij} + \gamma Z_{ij} + \lambda_j + e_{ij} \quad (1)$$

where Y_{ij} is the difference between the loan amount granted to men and to women in the loan experiment outcome indicator for loan officer i in region j . X_{ij} is a vector of loan officer characteristics (containing the variables included in Table 1, such as gender of the loan officer, education level, marriage status) and Z_{ij} is a vector of branch characteristics. Region fixed effects (λ_j) account for geographical differences in unobservable variables, where regions correspond to the NUTS-1 administrative divisions. We estimate this equation in what follows, progressively adding loan officer and branch characteristics. In addition to pooling across risk-levels, we also estimate (1) separately for high and low risk applications to see if the level of risk spurs greater or less gender discrimination.

4 Results

4.1 Prevalence of gender bias among loan officers

The average difference between the amount granted to men and women in the sample is on average TRY 78,051.95 (approximately \$14,000), which corresponds to an 8.1% greater loan size allocated to male applicants. The discrepancy is much larger in the low-risk application: on average TRY 70,130, compared to TRY 7,922 in the high-risk application. This corresponds to a 9.5% higher loan share allocated to the low-risk male applicant compared to the low-risk

female loan applicant, and a 3.5% higher loan share allocated to the high-risk male applicant compared to the high-risk male female applicant. In the latter, the loan size accorded to the male applicant is only 4% larger than to the female applicant and is not statistically significant. Moreover, when computing gender bias as a binary variable, equal to one when the value allocated to men is higher than the value allocated to women, we find that 35% of loan officers are gender biased. 33% percent of loan officers exhibit gender bias in the low-risk application allocation, versus 17% in the high risk. These summary statistics are reported in Table 2.

Table 2. Average amount of TRY loans assigned to each application by application risk and gender

	(1) Female	(2) Male	(3) Difference (1-2) [p-value]	Any Gender Bias
Amount Allocated	960,974	1,039,026	-78,051.95* [0.027]	0.35
Low-Risk Amount Allocated	737,272.7	807,402.6	-70,129.87* [0.034]	0.33
High-Risk Amount Allocated	223,701.3	231,623.4	-7922.08 [0.158]	0.17

When running a simple t-test of whether the amount granted to women is statistically significantly lower than the amount granted to men, we find that both the overall amount allocated and the low-risk amount allocated are statistically significant at the 5-percent level, while the high-risk amount allocated is not statistically significant at conventional levels (p-value = 0.158).

4.2 Determinants of gender bias

Next, we regress the degree of loan officer gender bias on years of experience of the loan officer and other socio-demographic officer control variables. Region fixed effects are included to average out any between-region variation that may render results less precise.

Table 3. Determinants of Gender Bias

Variables	(1) Gender Bias	(2) Proportional Gender Bias
Number of years in banking sector	-23940.3** (8882.9)	-0.0194* (0.00929)
The officer is a woman [yes=1]	216309.6 (143496.7)	0.270 (0.171)
Years of education	27738.0 (55837.0)	-0.0316 (0.0336)
The officer has a manager level position [yes=1]	119268.8 (134277.8)	-0.0410 (0.117)
Married [yes=1]	21687.0 (81508.1)	0.00419 (0.127)
Constant	-229045.4 (918873.7)	1.778** (0.576)
Observations	77	76
Number of Regions	11	11

Note: Robust standard errors in parentheses. The variables: the officer is a woman, the officer has a manager level and married are all dummy variables. Specification (2) has 76 respondents because the outcome of interest, proportional gender bias, cannot be calculated for one respondent. The % impact on gender bias of 1 additional year of banking experience in specification (1) is -10%. *** p<0.01, ** p<0.05, * p<0.1

Table 3 shows that experience in banking is strongly and significantly negatively related to gender bias. Specifically, both the absolute difference between the loan value allocated to the fictional male applicant and that allocated to the female applicant (“gender bias”) and the amount allocated to the male applicant expressed as a proportion of that allocated to the female applicant (“proportional gender bias”) decrease as the loan officer’s years of experience increase. The latter number indicates a 2-percentage point drop for every additional year of experience, an economically meaningful number given the degree of average tenure length in the banking sector. Computing the semi-elasticity of our coefficient on experience in the regression reported above, i.e., $(1/y) \cdot dy/dx = d(\log y)/dx$, yields -.057, implying that each additional year of experience is associated with a 6% reduction in gender bias.

Next, we investigate whether the determinants differ according to the riskiness of the applications in the loan experiment. As shown in Appendix Figure 1, riskier firms had loan applications that showed them to be younger, have a smaller asset size and a higher debt to equity ratio. Table 4 shows that the impact of increased experience in the banking sector on

reducing gender bias is negative for both high-risk and low-risk applications, but it is larger in magnitude and only statistically significant in the latter category.

Table 4. Determinants of Gender Bias by Risk Level

Variables	(1) Gender Bias in Lower Risk Applications	(2) Gender Bias in Higher Risk Applications
N. years in banking sector	-22118.5** (8352.5)	-1821.8 (1221.8)
The officer is a woman [yes=1]	217362.8 (139715.3)	-1053.1 (17434.8)
N. of years of education	34202.1 (53672.9)	-6464.1 (3485.9)
The officer has a manager level position [yes=1]	107140.1 (128774.4)	12128.6 (15218.6)
Married [yes=1]	20656.0 (74234.2)	1031.0 (17895.8)
Constant	-355331.1 (886842.7)	126285.6 (67199.2)
Observations	77	77
Number of Regions	11	11

Note: Robust standard errors in parentheses. The variables: the officer is a woman, the officer has a manager level and officer is married are both dummy variables. *** p<0.01, ** p<0.05, * p<0.1

We augment our model with a range of bank branch characteristics to further isolate the effect of loan officer experience in Table 5. We control for the average amount of credit requested by male- and female-entrepreneurs to the bank, the percentage of majority-female owned companies among all loan applicants reviewed, the share of applications that are granted credit per month among female-led applications, and a dummy capturing whether the loan officer's supervisor is a woman.

Table 5. With Branch Characteristics Controls

Variables	(1)	(2)	(3)
	Gender Bias	Gender Bias for Low Risk	Gender Bias for High Risk
N. years in banking sector	-26691.7** (10080.9)	-25126.5** (9625.1)	-1565.1 (1000.5)
The officer is a woman [yes=1]	210805.1 (138314.7)	211823.4 (131493.9)	-1018.3 (20175.7)
N. of years of education	27489.1 (56103.8)	35196.3 (53599.7)	-7707.1* (3759.0)
The officer has a manager level position [yes=1]	140065.6 (159668.5)	125526.4 (153689.6)	14539.1 (18977.7)
Married [yes=1]	3309.6 (82562.0)	10700.7 (71250.4)	-7391.1 (22282.0)
Amount of credit requested by women-owned firms	0.00920 (0.012)	0.00618 (0.011)	0.00302 (0.004)
Amount of credit requested by men-owned firms	-0.00212 (0.004)	-0.000539 (0.004)	-0.00158 (0.001)
% of SME loans submitted by majority women-owned firms	587.8 (1025.9)	812.8 (1008.5)	-225.0 (405.2)
% of women-owned SME loan applications made to branch and granted	1318.8 (1252.1)	1390.9 (1205.2)	-72.09 (213.4)
The officer's supervisor is a woman [yes=1]	-130391.3 (82014.7)	-129277.1 (83261.2)	-1114.2 (6174.1)
Constant	-210711.9 (889052.2)	-371763.7 (849091.3)	161051.8* (80170.6)
Observations	77	77	77
Number of Regions	11	11	11

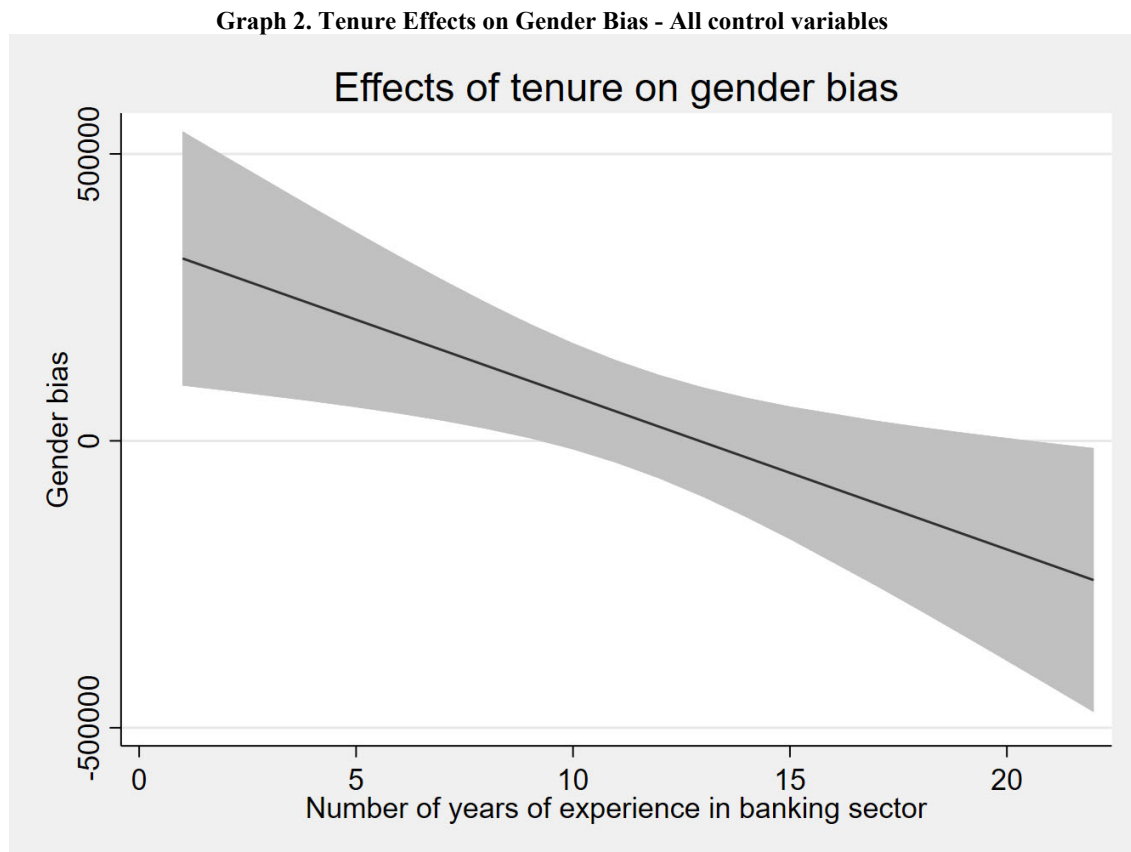
Note: Robust standard errors in parentheses. The variables: the officer is a woman, the officer has a manager level, officer is married and the officer's supervisor is a woman are all dummy variables *** p<0.01, ** p<0.05, * p<0.1

The effect of experience stays robust, and even increases in magnitude compared to results in Table 3. Furthermore, we notice the same pattern as in Table 4, with significant negative effects of experience on gender bias among low-risk loan applications, and negative but insignificant effects among high-risk applications. Finally, we note that the education of the loan officer has a negative link to gender bias among high-risk loan allocations.

The previous tables show that loan officers' experience reduces gender bias in loan allocation decisions, but that this effect differs depending on the potential performance of the loan. Since the loan amount granted to high risk and low risk applications differs substantially in the experiment, we standardize the gender gap loan variables in order to allow a better comparison

of the coefficient. We find that for every standard deviation unit increase in experience in the banking sector, the gender loan gap diminishes by 0.37 standard deviations overall and 0.36 among low risk loans (Appendix Table 2). We also note that a one standard deviation increase in education reduces gender bias in high risk loans by 0.18.

We represent the effects of experience on gender bias graphically in Graph 2 below, which plots the Table 5 coefficient of gender bias regressed on loan officer experience controlling for all other covariates. The graph shows the effect declining with experience and highlights a threshold point at around 11 years of experience. After this point, the sign of the gender bias appears to flip to a pro-female applicant effect, though the point estimate is not statistically different from zero.



Our results show that although gender-biased decisions are widespread among loan officers, those inequalities appear to be in part driven by a lack of experience. Further, the negative and significant effect of experience on unequal allocation to low risk applications and the negative

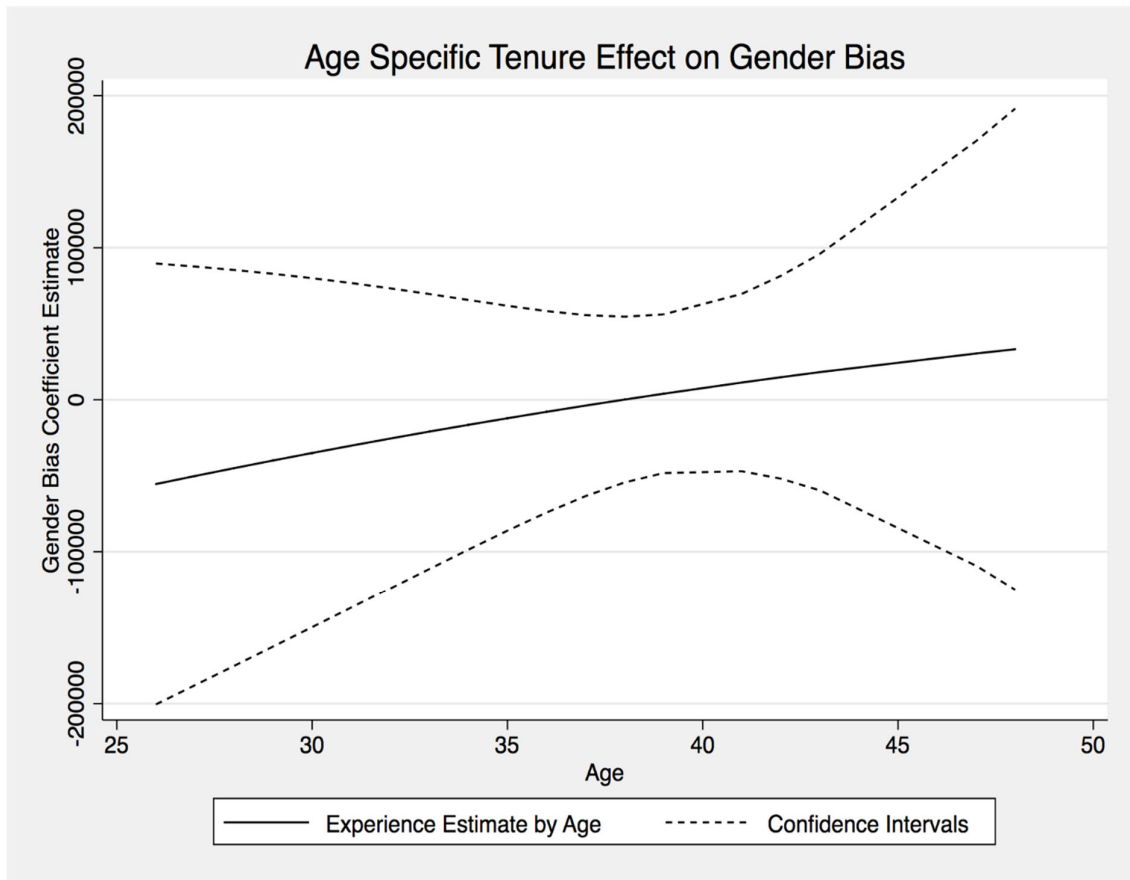
effect of the education level on the loan gap for high risk applications suggest that bankers may resort to a stylized, stereotypical view of women entrepreneurs when the banker is not skilled enough to decide based only on firm characteristics. Moreover, when the business fundamentals are self-evidently riskier (smaller and younger firms with higher debt loads) in the application, the heuristic is less necessary. Hence, we see lower levels of discrimination and experience mattering a lot less.

5 Robustness

In Section 4, we document a large and robust relationship between loan officers' experience levels and lower gender bias in their loan allocation. When thinking about potential policy responses to this pattern, it is important to rule out alternative scenarios: the result being driven entirely by age or position within the banking hierarchy rather than experience, or the result being driven by non-gender biased (or indeed, pro-female applicant) loan officers surviving on the job longer.

Given our small sample and high collinearity between age and experience (correlation coefficient = 0.89), it is not possible to cleanly disentangle the effect of experience. However, to show that experience ('tenure') still has explanatory power above and beyond age, despite the statistical limitations, we plot the coefficient of gender bias on years of experience in the banking sector for every year of age in Graph 3.

Graph 3. Age-Specific Tenure Effect on Gender Bias - All control variables



We note that the impact of experience varies across loan officer age and is thus not merely a linear function of age. Moreover, although the confidence intervals include zero, we note a suggestive upward slope of the curve. This indicates that at any given level of experience, loan officers' age may if anything *increase* gender bias.

A second possible confounder of our results is that they are driven by managerial status, rather than by increased experience, given that more experienced loan officers are also more likely to be managers.

Table 6. Interaction of Managerial Position & Tenure – all controls

Variables	(1) Gender Bias
N. years in the banking sector	-22,700.833** (9,560.019)
The officer has a manager level position [yes=1]	284,501.806 (210,340.702)
Managerial*number of years in banking sector	-13,303.585* (7,118.570)
The officer is a woman [yes=1]	212,694.745 (138,875.764)
N. years of education	20,850.621 (55,356.786)
Married [yes=1]	14,408.602 (81,743.965)
Avg amount of credit requested by women-owned SMEs	0.007 (0.012)
Avg amount of credit requested by men-owned SMEs	-0.001 (0.003)
% of SME loans submitted by majority women-owned firms	634.581 (991.676)
% of women-owned SME loan applications made to branch and granted credit	1,250.422 (1,310.930)
The officer's supervisor is a women [yes=1]	-120,580.624 (84,551.378)
Constant	-150,795.832 (875,054.629)
Observations	77
Number of Regions	11

Note: Robust standard errors in parentheses. The variables: the officer is a woman, the officer has a manager level, officer is married and the officer's supervisor is a woman are all dummy variables.

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

This is unlikely, given the positive and large (albeit insignificant) coefficient on managerial experience shown in Tables 4 and 5. To test this more formally, in the regression shown in Table 6, we interact managerial status with loan officers' years of experience. While the interaction term is significant, the coefficient on experience in the first line, which picks up the effect for non-manager loan officers, is also negative, significant and similar in magnitude to our earlier estimates. This indicates that the negative effect of increased experience on gender bias is not merely driven by managers.

Lastly, we turn to the possibility that loan officers who do not exhibit gender bias tend to stay in banking longer. For this to be true, more experienced loan officers should fundamentally differ from less experienced loan officers. We test this idea in Table 7, comparing average characteristics for less-than-average experienced loan officers with those for more-than-average experienced loan officers and showing whether their traits are significantly different.

Table 7. Balance Test – More vs. less-experienced officer characteristics

Variable	Mean (for less-experienced officers) (1)	Difference in Means (comparison with more-experienced officers) (2)
Number of years of education	16.400 (0.269)	-0.400 (0.365)
% female officers	0.114 (0.067)	0.148 (0.090)
Age	30.971 (0.536)	6.457*** (0.726)
% of loan officers who consider Turkish loan officers gender biased against both female or male owned SMEs	0.286 (0.072)	-0.095 (0.098)
% of loan officers who consider Turkish loan officers gender biased against female owned SMEs	0.229 (0.066)	-0.086 (0.089)
Av. no of SME loan applications assessed by loan officer monthly in the last 12 months	118.714 (36.992)	-37.738 (50.087)
% of SME loan applications made to branch and granted credit	59.400 (3.801)	8.219 (5.146)
% of SME loans submitted by majority women-owned firms (among those assessed by loan officer)	16.286 (4.249)	-0.571 (5.753)
% of women-owned SME loan applications made to branch and granted credit	42.171 (5.521)	9.067 (7.475)
Main criterion score: applicant's gender	1.314 (0.432)	0.281 (0.585)
relevance w: abstain from applying for belief of being rejected	5.114 (0.483)	-0.067 (0.655)
relevance w: do not know how to apply for a loan	5.914 (0.455)	-0.057 (0.616)
relevance w: application with missing documentation	3.857 (0.436)	0.310 (0.591)
relevance w: unrealistic plans on amount of credit requested	3.829 (0.407)	0.267 (0.551)
relevance w: unrealistic plans on payment schedule	3.629 (0.398)	0.490 (0.539)
relevance w: active in industries with lower credit score	5.743 (0.417)	-0.457 (0.565)
relevance w: do not know about credit/loan alternatives available	6.457 (0.409)	-0.386 (0.554)
relevance w: prefer to ask money from family and friends instead of bank loan	5.543 (0.501)	-0.543 (0.678)
relevance w: have considerable growth potential	5.371 (0.354)	0.176 (0.479)
relevance w: make credit payments on time	7.086 (0.358)	0.652 (0.485)
relevance w: own in general micro/small firms	7.857 (0.358)	0.310 (0.485)

Note: Experienced is a LO who has more than the average number of years of experience in the banking sector

In addition to the covariates already analyzed in the previous tables, Table 7 also includes loan officers' beliefs regarding female and male entrepreneurs from a separate section of the

questionnaire. In this section, officers were asked to score the relevance of different statements for women entrepreneurs using a scale between 1 “not relevant at all” to 10 “totally relevant”. The results show no significant differences across any of these loan officer dimensions except for age.

6 Conclusion

We conduct a loan allocation experiment with loan officers in Turkish banks and find evidence of gender bias that is both prevalent among the loan officer population and large in magnitude. Specifically, 35% of loan officers in our sample show a degree of gender bias against women, and on average the loan amount allocated to male-owned businesses in our experiment is 8 percent higher than that allocated to female-owned businesses. This bias is more pronounced in low risk loans.

Our analysis investigates the determinants of this gender bias and identifies loan officers’ experience in banking as the primary driver. That is, experience in sifting through loan applicants and reviewing portfolios of loans reduces the degree to which a loan officer uses gender as a salient determinant of loan-worthiness beyond business attributes. We also find that higher education levels among loan officers, perhaps suggesting a higher degree of technical knowledge, decrease the loan gender gap for high risk applications. These relationships do not appear to be driven by more experienced loan officers being older, more likely to be managers or having different attitudes or characteristics from less-experienced loan officers.

Our results suggest that loan officers may use gender as a heuristic device when determining the riskiness of a loan application, when they are not proficient enough to make a decision based only on firm characteristics. Experience in the banking sector can attenuate this bias among the less risky loans where gender bias is concentrated. Future work should investigate to what extent our identified mechanism generalizes to other settings.

Our results are relevant for the literature on bias in decision-making processes, highlighting how behavioral biases driven by uncertainty can magnify demographic bias on traits such as gender. Moreover, they also suggest that awarding more time to newer loan officers to review applications and delivering technical training on how to accurately assess loan worthiness

could reduce gender bias in SME lending, thus helping to close gender gaps in entrepreneurship outcomes. In addition to technical training to improve bankers' proficiency in the evaluation of loan applications, interventions could include sensitization on the prevalence of gender bias among loan officers with similar characteristics to the targeted loan officers, or the promotion of female entrepreneurs' success stories and information on the success rate of women-owned SME loans. Similar initiatives have been successful in other contexts (e.g., in reducing gender biases in student-teacher evaluations, as shown by Boring and Philippe 2017).

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8 Appendix

Appendix Figure 1. Loan Applications

Application A	Application B
<p>Owner of the firm: Zeynep Çelik Owner's age: 40 Owner's education: University graduate Firm sector: Food products manufacturing Firm founded in: 1996 Ownership structure: Privately-owned Total asset size: TRY 28,000,000 Turnover: TRY 15,800,000 Debt service coverage ratio: 0.93 Debt to equity ratio: 4.82 # of employees: 196 Facility: 6,000 m², privately-owned Clients: high number of bigger clients Suppliers: Mostly domestic suppliers, foreign suppliers Exports: constitute 25% of total sales Credit history: Good standing First time applying for a loan?: Yes Grants received: 0 TRY *All other relevant indicators are assumed to be the same as those of Firms B, C, D</p>	<p>Owner of the firm: Hakan Demir Owner's age: 41 Owner's education: University graduate Firm sector: Food products manufacturing Firm founded in: 1998 Ownership structure: Privately-owned Total asset size: TRY 29,500,000 Turnover: TRY 14,750,000 Debt service coverage ratio: 0.95 Debt to equity ratio: 4.76 # of employees: 200 Facility: 6,300 m², privately-owned Clients: high number of bigger clients Suppliers: Mostly domestic suppliers, foreign suppliers Exports: constitute 26% of total sales Credit history: Good standing First time applying for a loan?: Yes Grants received: 0 TRY *All other relevant indicators are assumed to be the same as those of Firms A, C, D</p>
<p>Loan amount assigned: _____</p>	<p>Loan amount assigned: _____</p>
Application C	Application D
<p>Owner of the firm: Ayşe Yılmaz Owner's age: 44 Owner's education: University graduate Firm sector: Food products manufacturing, big player Firm founded in: 1992 Ownership structure: Privately-owned Total asset size: TRY 32,000,000 Turnover: TRY 17,500,000 Debt service coverage ratio: 4.22 Debt to equity ratio: 1.05 # of employees: 222 Facility: 9,600 m², privately-owned Clients: high number of bigger clients Suppliers: Mostly domestic suppliers, foreign suppliers Exports: constitute 34% of total sales Credit history: Good standing First time applying for a loan?: Yes Grants received: 0 TRY *All other relevant indicators are assumed to be the same as those of Firms A, B, D</p>	<p>Owner of the firm: Mehmet Kaya Owner's age: 45 Owner's education: University graduate Firm sector: Food products manufacturing, big player Firm founded in: 1994 Ownership structure: Privately-owned Total asset size: TRY 38,500,000 Turnover: TRY 16,800,000 Debt service coverage ratio: 3.95 Debt to equity ratio: 0.86 # of employees: 181 Facility: 7,800 m², privately-owned Clients: high number of bigger clients Suppliers: Mostly domestic suppliers, foreign suppliers Exports: constitute 32% of total sales Credit history: Good standing First time applying for a loan?: Yes Grants received: 0 TRY *All other relevant indicators are assumed to be the same as those of Firms A, B, C</p>
<p>Loan amount assigned: _____</p>	<p>Loan amount assigned: _____</p>

Appendix Table 2. Branch Characteristics Controls and Standardized Variables

Variables	(1) Standardized Gender Bias	(2) Standardized Gender Bias for Low Risk	(3) Standardized Gender Bias for High Risk
N. years in banking sector (Standardized)	-0.365** (0.138)	-0.361** (0.138)	-0.108 (0.069)
The officer is a woman [yes=1]	0.605 (0.397)	0.638 (0.396)	-0.015 (0.293)
N. of years of education (Standardized)	0.126 (0.257)	0.169 (0.257)	-0.179* (0.087)
The officer has a manager level position [yes=1]	0.402 (0.458)	0.378 (0.463)	0.211 (0.276)
Married [yes=1]	0.009 (0.237)	0.032 (0.215)	-0.107 (0.324)
Amount of credit requested by women- owned firms (Standardized)	0.082 (0.109)	0.057 (0.106)	0.136 (0.172)
Amount of credit requested by men- owned firms (Standardized)	-0.063 (0.106)	-0.017 (0.110)	-0.239 (0.142)
% of SME loans submitted by majority women-owned firms (Standardized)	0.042 (0.074)	0.061 (0.076)	-0.082 (0.147)
% of women-owned SME loan applications made to branch and granted (Standardized)	0.124 (0.118)	0.137 (0.119)	-0.034 (0.102)
The officer's supervisor is a women [yes=1]	-0.374 (0.235)	-0.389 (0.251)	-0.016 (0.090)
Constant	-0.115 (0.280)	-0.127 (0.261)	0.032 (0.270)
Observations	77	77	77
Number of Regions	11	11	11

Robust standard errors in parentheses. The standardized variables: number of years in banking sector, number of years of education, amount of credit requested by women-owned firms, amount of credit requested by men owned firms, % of SME loans submitted by majority women-owned firms and % of women-owned SME loan applications made to branch and granted are Z scores, the variables: the officer is a woman, the officer has a manager level, officer is married and the officer's supervisor is a woman are all dummy variables.

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