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Discrimination and Access to Capital: Experimental Evidence from Ethiopia *

Shibiru Ayalew   Shanthi Manian   Ketki Sheth

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Access to capital is critical to business growth and productivity, yet female business owners are less likely to receive formal financing. Using a large-scale field experiment in Ethiopia, we show that gender discrimination by financial providers is unlikely to be a key contributor to this gap, and that there is no meaningful trade-off between gender equity and allocating capital to high-performing businesses. We study whether financial providers discriminated against female owners in a high-stakes capital allocation decision affecting real businesses in a national business plan competition. In a sample of 3,696 evaluations, we find no evidence that randomly assigned business-owner gender affected capital allocation decisions, neither for the competition prizes nor for consideration for a loan. Our confidence intervals are tight enough to exclude any meaningful gender discrimination in these decisions. Consistent with the lack of discrimination, an incentivized belief elicitation revealed that randomly assigned business-owner gender did not affect financial providers' beliefs about future business performance. Using a machine learning algorithm to predict actual business performance 18 months after the competition, we find that considering gender indeed does not improve targeting of capital towards high-performing businesses. The results provide support for the theoretical prediction that discrimination will not persist when it is not profit maximizing.

1   Introduction

Capital is a key accelerator for business growth and productivity, yet female business owners in many low-income countries are less likely to obtain formal financing and earn lower profits.[1] Gender discrimination by financial providers is widely believed to be a key contributor to these gaps.[2] Discrimination against female-owned businesses reduces female entrepreneurs' access to capital and diminishes the success of female-owned businesses. However, there is a concern that increasing capital access for female entrepreneurs comes at the cost of allocating capital away from high-performing businesses, and thus reducing financial provider profits.

Standard theories identify two possible sources of discrimination: preferences that favor allocating capital to one gender over another (i.e., taste-based discrimination (Becker, 1957)) or differing beliefs about the profitability of female-owned versus male-owned businesses (i.e., statistical discrimination (Arrow, 1974; Phelps, 1972; Aigner and Cain, 1977)). The Becker model implies that discriminatory financial providers will only remain in the market if discrimination is profit-maximizing. The theory of statistical discrimination demonstrates that it can indeed be profit-maximizing if discrimination is based on *accurate* beliefs (Bohren, Imas and Rosenberg, 2019). If financial providers aim to identify and target capital to high-performing businesses, and gender does in fact predict business performance, then gender-based discrimination may be an effective profit-maximizing strategy.[3] While these theoretical underpinnings suggest that discrimination should only persist when it is profit-maximizing, empirical studies have documented discrimination from prejudice and inaccurate beliefs, even when it reduces profits (Guryan and Charles, 2013).

In our study, we identify whether financial providers discriminate by gender in capital allocation decisions. We then turn to a primary contribution of our paper: going beyond documenting discrimination to consider the implications of these results for profit maximization (i.e., targeting high-performing businesses). We study whether financial providers have differing beliefs about the profitability of female-owned versus male-owned businesses and whether these beliefs are accurate. We use a machine learning algorithm to evaluate whether gender is a meaningful predictor of business performance. In doing so, we assess whether financial providers' decisions are consistent with a model of statistical discrimination based

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[1]See, for example, Blattman, Fiala and Martinez (2014); The World Bank Group (2019); Hardy and Kagy (2020). In Ethiopia, male managers are more likely to take out loans, and tend to borrow significantly more than female managers (The World Bank Group, 2019).

[2]See for example, "A third of the world's female entrepreneurs face gender bias from investors, HSBC claims," *CNBC*, Oct. 7, 2019; "Women entrepreneurs are fighting bias and proving their mettle," *The Times of India*, Mar. 8, 2022.

[3]High-performing (i.e., profitable) businesses increases the likelihood of repayment or returns to capital. Numerous interviews with loan officers confirmed that the profitability of a business is a key factor in providing capital to businesses.

on accurate beliefs and determine the implications for targeting high-performing businesses.

We identify discrimination by randomly assigning business-owner gender in the evaluation of a large business plan competition in Ethiopia. Business owners throughout Ethiopia completed an application form designed to mimic information commonly captured in initial loan applications. We recruited 84 financial providers (i.e., loan officers) from thirteen different financial institutions to evaluate 916 real businesses that applied to the competition. For each businesses, financial providers provided a score that determined the competition prizes, a recommendation on forwarding the application to their own lending institution to be considered for a loan, and predictions about how the business would perform in the future (both with and without additional capital). The latter belief elicitation was incentivized for accuracy.[4] Each business application was evaluated multiple times, and each financial provider evaluated multiple businesses, resulting in a sample of 3,696 evaluations and an identification strategy that incorporates business and financial provider fixed effects. This context allows us to study the key players of interest: real businesses interested in applying for capital, and financial providers that are regularly involved in making capital allocation decisions in the financial industry.

We find no evidence that financial providers discriminated against female-owned businesses. Randomly assigned business owner gender did not affect financial providers' scores for awarding the competition prizes, nor their decision to forward the business to their own financial institution for consideration for a loan. The point estimates of gender differences in both decisions are small: less than .03 standard deviations in the competition score and less than .01 percentage points in forwarding applications to their own lending institution. We find no evidence for discrimination in any subset of the sample (e.g., based on characteristics of the business owner, the business, or the financial providers), and our standard errors rule out any meaningful differences in these capital allocation decisions by gender.

Consistent with this lack of gender discrimination, we find that financial providers expected similar future business performance and returns to capital (i.e., future survival, profits, and assets) for both genders.[5] The alignment between capital allocation decisions and expectations of business performance is consistent with a model of discrimination based on beliefs: financial providers do not believe that business-owner gender is predictive of business performance, and so do not award capital differently.

Theory suggests that the in the absence of discrimination, discrimination must not be profit-maximizing. A follow-up survey of the businesses conducted 18 months after the com-

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[4]These elicited beliefs were not used to determine capital awards to ensure that financial providers had no incentive to manipulate their stated beliefs to influence the outcome of the competition.

[5]Financial providers also reported no gender difference in loan repayment likelihood.

petition confirms that gender was indeed not a meaningful predictor of business performance. Like the financial providers, a machine learning algorithm does not include gender in a set of optimal predictors from the business' application to predict business profits measured 18 months after the competition. This is not because gender has *no* predictive value for business performance on average, but rather that the predictive value is not large enough to justify statistical discrimination. Both the financial providers and our machine learning algorithm rely on other information in the application to target high-performing businesses.[6] This set of results is consistent with a model of statistical discrimination based on accurate beliefs. Our results imply that there is no meaningful trade-off between gender equity and allocating capital to the highest performing businesses.

We provide a number of checks to confirm the validity and robustness of our results. We show that financial providers were attentive and thorough in their evaluation of businesses: capital allocation decisions responded to business characteristics in the application and were correlated with expectations of future performance, financial providers' beliefs and decisions were predictive of actual future performance of the business, and business performance expectations were higher conditional on the business receiving additional capital. This is consistent with financial providers' incentives: their compensation was tied to performance, and they faced reputational incentives to perform well in the judging. They were selected by their respective institutions based on formal agreements with the Entrepreneurship Development Institute, a highly respected agency in Ethiopia. Moreover, our finding of a lack of discrimination is robust to a battery of tests that modify the identifying variation, variable definitions, and sample selection.

Our paper most directly contributes to the literature on gender gaps in business finance. The bulk of this literature relies on observational studies that estimate residual gender differences in survey data after controlling for observable characteristics. These studies have found mixed results, without a clear consensus on the existence of gender discrimination in business capital decisions.[7,8] However, these estimates of discrimination, and hence the

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[6] We also find that financial providers' beliefs are accurate overall: their beliefs are highly correlated with real outcomes.

[7] For example, Muravyev, Talavera and Schäfer (2007) find that female-managed firms are less likely to obtain a bank loan across 34 countries, primarily representing Central and Eastern Europe. In contrast, Aterido, Beck and Iacovone (2013) find that across Sub-Saharan Africa, the gender gap in using formal bank credit, and being rejected conditional on applying for a loan, disappears after controlling for the firm characteristics. Beck and Cull (2014) find some evidence that female-owned firms are more likely to have bank loans in Africa, likely reflecting survival bias. See Klapper and Parker (2011) for a more thorough review.

[8] A related literature explores credit decisions when clients and loan officers share traits, which suggests that discrimination may be an underlying phenomenon (Fisman, Paravisini and Vig, 2017; Beck, Behr and Madestam, 2017).

implications for profit maximization, generally suffer from omitted variable bias. A recent exception is a lab-in-the-field experiment, framed as a training session, in which loan officers from Turkey made hypothetical lending decisions for previous real loan applications in which business-owner gender was randomized (Brock and De Haas, 2023).[9] These decisions were incentivized for accuracy based on the real outcome of the loan. Brock and De Haas (2023) do not find evidence for gender discrimination on the extensive margin (i.e, whether to approve a loan) and find that loan officers do not differ in their beliefs of loan repayment by gender.[10]

We build on this literature by identifying gender discrimination in business finance in a large-scale real-stakes experiment. We incentivized financial providers to make decisions based on their own capital allocation preferences, and their decisions had meaningful consequences for real businesses. Our experimental approach improves upon observational studies where financial providers' incentives are strong but gender discrimination is not well identified. Our real-stakes setting improves upon experimental studies that yield convincing identification but often lack strong incentives directly aligned with loan officer preferences.[11] To the best of our knowledge, our paper represents one of the first experimental estimates of gender discrimination in a real-world business capital allocation decision.

A key contribution of our paper is to use financial providers' elicited beliefs to link their decisions to theoretical frameworks for discrimination. Previous research typically has not observed underlying beliefs, making our study one of the first to measure and estimate the accuracy of these beliefs across our entire sample.[12] Our incentive-compatible belief elicitation allows us to directly study whether financial providers' beliefs about gender and business performance align with their actual decision-making. Furthermore, by collecting data on true business performance, we evaluate the accuracy of these beliefs, the critical component to identifying whether gender discrimination is a profit-maximizing strategy.

Our findings provide support to the theoretical argument that discrimination will not

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[9]Another recent exception is in the context of consumer lending. Montoya et al. (2020) use experimental variation in Chile and finds lower approval rates for female borrowers, driven by loan officers with pro-male attitudes.

[10](Brock and De Haas, 2023) do find that women receive stricter conditions on credit offers, an outcome that was not incentivized. This is similar to Alibhai et al. (2019), who also find evidence of gender discrimination on the intensive margin of capital provision (i.e., loan size) in a lab-in-the-field experiment based on non-incentivized decisions about hypothetical loan applications, also in Turkey.

[11]For example, in Brock and De Haas (2023), the incentives faced by financial providers were based on outcomes of colleagues (i.e., did not reflect their own preference on how best to review loans), nor did their decisions have actual impact on the businesses that were being evaluated.

[12]Non-incentivized repayment beliefs are measured in Brock and De Haas (2023), but the accuracy of these beliefs can only be assessed a non-random sample (i.e., loans that were approved in real life). In consumer credit, Montoya et al. (2020) measure non-incentivized gender preferences and attitudes, but do not capture beliefs on repayment or business performance.

persist in contexts where it is not profit-maximizing. This is generally consistent with the experimental literature to date. Brock and De Haas (2023)'s lab-in-the-field experiment does not find discrimination on the margin for which loan officers were incentivized (*loan approval*), though they do find discrimination on a margin that was not incentivized (*requiring a guarantor*).[13] This latter discrimination is mitigated by loan officer age and experience, two key characteristics associated with increased learning. Similarly, in the context of consumer credit in Chile, Montoya et al. (2020) find gender discrimination against women is mitigated in areas with greater market competition.

Finally, we are not aware of another paper that uses experimental variation to study gender discrimination or its implications for business capital allocation in a low-income country. In Ethiopia, like many low-income countries, gender gaps in access to finance persist and contribute to high levels of gender inequality (Klapper and Parker, 2011). In such contexts, a common assumption is that unequal gender norms will lead to gender discrimination and cause capital misallocation across equally productive men and women; however, we show that this is not necessarily the case. This suggests caution against assuming that patterns of gender discrimination align with patterns of gender disparities. Indeed, empirical evidence has highlighted that in developing countries with high gender inequality, gender discrimination can favor women conditional on indicators of high ability (Delavande and Zafar, 2019; Ayalew, Manian and Sheth, 2021).

The rest of the paper proceeds as follows. Section 2 describes the context in which we implement our study and our experimental design. Section 3 details our empirical strategy for identifying discrimination and differential beliefs, and we present our findings in Section 4. Section 5 concludes.

2 Context and Experimental Design

2.1 Ethiopian context

Ethiopia generally performs poorly on global indicators of gender equality. For example, in the World Economic Forum's 2016 Global Gender Gap Report, Ethiopia ranked 109 of 144. This low rank was driven by their rank on sub-indices related to labor and education outcomes: they ranked 106 on economic participation and opportunity and 132 on educational attainment. These stark gender differences suggests that gender discrimination (both

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[13]The patterns provided in Brock and De Haas (2023) provide convincing evidence of gender discrimination on this margin of contractual details, but it remains an open question of whether the discrimination could be mitigated if loan officers had to pay a cost for making them.

belief-based and alternative mechanisms such as social norms or prejudice) may be present in various contexts in Ethiopia.

After the agricultural sector, the most common way women participate in the labor force in Ethiopia (and in Sub-saharan Africa) is as entrepreneurs. This highlights the importance of gender gaps in capital and business performance. Based on data from the Ethiopia Socioeconomic Survey, The World Bank Group (2019) documents that male business managers are 3.7 percent more likely to borrow and borrow approximately 50 percent more than their female counterparts.[14] There is increasing acknowledgement of these gender gaps, which has driven policy responses. For example, Ethiopia has a financial inclusion policy that specifically targets gender gaps and many lending institutions are encouraged to lend to female clients.

2.2   The Business Plan Competition

In 2019, the Entrepreneurship Development Institute (EDI)[15] launched a business plan competition, EthioSpur, to provide capital and other awards to promising businesses. Business plan competitions are an increasingly common method to stimulate entrepreneurial growth in developing countries. For example, during the time of our own competition, we were aware of two other business plan competitions in Ethiopia itself.

We partnered with EDI to study whether financial providers, recruited to judge the competition, discriminated against female-owned businesses during the judging process. To identify gender discrimination, we use an audit study approach: recruited financial providers were given a packet of applications to evaluate in which the gender of the applicant had been randomly assigned. We describe the randomization process in a following section.

EthioSpur targeted existing entrepreneurs to help support firm growth. The eligibility criteria for the competition were that the applicant: (i) was the majority owner of an existing business in Ethiopia; (ii) the business was operational for at least four months prior to the competition; and (iii) had an idea to expand or scale the business.[16] The competition's prizes were 300,000 ETB, 220,000 ETB, and 140,000 ETB for the top three businesses.[17] In addition, the top 20 businesses were awarded with media and marketing coverage, and the top 100 were awarded with a "fast track to credit."

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[14]A business manager is defined as an individual within a household in charge of the decisions regarding the earnings from an enterprise.

[15]The Entrepreneurship Development Institute, formerly Entrepreneurship Development Center, is a key agency tasked by the government of Ethiopia to increase entrepreneurship and economic growth, with specific attention to the needs of women entrepreneurs. A key element of EDI's mission is to improve access to finance.

[16]Businesses were not required to have a license at the time of the application, but were informed that they would be required to get a business license to receive any prizes.

[17]This corresponds to approximately 9,375, 6,875, and 4,375 USD at the time of the competition.

2.3 The Application Form

We intentionally designed the application form to reflect the criteria used by financial providers when making capital lending decisions. This ensured that the capital allocation decision in the business plan competition reflected the experience and expertise of the financial providers, and it enhances the external validity of our findings to capital markets more generally. We interviewed financial providers from nine different financial institutions on the criteria they used when evaluating businesses, and reviewed their standard loan application forms. The application form collected information on current business characteristics (e.g., industry, profits, years of operation, etc.) and a business expansion plan (e.g., description of plan, expected revenue). The form also collected additional information on the business owner (e.g., marital status, age, gender).[18]

To ensure the application was widely accessible, the competition was promoted on a national level via social media, SMS, and targeted outreach by EDI staff. The application was designed to be simple and available in multiple languages, and could be submitted online, in hard copy, or via email. EDI also provided assistance in completing the application to a subset of entrepreneurs that had previously used their services. To ensure that applicants were truthful, they were informed that all information would be audited and verified for winning businesses. If a business was found to have provided false or misleading information, they would not only be disqualified from the competition, but also from all future EDI initiatives. All applications were digitized and translated into English, with the exception of the detailed business plan narrative if it was submitted in Amharic, the most prevalent local language in Ethiopia.

2.4 Applicants

The competition attracted 916 businesses. Table 1 provides summary statistics for the business owners that applied to the competition. 44 percent of applicants were female-owned businesses. The sample is highly educated: we observe that nearly 50 percent report having a bachelors degree or higher, though this varies by business owner gender. We similarly see that female-owned businesses have more children (1.95 vs 1.62), though we see smaller differences by gender on marital status (54 percent are married or co-habitating). Both genders report being a household head[19] and having a high self-reported risk preference (8.64).

Table 2 provides summary statistics on the business performance of the applicants. Since

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[18]The complete application form can be found in Appendix A.
[19]This includes sharing the status of household head with a spouse.

Table 1: Applicants: Mean Owner Characteristics

	(1) Total	(2) Male	(3) Female
Female	0.44	-	-
	(0.50)		
Bachelors Degree or Higher	0.49	0.56	0.39
	(0.50)	(0.50)	(0.49)
Married/Cohabitating	0.53	0.54	0.53
	(0.50)	(0.50)	(0.50)
Number of Children	1.76	1.62	1.95
	(1.70)	(1.80)	(1.56)
Household Head	0.86	0.85	0.87
	(0.35)	(0.36)	(0.33)
Self-Reported Risk Preference	8.64	8.60	8.69
	(2.15)	(2.16)	(2.14)
Observations	911	510	401

Table reports mean and standard deviation. Self-reported risk preference ranges from 0 to 10, increasing in risk tolerance.

many aspects of business performance are highly skewed, we report medians, means, and standard deviations. The median years in the industry is 5 years for both male and female businesses. The median profit for the previous month was 15,000 Birr (500 USD), but female businesses report nearly 5000 Birr (USD 167) less than their male counterparts. We see similar gaps in the median number of employees (3 versus 2), assets (247,500 Birr vs 220,981 Birr), and liabilities (4,450 Birr vs 3,000 Birr). These gender differences are discussed in greater detail in Section 4 of the paper. Below the median, we report the mean and standard deviation. The mean is generally much higher than the median, highlighting that there is a significant right tail of larger businesses that applied to the competition. Table 1 and Table 2 suggest that the majority of businesses that applied to the competition were relatively small, but likely more successful and larger than the median Ethiopian business: applicants are much more highly educated than the average Ethiopian, and the median number of employees is 3.

By design, our sample comprises existing businesses seeking capital to grow their businesses, representing the relevant population for understanding the beliefs and behaviors of loan officers. Among our sample, 32 percent of businesses report having applied for a loan in the previous 12 months, and 10 percent report receiving that loan. We observe no statistically significant difference by gender in having applied for a loan in the last 12 months, in

Table 2: Applicants: Business Median, Mean, and Standard Deviation

	(1) Total	(2) Male	(3) Female
Years in Industry	5	5	5
	6.04	5.93	6.16
	(4.59)	(4.84)	(4.28)
Profits (thousands of birr)	15	17	12
	182.16	292.82	43.69
	(1,604.38)	(2,141.17)	(170.80)
Employees	3	3	2
	14.79	11.09	19.44
	(201.79)	(108.49)	(277.74)
Assets (thousands of birr)	240	248	221
	1,760.02	2,245.59	1,142.47
	(15,964.60)	(20,855.22)	(5,067.66)
Liabilities (thousands of birr)	4	4.5	3
	644.89	1,024.13	168.65
	(7,948.47)	(10,621.61)	(750.25)
Observations	911	510	401

For each variable, the first row reports the median, followed by mean and standard deviation in parentheses. Profits refer to reported profits from the previous month. Profits, Assets and Liabilities are shown in thousands of Ethiopian birr.

the amount of loan for which they applied, nor whether they received the loan. Similarly, Kolmogorov-Smirov tests find no statistical difference in the distributions of the amount requested by gender.

2.5 Financial Providers as Judges

The competition was judged by financial providers recruited from lending institutions (i.e., banks and microfinance institutions) across Addis Ababa. Institutions were asked to provide experts that met the following criteria: (i) involved in reviewing applications seeking capital from the institution, with specific attention to urban clients, capital for business purposes, and individual applicants or enterprises;[20] (ii) employed as a loan officer or a member of the loan approval committee; and (iii) employed for at least one year at the institution. Thus, just as applicants were real businesses interested in growth and capital, judges were real experts that reviewed and evaluated of loans for businesses as their primary profession.

The recruited loan officers spanned 13 different lending institutions, representing a significant portion of the institutions in the financial sector serving Addis Ababa. 14 percent were female and 65 percent were recruited from microfinance institutions. On average, the judges had been at their respective institution for five years, and in finance for 11 years.

The recruitment process highlights that these loan officers had an incentive to conduct a thorough and thoughtful review. They had been handpicked by their respective institutions to serve as judges, based on Memorandums of Understanding (MoUs) between EDI and their institutions. EDI is a highly respected agency in Ethiopia with a key focus on developing and maintaining relationships with many of the financial institutions that provided the judges. Thus, there would be a reputational consequence both within their institution, and in the broader financial sector, for poor performance on the task.

Judges reviewed the applications remotely and completed an evaluation form for each application they reviewed.[21] To protect against concerns of social desirability bias, the judges were not told ahead of time that their evaluations would be used in an academic study. All communication with judges, including the orientation, was through the local project manager who was blinded to the key question of interest and to the randomized gender assignment.[22] Judges were compensated 2,500 ETB for their time upon completion of their evaluations. Judges were requested to complete their review of applications in two

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[20]This is in contrast to "social collateral" loans in which a group receives a loan with joint liability, commonly found in microfinance.

[21]Judges underwent an orientation that was generally done over the phone or internet due to the COVID-19 pandemic.

[22]The project manager was not informed about the gendered randomization until necessary for the debriefing of judges.

weeks, but we granted extensions if needed.

2.6 Evaluation Form: Treatment Salience and Outcomes

The financial providers reviewed digitized application forms that were translated into English and shown in a standard format. An example of an application form is shown in Figure 1, with identifying information redacted. The top of the form provided demographic information about the applicant, including gender. The remainder of the form showed information about the business and the business plan. The evaluation form that the financial provider completed for each reviewed business was divided into four sections (see Figure 2). Section A was designed to ensure salience of the randomly assigned gender without revealing the research question. This section asks the judge to confirm basic demographics of the applicant: ID, age, gender, total years of experience, and whether the applicant was also employed outside of the proposed business. Judges were informed that this section was used to verify that the correct application was being reviewed. In addition to ensuring that the judge was aware of the randomly assigned gender of the business owner, we used this section as a check that the judge was paying attention to the information in the application. 98.5% of evaluations noted the gender correctly.

To confirm that gender was not revealed in other parts of the application, our local survey firm explicitly reviewed the digitized application materials and confirmed that there was no information in any digitized form that would reveal the gender of the applicant. In addition, among the twenty industry categories in the application form, all industries have both genders represented, and EDI was not concerned that businesses were gendered to the extent that the type of business would reveal the true gender of the business owner or cast doubt on the credibility of the randomly assigned gender of the business owner. This implies that if gender discrimination is identified, it is unlikely to be caused by evaluators reacting to the fact that the gender of the business owner is uncommon within the industry.

Section B asked the judge to provide a prediction of the business' performance in January 2021, exactly one year after the submission of applications. Importantly, the majority of the evaluations were completed only a few months prior to January 2021. As a result, judges were well aware of the shocks in the economy, including those related to the COVID-19 pandemic, at the time of their predictions. They were asked to provide these predictions for two scenarios: if the business did or did not win 300,000 Birr (i.e., the amount of the top prize) from the competition. The judges predicted the likelihood of survival, monthly profit, capital stock, and number of paid employees in these two scenarios. Our interviews with financial providers indicated that a businesses' future profitability is a key metric used

Application ID: ▨▨

Business Owner's Characteristics
28 years old
Female
9 years of total work experience
Not currently employed outside of proposed business
Vocational training is the highest level of education completed
Never Married
4 total household members, including applicant
0 children

Business Characteristics
Owns 100% of the business
Description of product and/or services: ▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨
▨▨▨▨▨
5 years of experience in the industry
Business cards have been used for advertising
Has a current business license
13 years of operation
Rents primary business location
Yes, had a written financial record keeping system for the previous 4 months

Current Business Performance
25,950 birr PROFIT reported in previous month
    84,000 birr total revenue reported in previous month
    58,050 birr total expenses reported in previous month
        45,000 birr supply purchase expenses
        150 birr rental expenses
        7,000 birr salary expenses
        5,900 birr other expenses
9 paid full-time employee(s)
    48 hours per week typically worked by employees
310,000 birr total assets
    55,000 birr cash assets
    210,000 birr fixed assets
    45,000 birr other assets
0 birr total liabilities
    0 birr loans payable within one year
    0 birr loans with longer than one year duration
    0 birr to trade creditors
    0 birr in other liabilities

Top Three Customers
1. Name and phone number provided. 320,000 birr in revenue during the past year.
Customer is an Organization.
2. Name and phone number provided. 21,000 birr in revenue during the past year.
Customer is an Organization.
3. Name and phone number provided. 300,000 birr in revenue during the past year.
Customer is an Organization.

Business Plan
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Figure 1: Application form shown to financial providers

Confidential Evaluation of Applicant
Date of evaluation (DD/MM): _____   Judge ID: _____

Section A: Application Verification (*For verification purposes only*)

Application ID:
Applicant's age: ☐ 18-25 ☐ 26-35 ☐ 36-45 ☐ 46-55 ☐ above 55 ☐ Information is missing
Applicant's gender: ☐ Male ☐ Female ☐ Information is missing
Applicant's total years of experience: ☐ 0-4 ☐ 5-9 ☐ 10-19 ☐ 20 or more ☐ Information is missing
Applicant employed outside of the proposed business: ☐ Yes ☐ No ☐ Information is missing

Section B: Understanding Business Growth (*For determining judge bonus only*)

*Suppose that the applicant receives **no capital** from the competition:*

What is the probability that this business will be operational in January 2021:
☐ 0-10% ☐ 11–20% ☐ 21–30% ☐ 31–40% ☐ 41-50% ☐ 51-60% ☐ 61-70% ☐ 71–80% ☐ 81-90% ☐ 91-100%
Assuming that the business is operational in January 2021, provide your best estimate of:
The number of operational hours in January 2021 will be:
☐ Less than in January 2020   ☐ Similar to January 2020   ☐ Greater than January 2020
The value of the business' capital stock in January 2021:   Birr
The monthly profits or losses of the business in January 2021 (*Only one should be filled*).
Monthly Profit: _____ Birr *Monthly Loss:* _____ Birr
The number of paid employees (excluding the owner) in January 2021:

*Suppose the applicant receives **300,000 ETB** from the competition:*

What is the probability that this business will be operational in January 2021:
☐ 0-10% ☐ 11–20% ☐ 21–30% ☐ 31–40% ☐ 41-50% ☐ 51-60% ☐ 61-70% ☐ 71–80% ☐ 81-90% ☐ 91-100%
Assuming that the business is operational in January 2021, provide your best estimate of:
The number of operational hours in January 2021 will be:
☐ Less than in January 2020   ☐ Similar to January 2020   ☐ Greater than January 2020
The value of the business' capital stock in January 2021:   Birr
The monthly profits or losses of the business in January 2021 (*Only one should be filled*).
Monthly Profit: _____ Birr *Monthly Loss:* _____ Birr
The number of paid employees (excluding the owner) in January 2021:

*If the applicant was instead given a **3-year 100,000 ETB loan**, which of the following do you believe is most likely?*
☐ Applicant will repay the loan: Applicant will have enough financial resources and will repay.
☐ Applicant will strategically default: Applicant will have enough financial resources, but will still not repay.
☐ Applicant must default: Applicant will not have enough financial resources to repay the loan.

Section C: Reviewing the Applicant

Rate applicant's managerial skills: ☐ very poor ☐ poor ☐ acceptable ☐ good ☐ excellent
Which do you expect that the applicant can access to cover shortfalls in demand? *Check all that apply.*
☐   Personal savings/assets   Gifts/Loans from family or friends ☐ Business loans from microfinance B   Busness loans from bank   Government assistance
Estimate the total amount of additional capital the applicant can secure (from all sources):   Birr
Applicant's business is most likely the primary source of income for the applicant's household? ☐ Yes ☐ No
Rate market demand of applicant's business: ☐ very low ☐ low ☐ medium ☐ high ☐ very high

Section D: Determination of winner Overall impression will be half the final score, and value proposition and entrepreneurial credibility will be the other half of the final score. ***This final score is the only measure that determines the competition winners.*** **Final Score = Overall Impression + ½ *Value Proposition + ½ *Entrepreneurial Credibility.**

OVERALL IMPRESSION:	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6	☐ 7	☐ 8	☐ 9	☐ 10
VALUE PROPOSITION:	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6	☐ 7	☐ 8	☐ 9	☐ 10
ENTREPRENEURIAL CREDIBILITY:	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6	☐ 7	☐ 8	☐ 9	☐ 10

<u>**Internal**</u>: Should applicant's information be sent to your institution for loan consideration? ☐ Yes ☐ No

Figure 2: Evaluation Form

when deciding whether to allocate capital to a business at their institution. In addition, in an exit survey of 43 financial providers that served as judges, 86 percent reported that growth potential (i.e., future profits) was either an important or very important factor when determining whether to approve a loan. In addition to beliefs on future firm performance, loan repayment is another key requirement for loan approval. We therefore also asked judges explicitly about the likelihood of repayment for a 3-year loan for 100,000 ETB.

This section on beliefs was incentivized for accuracy. The judges were informed that the person with the most accurate evaluations for Section B would receive 15,000 ETB (500 USD).[23] They were also informed that their responses in this section would have no bearing on the awarding of the capital from the competition. In this way, we ensured that beliefs of business performance were not affected by a judge's preference on how capital should be allocated.

Section C collected addition information about the judge's beliefs about the business owner. They were asked to evaluate the business owner's managerial skills, sources and amount of capital for the business, market demand for the business, and whether the business was the primary source of income for the household. This section was not incentivized, and was designed to shed light on potential beliefs that did not affect business performance, but could be influenced by gender and affect an evaluation of a business.

Section D was the judge's overall score for the business. This is the key outcome that was used to determine the competition's prizes. The judges were asked to score the business on overall impression, value proposition, and entrepreneurial credibility with a range of 1 to 10 each. This was then aggregated into a final score using the following formula: $FinalScore = OverallImpression + .5 * (ValueProposition + EntrepreneurialCredibility)$. Importantly, the financial providers were informed that this was the *only* measure that would determine the competition's winners.

Following Section D, financial providers were asked whether they wanted the applicant's information to be sent to their institution for consideration for a loan. We included this question because it may be the case that judges make different decisions about capital that is not sourced from their own employer or lending institution. This question served as a proxy for capital allocation decisions from the provider's own lending institution. Financial providers were informed that EDI would "let your institution know you recommend this person to be reviewed for a loan and forward this information to your institution if the applicant is interested in a loan." While this decision did not bind the loan officer or institution to offer a loan, the lending institutions did sign Memoranums of understanding with EDI representing

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[23]The recruited judges were not informed of the exact way that accuracy would be determined. They were simply told "the judge who provides the most accurate evaluations" will receive the bonus.
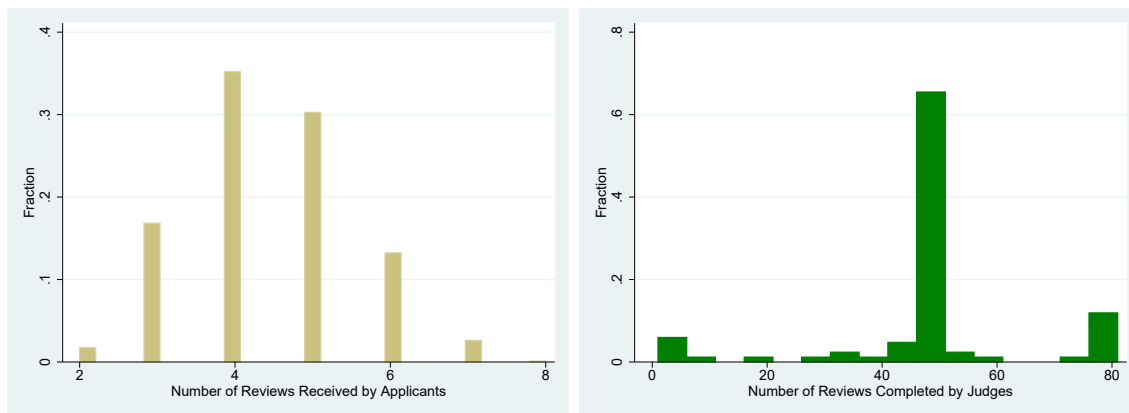
Figure 3: Reviews per Application and Evaluation per Judge

a good faith commitment to place the forwarded applicants in a "fast track" loan process in which the information provided in the application would be considered.[24]

Our main outcomes of interest for capital decisions are 1) the judge's final score from Section D, and 2) whether they requested the applicant's information be sent to their own institution for consideration for a loan.

2.7 Random Assignment

Each application was reviewed multiple times with a randomly assigned business owner gender, and each financial provider evaluated multiple applications. Figure 3 illustrates that the median number of reviews per business was 4, and that the median number of evaluations completed by judge is 48.

We created duplicates of the original applications[25] and randomly assigned those applications to be shown as either male or female. We randomly assigned 48 or 49 application forms to each judge, in a random order.[26] We refer to the application forms assigned to a judge as their "application packet." Because of this random ordering of application forms, our causal identification is valid even if there is attrition (i.e., judges do not complete the application forms assigned to them).

Due to COVID-19, there was a delay between the submission deadline to the competition and the evaluation process, and the evaluation process itself took longer than planned. The competition closed on January 20, 2020, and evaluations were conducted from September

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[24]Because of the disruptions caused by COVID-19 in the interim and the delays in the judging process, these fast-track procedures and their outcomes were not monitored.

[25]Each application is duplicated two to eight times. The number of times they were duplicated was randomly determined, and the median number of reviews was 4.

[26]If it was the case that an applicant was assigned to the same judge twice, we simply dropped one of the application forms before providing the packet to the judge.

2020 to December 2020 [27]. Thus, judges were aware of COVID when they scored the applications and predicted business success. Judges benefited from the delay because they had more contextual information to predict business performance in January 2021, given information on past business performance in January 2020.

We limit our primary analysis sample to evaluations in which judges completed all our pre-specified primary and secondary outcomes.[28] Our primary analysis sample consists of 3,696 completed evaluations of 916 businesses by 84 financial providers. In this sample, 910 businesses were evaluated by multiple (2 to 8) financial providers, and 83 financial providers reviewed multiple applicants (2 to 79). 82 of these financial providers had variation in the gender of the applications they reviewed.

2.8   Ethical Considerations

As in all audit study designs, our methodology uses deception by randomizing the gender depicted in the application that a judge is reviewing. The justification for using deception in audit studies is that no alternative method exists to rigorously identify discrimination, as was the case in our setting. Given the scarcity of studies identifying gender discrimination in low-income country settings, we argue that the benefits of the research justified the design. The study was approved by the IRB at UC Merced. It was also approved by the Entrepreneurship Development Institute, the local organization with whom we collaborated. EDI is a highly respected institution in Ethiopia and had a reputational stake in the study. All judges were debriefed and informed after the completion of the study that demographic information was manipulated for research purposes in the applications they were reviewing.

Another ethical concern with audit studies is the time spent by experts in reviewing fake materials. In our case, experts were evaluating real businesses for a real business plan competition, and they were compensated for their time.[29]

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[27]A few judges also returned packets after the December deadline

[28]Results are robust to expanding the sample to include all evaluations submitted on a given outcome of interest. We limit the analysis sample for our main specifications to ensure that results across outcomes are not driven by a change in the sample composition.

[29]An additional ethical concern is the scores given to the applicants for the business plan competition. If we had observed discrimination, there were two possible ways we would have proceeded: using only real gender or using only one gender when determining scores to award the competition prizes. However, since we did not observe gender discrimination, EDI chose to use all evaluations in determining the prizes.

3 Empirical Strategy: Gender Discrimination and Beliefs

We estimate whether capital allocation decisions differ when the business owner was randomly assigned to be shown as male using the following estimating equation:

$$Y_{ij} = \beta_1 * RandomlyAssignedMale_{ij} + \alpha_i + \alpha_j + \epsilon_{ij} \qquad (1)$$

where $RandomlyAssignedMale$ indicates that applicant i assigned to judge j was shown as a male. The specification includes applicant and judge fixed effects and uses robust standard errors. We study two primary outcomes that reflect capital allocation decisions. The first outcome is the overall final score given to the application, which determined the winners of the business plan competition. The second outcome is an indicator for whether the judge selected the business application to be forwarded to their institution for consideration of a loan.

We next estimate Eq 1 on a pre-specified set of judge predictions of future business performance in the upcoming months: survival, profits, and assets. We estimate these for the judge's beliefs on expected business performance with and without having received additional capital. We use the differences in these predictions as a measure of the judge's expectations on the return to capital as a function of gender.

4 Results

4.1 Identifying Discrimination

We find that the randomly assigned gender of the business owner did not affect capital allocation decisions by the financial provider, neither for the capital prize in the competition nor for consideration of a loan at their own institution. Table 3, Column 1 finds that the final score, which was used to determine who would be awarded the competition prizes, is not statistically different whether the applicant was shown as male or female. In fact, when applicants were shown as male, they received slightly lower scores. The point estimate for the difference in scores is 0.105 points (on a scale from 2 to 20), which amounts to a difference of less than .03 standard deviations. The 95 percent confidence interval for the differences in scores is similarly very small (-.337 to .127), a range of merely -.07 to .03 standard deviations. These results suggest that financial providers did not discriminate by applicant gender in the allocation of capital in the business plan competition. Columns 2 through 4 document differences in each component of the final score (each ranging from 1 to 10), and we continue to find no meaningful differences by randomly assigned business-owner gender.

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Table 3: Causal Effect of Gender on Capital Allocation Decisions

	(1) Score	(2) Overall Impress	(3) Value Prop	(4) Entrepreneurial	(5) Loan
Male	-0.105	-0.0478	-0.0550	-0.0596	0.00159
	(0.116)	(0.0611)	(0.0626)	(0.0650)	(0.0140)
Observations	3696	3696	3696	3696	3696
Female Mean	12.06	5.990	6.079	6.069	0.495

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Score is the final score in the business plan competition, determined by Overall Impression (Overall Impress) + .5* Value Proposition (Value Prop) + .5*Entreprenuerial Credibility (Entreprenuerial). Each of these subscores is on an increasing scale of 1 to 10. Loan indicates whether the application was forwarded by the judge to their own institution for loan consideration. Specifications include judge and application fixed effects. Robust standard errors in parentheses.
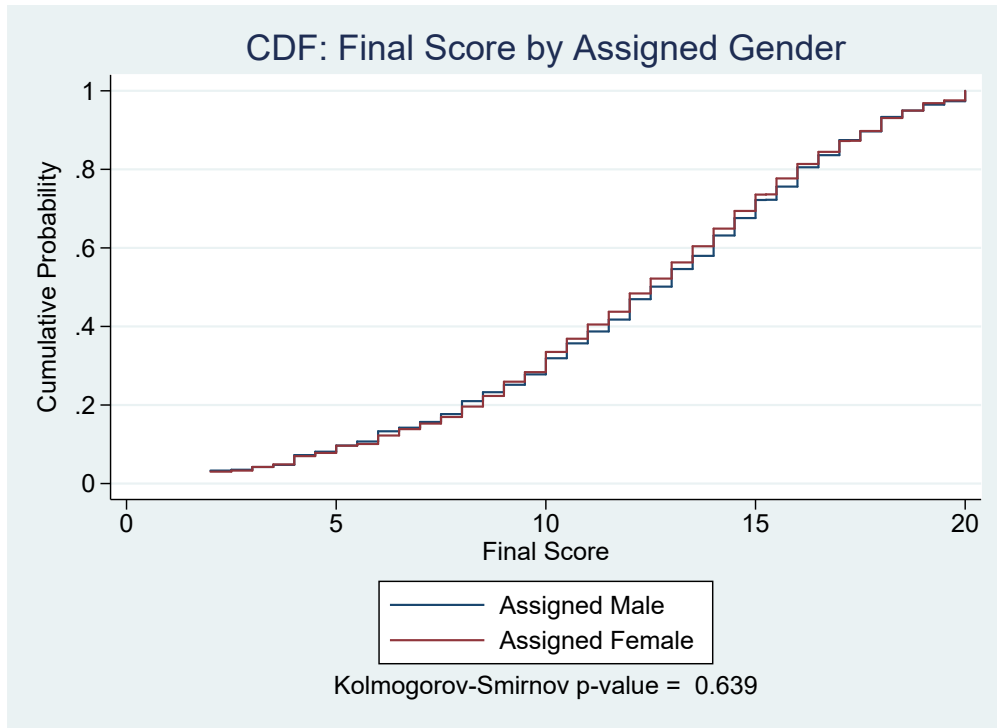

Figure 4: CDF of Final Score by Randomly Assigned Gender

We then turn to the decision of whether the loan officer wanted to forward the application to their own institution. This addresses the possible concern that decisions for a grant given by an external institution may not reflect decisions a loan officer would make for a loan at their institution. Randomly assigned gender did not affect loan officers' decision to forward the applicant's information to their own institution for possible consideration for a loan (see Table 3, Column 5). That is, loan officers were equally likely to recommend businesses in which the owner was randomly assigned as female or randomly assigned as male. The point estimate on the difference in recommendation is less than .01 percentage points. This highlights that financial providers did not discriminate even when making decisions relevant to their own institution.

The similarities we observe across both outcomes suggest that there is significant external validity across the two settings. Although a loan decision relies in part on the expected probability of repayment, while a capital grant does not, the probability of repayment is increasing in business performance. Thus, for both decisions, business performance is a key criterion. In formative discussions, the loan officers themselves indicated that the viability of the idea is important and they aim to allocate loans toward more promising business ideas. We also explicitly asked judges their beliefs about the applicants ability to repay a loan and find no meaningful difference in their expectations of either strategic default, or default due to lack of resources, based on randomly assigned business-owner gender.[30] The standard errors for both capital allocation decision estimates are very small, allowing us to rule out any meaningful differences in how the application was treated as a function of the randomly assigned gender of the business owner.

This lack of discrimination is consistent across the distribution of scores in the competition (Figure 4). The figure highlights that throughout the distribution of business quality, randomly assigned gender had no meaningful effect on the evaluation of the businesses for the competition. A Kolmogorov-Smirnov test finds no statistical difference between these two distributions, with a p-value of 0.639. Similarly, we find no differences in the variance of final scores by gender.[31]

We generally find no evidence of gender discrimination along several pre-specified dimensions of heterogeneity. We do not find discrimination conditional on the business owner's marital status, education, or number of children (see Table 4). We do observe gender discrimination against female widows for consideration of a loan. This is consistent with female

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[30]In 19 and 13 percent of evaluations, judges believed the applicant would be unable to repay a loan or strategically default, respectively. Differences by randomized gender were .7 and .1 percent. The loan was described as being for 3 years for 100,000 ETB.

[31]We test for differences in variance using the the STATA command sdtest and robvar, reflecting the proposed tests by Levine (1960) and the alternative specifications proposed by Brown and Forsythe (1974).

Table 4: Heterogeneity by applicant characteristics

	(1) Score	(2) Score	(3) Score	(4) Loan	(5) Loan	(6) Loan
Male	-0.168	-0.313	-0.143	-0.0144	-0.0343	-0.0115
	(0.191)	(0.423)	(0.177)	(0.0227)	(0.0530)	(0.0226)
Male × Married=1	0.152			0.0261		
	(0.249)			(0.0300)		
Male × Separated=1	-0.455			-0.0662		
	(0.511)			(0.0569)		
Male × Widowed=1	0.388			0.214**		
	(0.749)			(0.0930)		
Male × Highest Education		0.0254			0.00459	
		(0.0614)			(0.00772)	
Male × Number children			0.0482			0.00981
			(0.0736)			(0.00962)
Observations	3602	3605	3093	3602	3605	3093
Female Mean	12.06	12.06	12.06	12.06	12.06	12.06

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Score is the final score in the business plan competition, ranging from 2 to 20. Loan indicates whether the application was forwarded by the judge to their own institution for loan consideration. Specifications include judge and application fixed effects. Robust standard errors in parentheses.

widowhood signaling unique vulnerability and access to fewer resources.

We also find no evidence for discrimination conditional on business characteristics. First, we explore discrimination based on whether the business industry is male-dominated, a pre-specified characteristic. If female business owners face discrimination in male-dominated industries, which tend to be more profitable, this could be an important driver of the gender profit gap. We asked our local survey firm to have two employees review the products and services described in the application, and categorize the business as belonging an industry dominated by women, dominated by men, or neither.[32] Second, we present exploratory analyses based on business performance, as measured by profits and size. Even if there is no gender discrimination on average, if high-performing female business owners face discrimi-

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[32]For each application, employees were requested to answer the following two questions with Yes, No, or Unsure: In your opinion, are over 90 percent of businesses that supply the main product described [in the application] run by women [men] (i.e., are over 90 percent of the business owners of such businesses female [male])? In practice, the employees appeared to categorize businesses as being dominated by a gender using a threshold lower than 90 percent. We use this question to define indicators for male or female industries for the businesses that were marked affirmative for each of these respective questions. 28 percent of applications were coded as female-dominated, 38 percent as male-dominated, 30 percent as unsure, and 3 percent were missing.

Table 5: Heterogeneity by business performance

	(1) Score	(2) Score	(3) Score	(4) Loan	(5) Loan	(6) Loan
Male	-0.175	-0.0798	-0.120	0.00722	0.00108	-0.000677
	(0.149)	(0.117)	(0.132)	(0.0175)	(0.0149)	(0.0161)
Male × Male-dominated industry	0.183			-0.0148		
	(0.239)			(0.0289)		
Male × Baseline profits		0.0431			0.000548	
		(0.0594)			(0.00791)	
Male × Number employees			0.00185			0.000298
			(0.00980)			(0.00139)
Observations	3696	3367	3593	3696	3367	3593
Female Mean	12.06	12.06	12.06	0.495	0.495	0.495

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Score is the final score in the business plan competition, ranging from 2 to 20. Loan indicates whether the application was forwarded by the judge to their own institution for loan consideration. Baseline profits are in units of 1,000,000 Birr. The number of employees is winsorized at the 99 percent level. Specifications include judge and application fixed effects. Robust standard errors in parentheses.

nation, this could explain why they are not able to grow further. We do not find support for discrimination within gendered industries using our survey firm's categorization of industries as female-dominated or male-dominated, nor as a function of business baseline profits or the number of employees (see Table 5).

In addition to testing for discrimination within subsets of business type, we also look for differences by whether the judging loan officer was employed at a microfinance institution (MFIs) or by loan officer gender. We find no heterogeneity in discrimination based on financial provider characteristics (Table 6). Though MFIs often prioritize female clients, none of the MFIs that participated in the judging serve women exclusively. In our exit survey of judges (N = 43), no judge reported having a portfolio of borrowers of only one gender. The highest percent of borrowers in a judge's portfolio that were women was 82.5 percent.[33]

Consistent with the lack of a discrimination in capital allocation decisions, financial providers also predict similar business performance for applicants shown as male or female. As described in Section 2.5, financial providers were asked to predict business performance one year after the application submission. Table 7 finds no difference in expectations of the business' profit (Column 1), survival likelihood (Column 2), or assets (Column 3) as a function of the business owner's gender. This lack of difference in expected business

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[33]We pre-specified additional judge characteristics for heterogeneity tests based on an exit survey of the judges. However, our response rate on the exit survey was only 63 percent (43 judges), and thus we do not report these additional tests.

Table 6: Heterogeneity by loan officer characteristics

	(1) Score	(2) Score	(3) Loan	(4) Loan
Male	-0.0540	-0.0528	0.0135	0.00607
	(0.223)	(0.128)	(0.0267)	(0.0157)
Male=1 × MFI=1	-0.0718		-0.0167	
	(0.281)		(0.0324)	
Male=1 × Fem. Judge=1		-0.244		-0.0130
		(0.377)		(0.0433)
Observations	3695	3647	3695	3647
Female Mean	12.07	12.07	0.495	0.495

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Score is the final score in the business plan competition, ranging from 2 to 20. Loan indicates whether the application was forwarded by the judge to their own institution for loan consideration. MFI is an indicator for whether the judge was employed at a microfinance institution. Fem. Judge is an indicator for whether the judge was female. Specifications include judge and application fixed effects. Robust standard errors in parentheses.

performance remains true for both predictions without additional capital (Panel A) and with additional capital (Panel B).[34] These results are robust to comparing the CDF of expected profits and assets by gender (see Figure 5). In each scenario and outcome, Kolmogorov-Smirnov tests fail to reject equality across the two distributions. We also find no differences in the variance of these distributions by gender, except for profit predictions in the condition with capital, where we observe a slightly higher variance in expected profits with additional capital among female-owned businesses.[35] Taken as a whole, our results generally suggest that financial providers did not expect gender differences in a business' growth potential on average, even after receiving a capital infusion.

Further bolstering the finding that financial providers expect business performance to be similar by gender, we do not observe heterogeneity in capital allocation decisions as a function of missing information in the application. When the application is missing key information, we would expect that providers are more likely to use gender as a proxy for capital allocation decisions. If providers did not believe that gender was correlated with business

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[34]Appendix Table A14 finds no support for differences in the beliefs about return to capital by business owner gender. Appendix Table A1 includes beliefs on employment, an additional prespecified variable.

[35]This difference in variance is not robust to using winsorized levels of profit expectations.

Table 7: Effect of Gender on Business Performance Beliefs

| | (1) | (2) | (3) |
	Survival	Win. Profits	Win. Assets
Panel A: Without capital			
Male	-0.0944	1.665	60.09
	(0.636)	(4.208)	(46.85)
Observations	3696	3696	3696
Female Mean	50.47	42.41	778.4
Panel B: With capital			
Male	-0.0339	-8.534	52.75
	(0.666)	(7.895)	(65.42)
Observations	3696	3696	3696
Female Mean	60.08	84.57	1089.4

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Survival, Profits, and Assets are judge expectations with and without additional capital. Profit and Assets are in thousands of birr. Survival is the probability of survival, from 0 to 100; Win. specifications winsorize the variables at 1 percent. Specifications include judge and application fixed effects. Robust standard errors in parentheses.
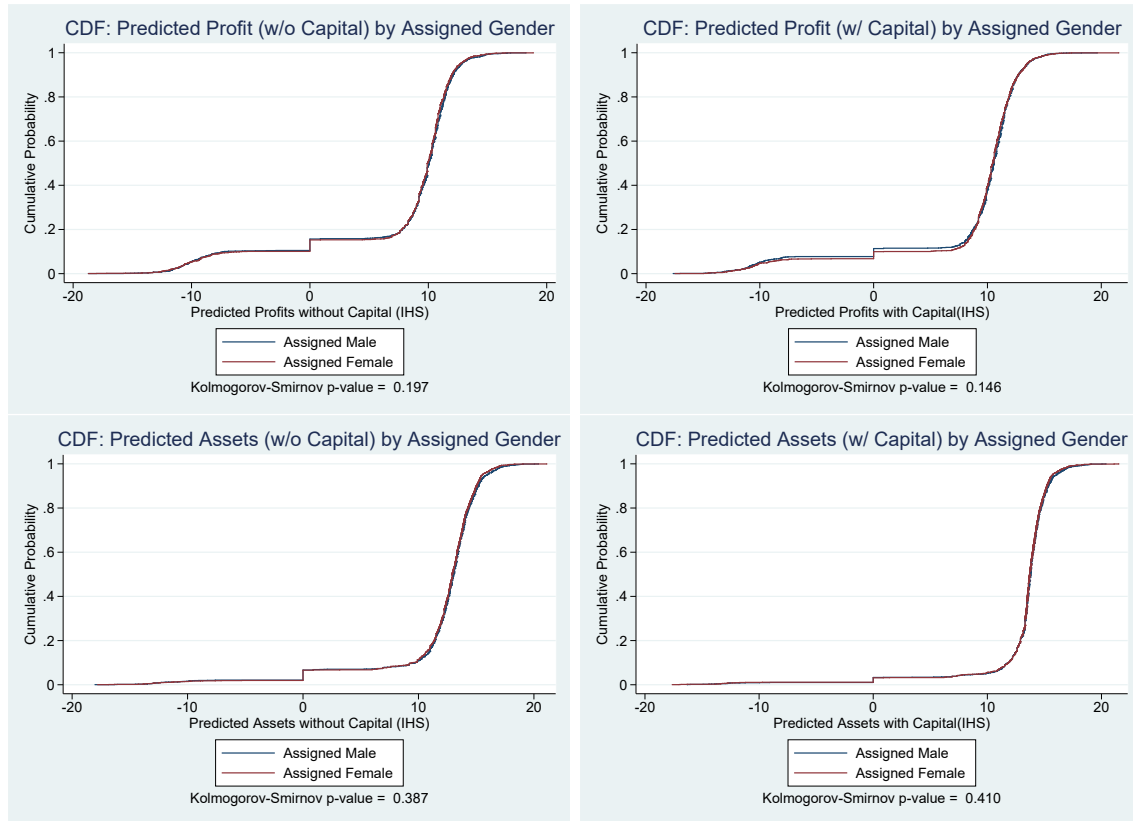

Figure 5: Distribution of Profits and Assets by Assigned Gender

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Table 8: Heterogeneity by Missing Information in the Application

	(1) Score	(2) Loan
Male	-0.0230	-0.00498
	(0.139)	(0.0161)
Male=1 × Mssng Indx	-0.112	0.00895
	(0.140)	(0.00984)
Observations	3696	3696
Female Mean	12.06	0.495

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Score is the final score in the business plan competition, ranging from 2 to 20. Loan indicates whether the application was forwarded by the judge to their own institution for loan consideration. Mssng Indx ranges from 0 to 8 and is a count of missing the following information in the application: profits, number of employees, total assets, total liabilities, years of operation, years of experience in the indusry, projected employees, and projected revenue. Specifications include judge and application fixed effects. Robust standard errors in parentheses.

performance, then we would expect to continue to see a lack of gender discrimination. We test for heterogeneity in the capital allocation decision as a function of missing information, defined as a count of how many of the following data points are missing in the application: profits, number of employees, total assets, total liabilities, year of operation, years of experience in the industry, projected employees, and projected revenue. Table 8 finds no evidence for increasing discrimination against female-owned businesses in applications with more missing information.

Finally, we conducted an additional battery of pre-specified robustness tests that confirm the lack of discrimination: weighting evaluations so that each judge has equal weight (Table A2 and A3); controlling for the order in which evaluations were assigned (Table A4 and A5); using the gender as reported by the judge (Table A6); excluding 5 percent of judges with the least amount of variation in their final score (Table A11); limiting the sample to the first five applications given to judges (Table A12); and removing judge fixed effects (Table A13). We also confirm robustness to limiting the sample to judges who passed various attention and internal consistency checks: correctly answering 75 and 100 percent of the verification questions (Table A7 and A8), baseline information in the application predicted the final score with a p-value of less than .15 (Table A9), and prediction of profits and firm survival

with capital were higher than predictions without capital (Table A10). The main finding that there is no discrimination in the evaluation of businesses is remarkably robust.

4.2 Validity of Evaluations

We provide several pieces of evidence that the financial providers were attentive and thorough when evaluating businesses. First, though randomly assigned gender did not affect evaluations, we find that financial providers did consider other aspects of the business when evaluating the applicant. Table 9 shows that businesses with higher profits, greater assets, and business plans that projected greater employees and revenue were more likely to receive higher scores and be recommended for loan consideration. Evaluation outcomes are strongly predicted by baseline business information, which indicates that judges reviewed the businesses with effort and attention.

Second, judges completed the initial verification section of the evaluation form with high accuracy. As described in Section 2.6, judges were asked to verify the applicant's gender and other demographic characteristics before filling out the evaluation. Judges correctly indicated the applicant's gender in 98.5 percent of evaluations, the applicant's age in 97 percent of evaluations, the applicant's experience in 96 percent of evaluations, and the applicant's employment status in 95 percent of evaluations.

Third, evaluations were internally consistent in several ways. Judges predicted businesses would have better performance with capital than without in the vast majority of evaluations. In 92 percent of evaluations, judges predicted that the business would be as or more likely to be operational in a year if they received additional capital than if they did not. We observe similarly high percentages of internally consistent evaluations with and without capital for projected number of employees (93 percent), capital stock (93 percent), and profits (84 percent).

Fourth, businesses with stronger predicted performance were more likely to be awarded capital. Table 10 finds that judges provided higher scores and were more likely to consider for a loan those businesses that they believed were more likely to survive, have higher profits, and have greater assets. Using our endline survey, we also confirm that both the final score and loan consideration decision were predictive of firm survival and profits 18 months after the competition (Appendix Table A16).

Finally, judges had significant variation within their own evaluations, suggesting that they were thoughtful in evaluating the information in the application. The average range of scores used by a judge in their evaluations is 13.8 out of a possible 18, and the average standard deviation for final scores within a given judge is 3.6. Judges recommended 50 percent of

Table 9: Baseline Business Characteristics Predictive of Capital Allocation Decisions

	(1) Score	(2) Loan
Profits (IHS)	0.136***	0.0104***
	(0.0201)	(0.00173)
Employees	0.000141	0.0000563**
	(0.000359)	(0.0000269)
Assets (IHS)	0.254***	0.0190***
	(0.0258)	(0.00255)
Liabilities (IHS)	-0.0108	-0.000353
	(0.0116)	(0.00135)
Initial Yr	0.0197*	0.00125
	(0.0114)	(0.00101)
Projected Employees	0.00313**	-0.0000309
	(0.00143)	(0.000104)
Projected Revenue (IHS)	0.224***	0.0137***
	(0.0290)	(0.00300)
Industry Exp.	0.0136	0.00239
	(0.0155)	(0.00187)
Observations	3696	3696
F	40.59	28.18
pvalue	4.41e-57	7.79e-35

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Each independent variable is interacted with an indicator for the variable being missing, which is not shown. All independent variables are information reported by the applicant and viewed by the judge. Specifications include judge fixed effects, and standard errors are clustered by application.

Table 10: Final Score Correlates with Business Performance Beliefs

	(1) Survival	(2) Survival	(3) Win. Profit	(4) Win. Profit	(5) Win. Assets	(6) Win. Assets
Score	2.579***		7.733***		99.40***	
	(0.100)		(0.946)		(15.13)	
Loan		15.53***		53.45***		499.9***
		(0.830)		(8.251)		(88.49)
Observations	3696	3696	3696	3696	3696	3696

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Survival, Profits, and Assets are expectations of the judge's with and without additional capital. Profit and Assets are in thousands of birr. Survival is the probability of survival, from 0 to 100; Win. specifications winsorize the variables at the 1 percent. Specifications include judge fixed effects. Standard errors are clustered at the application.

their businesses for loan consideration, on average, and all judges except five recommended at least one business for the loan consideration. None of the judges recommended all of the businesses they reviewed for consideration of a loan.[36]

These results are consistent with the fact that the study context provided significant incentives for judges to complete the evaluations carefully. Judges were responsible for the allocation of a significant amount of capital by a prominent national agency in a well-publicized business plan competition. They were typically referred by their manager to serve as judges. Thus, there would be reputational costs to negligent work on the evaluations. Compensation was also contingent on complete evaluations. Together, these features underscore that loan officers took the evaluation process seriously.

4.3 Implications for capital targeting and accuracy of beliefs

A key contribution of our paper is to connect the audit study results to real performance outcomes using endline measures of business performance, based on a follow-up survey of applicants 18 months after the competition. We test whether financial providers' decisions are consistent with targeting of capital toward the highest performing businesses. Further, we identify whether financial provider's beliefs on the relationship between gender and business performance were accurate. This allows us to assess whether the lack of gender discrimination (i.e., gender equity) comes at a cost of selecting lower performing businesses (i.e., profit maximization). This could be the case if true business-owner gender has meaningful predictive value in identifying business performance above and beyond financial providers'

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[36]These statistics are based on 83 judges that are used in our main sample and had more than 1 evaluation.
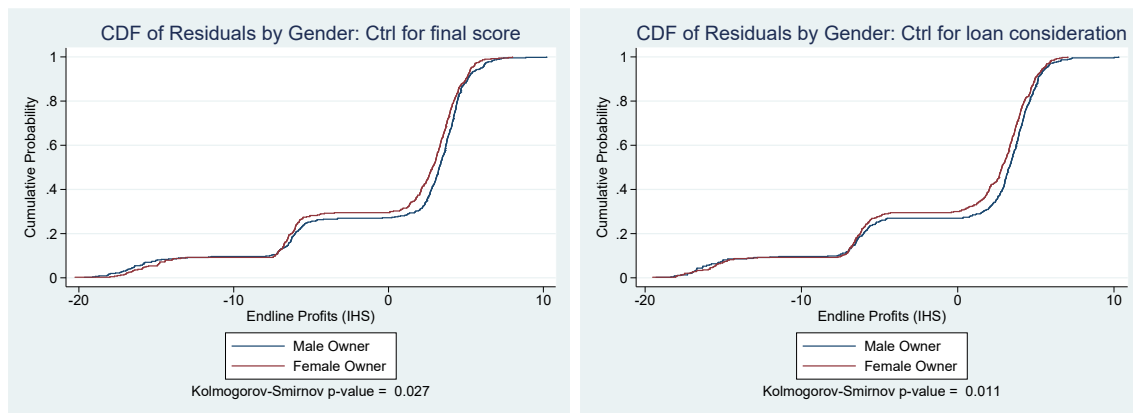
Figure 6: Distribution of Profits by True Gender, Conditional on Financial Provider Evaluations

evaluations.[37]

We do not find statistically significant differences in the average likelihood of survival by business-owner gender, but we do find that female businesses have lower profits even after controlling for financial providers' decisions (Figure 6).[38,39] Thus, our sample reflects the broader gender profit gaps that have been documented in Ethiopia and elsewhere in Sub-Saharan Africa (The World Bank Group, 2019; Hardy and Kagy, 2020). This result highlights a potential gap between judge's predictions of how business performance differs by gender and the true relationship between gender and business performance. This raises the question of whether discriminating by gender would make a meaningful improvement in targeting high performing businesses. One way to conceptualize whether financial providers' beliefs are meaningfully different from reality is to assess whether gender is an important variable when constructing an optimal prediction of business outcomes.

To address this, we use a machine learning algorithm to select optimal predictors of endline business profits from the set of variables shown to the financial providers during the judging process. We use a LASSO algorithm to select optimal predictors for a sparse

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[37]Appendix Table A15 confirms that our main results on discrimination in capital allocation are robust to the sample for which we successfully survey at endline.

[38]Without controlling for financial providers' decisions, we find that female-owned firms earn lower profits than their male counterparts across the distribution, and this difference is statistically significant (p-value = 0.002). There is no statistically significant gender difference in firm survival, though male-owned businesses are slightly more likely to survive.Appendix Table A16 shows regression results estimating how business performance differs as a function of the true gender of the business owner, conditional on the business' capital allocation decisions by the financial providers. Appendix Table A17 estimates differences in gender on additional measures of business performance prespecified in the study's preanalysis plan.

[39]As mentioned in Section 4, we do find that the final scores in the competition and loan consideration are predictive of firm survival and profits. This indicates that financial providers were able to predict future performance, confirming the validity of their evaluations.

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Table 11: Optimal predictors of endline business profits (LASSO)

	Included Proportion (1,000 runs)
Female	**0**
Business age	.995
Construction industry	.962
Employed outside of business	1
Financial services industry	.962
Loss amount missing	1
Masters degree or higher	1
Media/Marketing industry	1
Missing employee hours	.912
Missing revenue item	1
No business license	1
Owns primary business location	.912
Profit	.845
Profit missing	1
Resource industry	.99
Tax liabilities	.845
Widowed	.845

The table shows variables that are selected in more than 80% of 1,000 runs of a LASSO algorithm to select predictors of endline business profits, from among the variables shown to financial providers in the business plan competition application. Included Proportion indicates the share of runs in which the variable was included.

prediction model, which avoids overfitting and minimizes out-of-sample prediction error.[40] We conduct 1,000 trials to see which of the 94 variables in the application the algorithm will select to accurately target the most profitable businesses. We find that LASSO never includes gender in the set of variables selected (Table 11).

The machine learning exercise serves as a clear benchmark for the optimal capital allocation decision by financial providers. By design, the objective function of the machine learning algorithm is the same as the belief elicitation of the financial providers: to predict future performance of the business. Furthermore, the data utilized by the machine learning algorithm constitutes only a subset of the information available to financial providers (i.e., information that could be quantified). Considering that the additional information observed by financial providers is independent of gender by design, it must be the case that gender is less than (or equally) informative in the machine learning context than in the decision made by the financial providers. Lastly, there is a large literature highlighting that humans have limited resources when making decisions (i.e., limited attention).[41] Given these cognitive

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[40]We select the penalty parameter using cross-validation.

[41]Limited attention has been the subject of a large theoretical and empirical literature in economics; see for

constraints, financial providers must rely on a limited set of criteria when making capital allocation decisions, while these constraints are less strict for computers. The fact that our machine learning exercise shared the same objective function as the financial providers, that financial providers saw even more information than the machine learning algorithm, and that machine learning is not restricted by human cognitive limitations collectively establish the machine learning exercise as a benchmark with which to compare the financial providers' decisions.

Our machine learning exercise highlights that though gender is a factor in predicting business performance, its importance is dwarfed by the other detailed information provided in the application (and in a loan application more generally). Just as our machine learning algorithm results selected key variables to identify successful businesses, we find that financial providers also responded to key information about the business. We explicitly asked about the importance of different factors in approving loans in an exit survey of 43 financial providers who served as judges. We find that 98 percent reported current profits as being important, 91 percent reported capital stock as being important, and 86 percent reported growth potential (i.e., future profits) as important, which reflects their actual decision-making (Table 9). In contrast, just 33 percent of financial providers reported that the gender of the business owner is an important factor when deciding whether to approve a loan.[42] Considering the machine algorithm's selection of variables as optimal suggests that financial providers' beliefs were not different enough from reality to affect how capital should be awarded. These results suggest that there is no meaningful trade-off between gender equity and targeting of successful businesses.

Our results suggest that the decisions made by financial providers are consistent with a model of statistical discrimination based on accurate beliefs. In this class of models, the justification for statistical discrimination is that after accounting for all observable characteristics of businesses, considering gender can improve predictions about the future performance of businesses. That is, if financial providers have accurate beliefs that female-owned businesses perform differently conditional on all other observable information, statistical discrimination can be profit-maximizing. In our context, we find that financial providers do not believe

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example, Sims (2003) and reviews by Wiederholt et al. (2010), Gabaix (2019) and Maćkowiak, Matějka and Wiederholt (2023). Lieder and Griffiths (2020) discuss how these models fit into the broader psychological literature on human cognitive limitations. Bartoš et al. (2016) discuss endogenous allocation of attention as an aspect of discrimination; we do not find evidence for this type of effect given that we document an absence of discrimination.

[42]We asked about the importance of current profit, capital stock, growth potential, collateral, business sector, marital status, children, age of the business, experience of business owner, gender, age, and customer references. For each factor, judges were asked whether the factor was not at all important, somewhat important, important, or very important. Statistics on importance reflect those that responded with important or very important.

that gender predicts business performance, and in accordance with these beliefs, they do not discriminate. Moreover, our machine learning results suggest that the predictive value of gender is not large enough to justify statistical discrimination. This suggests that financial providers beliefs are accurate enough to respond to gender in a manner consistent with profit maximization.

5   Conclusion

This paper provides evidence on the role of gender discrimination in capital allocation decisions using a large-scale field experiment in the context of a high-stakes business plan competition in Ethiopia. We obtain clean identification of gender discrimination by randomizing the gender of applicants in the evaluation of the competition. We then evaluate the potential trade-off between gender equity and targeting capital to the highest performing businesses. Taking our results as a whole, we do not find support for gender discrimination by capital providers as an explanation for gender gaps in access to capital. In a sample of 84 experienced financial providers representing 13 different financial institutions in Ethiopia, the randomly assigned gender of the business owner did not affect real capital allocation decisions, neither in a high-stakes business plan competition, nor for consideration for a loan. These results are remarkably consistent regardless of business-owner characteristics, business size, and financial provider characteristics.

Consistent with the lack of gender discrimination in these capital allocation decisions, we find that randomly assigned gender of the business owner did not affect financial providers' expectations about future business performance and returns to capital (i.e., future survival, profits, and assets) in a belief elicitation that was incentivized for accuracy. Thus, we find that financial providers do not believe that gender predicts business performance, and they make decisions in accordance with these beliefs (i.e., they do not discriminate). These beliefs are accurate enough to respond to gender in a manner consistent with profit maximization (i.e., targeting high-performing businesses). This set of results is consistent with a model of statistical discrimination based on accurate beliefs. Since we do not find discrimination overall, these results also imply the absence of preferences for or against providing capital to women (i.e., taste-based discrimination).

We find that this lack of discrimination did not have a meaningful cost in terms of targeting capital to the highest performing businesses. Using data we collected from the competition applicants 18 months after the competition, we use a machine learning algorithm to generate optimal predictions of future business performance, and find that the gender of the business owner is not a key variable used in these predictions. This suggests that there

is no meaningful trade-off between gender equity and targeting of successful businesses.

Our results in the business plan competition have important external validity to credit markets more generally. We intentionally designed our application to mimic the first stages of a loan application, based on interviews with financial providers and reviews of their written loan applications. We recruited financial providers who regularly review loan applications to serve as judges, and our financial providers represented both microfinance institutions and commercial banks, which are the two main types of institutions providing small business credit in Ethiopia.

A potential concern with external validity is that credit decisions hinge on repayment probability, while grant decisions in a business plan competition do not. However, we find direct evidence that the capital allocation decision in the business plan competition do reflect the decisions financial providers would make in evaluating the businesses for credit. Most importantly, we do not find gender discrimination in financial providers' decision to forward the application to their own institution for consideration for a loan. This outcome leverages the incentives that financial providers face within their own institution: in general, they were referred to serve as judges by their manager, and forwarding low-quality applications for further loan consideration would be observed by their institution. In addition, we explicitly asked the financial providers whether they thought an applicant would be likely to repay a large loan, and randomly assigned gender did not affect this response. Finally, in an exit survey of the financial providers, we also find that they highlight current profits and growth potential as the key criteria for approving a loan. These are the same factors that are most influential in the capital allocation decisions we observe (Table 9), and randomly assigned gender does not affect expectations about growth potential (i.e., future business performance). In the exit survey, financial providers considered these factors to be more important than collateral (i.e., 97% considered current profits important or very important, and this was 86% for growth potential, versus 83% for collateral).

Our results have identified a key margin on which female entrepreneurs do not face discrimination in access to capital. Our context is most similar to the earlier stages of a loan or grant process, but capital requests often involve further steps and interactions, during which we may be concerned that gender discrimination could become a factor. For example, loan processes generally include multiple visits and communications between a potential business and the lending institution.

However, standard economic models of discrimination, including statistical discrimination, taste-based discrimination, and discrimination based on violation of gender norms, suggest that discrimination should be even less likely at later stages of the process. A key prediction of models of statistical discrimination is that more information reduces reliance

on gender as a signal (Aigner and Cain, 1977; Guryan and Charles, 2013). Since every interaction between a financial provider and a loan or grant applicant increases information, this should reduce statistical discrimination. For taste-based discrimination or discrimination due to violation of gender norms, backward induction suggests that a loan officers would not start a process that would be less likely to be successful due to their preferences.

Nevertheless, there might be reasons to believe that discrimination could emerge in later stages. This could happen if information is interpreted differently by gender (i.e., the same information causes financial providers to update their beliefs differently based on gender). Given limited attention, it also possible that gender discrimination could emerge once gender become more salient through in-person interactions. Lastly, it may be that discrimination emerges on the intensive margin (i.e, the loan amount) or contractual features of loans (e.g., collateral requirements). Thus, exploring discrimination at different stages and margins remains an open question, both in terms of its existence and also how it can be reconciled with the lack of discrimination observed in early stages and the extensive margin.

Our results suggest that gender discrimination in access to capital is not a key contributor to gender gaps in business performance and growth, highlighting the importance of future research on what factors do explain these gaps. The literature suggests that observable differences in gender are important, but that they cannot always explain the entire gap. One key consideration is gender differences in the demand for capital. We observe smaller (or no) gender gaps in capital access conditional on the sample that applies for capital, relative to what is generally observed in the broader population. This suggests that the choice to request capital may itself be an important consideration for the gender gaps observed in access to finance.

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A   Appendix

Table A1: Prespecified Secondary Outcomes

	(1) Surv., w/o Cap	(2) Surv., w/ Cap	(3) Win. Assets, w/o Cap	(4) Win. Assets, w/ Cap	(5) Win. Jobs, w/o Cap	(6) Win. Jobs, w/ Cap	(7) Loan
Male	-0.0944	-0.0339	60.09	52.75	87.85**	162.0	0.00159
	(0.636)	(0.666)	(46.85)	(65.42)	(43.00)	(205.3)	(0.0140)
Observations	3696	3696	3696	3696	3696	3696	3696
Female Mean	50.47	60.08	778.4	1089.4	219.2	878.0	0.495

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Loan indicates whether the application was forwarded by the judge to their own institution for loan consideration. Survival, Assets, and Employees are expectations of the judge's with and without additional capital. Assets are in thousands of birr. Survival is the probability of survival, from 0 to 100. Employees is the number of people employed by the business. Win. specifications winsorize the variables at the 1 percent. Specifications include judge and application fixed effects. Robust standard errors in parentheses.

Table A2: Primary outcomes with judge weights

	(1) Score	(2) Profit, w/o Cap	(3) Win. Profit, w/o Cap	(4) Profit, w/ Cap	(5) Win. Profit, w/ Cap
Male	-0.0727	-30.13	0.701	-1141.5	-14.20*
	(0.116)	(77.97)	(4.197)	(990.2)	(8.323)
Observations	3696	3696	3696	3696	3696
Female Mean	11.96	52.98	42.74	713.8	86.19

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Score is the final score in the business plan competition, ranging from 1 to 20. Profits are expectations of the judge's with and without additional capital, and measured in thousands of birr. Win. specifications winsorize the variables at the 1 percent. Specifications include judge and application fixed effects, and weight each judge equally. Robust standard errors in parentheses.

Table A3: Secondary outcomes with judge weights

	(1) Surv., w/o Cap	(2) Surv., w/ Cap	(3) Win. Assets, w/o Cap	(4) Win. Assets, w/ Cap	(5) Win. Jobs, w/o Cap	(6) Win. Jobs, w/ Cap	(7) Loan
Male	0.276	0.531	57.58	46.95	81.51**	93.86	0.00127
	(0.665)	(0.703)	(45.28)	(66.18)	(38.63)	(191.3)	(0.0144)
Observations	3696	3696	3696	3696	3696	3696	3696
Female Mean	49.74	58.10	771.5	1105.8	155.3	692.7	0.479

$* \ p < 0.10$, $** \ p < 0.05$, $*** \ p < 0.01$. Loan indicates whether the application was forwarded by the judge to their own institution for loan consideration. Survival, Assets, and Employees are expectations of the judge's with and without additional capital. Assets are in thousands of birr. Survival is the probability of survival, from 0 to 100. Employees is the number of people employed by the business. Win. specifications winsorize the variables at the 1 percent. Specifications include judge and application fixed effects, and weight each judge equally. Robust standard errors in parentheses.

Table A4: Primary outcomes with ordering FE

	(1) Score	(2) Profit, w/o Cap	(3) Win. Profit, w/o Cap	(4) Profit, w/ Cap	(5) Win. Profit, w/ Cap
Male	-0.114	-25.15	1.721	-948.8	-8.159
	(0.116)	(73.46)	(4.220)	(907.6)	(7.910)
Observations	3685	3685	3685	3685	3685
Female Mean	12.06	43.26	42.41	709.2	84.57

$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Score is the final score in the business plan competition, ranging from 1 to 20. Profits are expectations of the judge's with and without additional capital, and measured in thousands of birr. Win. specifications winsorize the variables at the 1 percent. Specifications include the order of the application presented to the judge, judge, and application fixed effects. Robust standard errors in parentheses.

Table A5: Secondary outcomes with ordering FE

	(1) Surv., w/o Cap	(2) Surv., w/ Cap	(3) Win. Assets, w/o Cap	(4) Win. Assets, w/ Cap	(5) Win. Jobs, w/o Cap	(6) Win. Jobs, w/ Cap	(7) Loan
Male	-0.108	-0.0501	57.63	50.45	90.41**	160.8	0.00108
	(0.639)	(0.670)	(47.14)	(65.39)	(42.93)	(206.1)	(0.0141)
Observations	3685	3685	3685	3685	3685	3685	3685
Female Mean	50.47	60.08	778.4	1089.4	219.2	878.0	0.495

$*$ $p < 0.10$, $**$ $p < 0.05$, $***$ $p < 0.01$. Loan indicates whether the application was forwarded by the judge to their own institution for loan consideration. Survival, Assets, and Employees are expectations of the judge's with and without additional capital. Assets are in thousands of birr. Survival is the probability of survival, from 0 to 100. Employees is the number of people employed by the business. Win. specifications winsorize the variables at the 1 percent. Specifications include the order of the application presented to the judge, judge, and application fixed effects. Robust standard errors in parentheses.

Table A6: Reported Gender

	(1) Score	(2) Profit, w/o Cap	(3) Wind. Profit, w/o Cap	(4) Profit, w/ Cap	(5) Wind. Profit, w/ Cap
Reported Male	-0.114	-26.87	2.276	-990.6	-7.967
	(0.117)	(76.04)	(4.273)	(937.4)	(7.995)
Reported No Gender	-0.0292	-57.08	-2.715	-754.8	-32.09
	(0.451)	(93.75)	(16.26)	(701.2)	(31.22)
Observations	3696	3696	3696	3696	3696
Reported Female Mean	12.06	43.18	41.99	717.2	84.32

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Score is the final score in the business plan competition, ranging from 1 to 20. Profits are expectations of the judge's with and without additional capital, and measured in thousands of birr. Win. specifications winsorize the variables at the 1 percent. Independent variables are those reported by the judge. Specifications include judge and application fixed effects. Robust standard errors in parentheses.

Table A7: 75 percent correct on Verification Questions

	(1) Score	(2) Profit, w/o Cap	(3) Wind. Profit, w/o Cap	(4) Profit, w/ Cap	(5) Wind. Profit, w/ Cap
Male	-0.105	-24.26	1.665	-962.1	-8.534
	(0.116)	(74.49)	(4.208)	(911.4)	(7.895)
Observations	3696	3696	3696	3696	3696
Female Mean	12.06	43.26	42.41	709.2	84.57

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Score is the final score in the business plan competition, ranging from 1 to 20. Profits are expectations of the judge's with and without additional capital, and measured in thousands of birr. Win. specifications winsorize the variables at the 1 percent. Observations limited to judges that corrected answered verification questions on at least 75 percent of their evaluations. Specifications include judge and application fixed effects. Robust standard errors in parentheses.

Table A8: 100 percent correct on Verification Questions

	(1) Score	(2) Profit, w/o Cap	(3) Wind. Profit, w/o Cap	(4) Profit, w/ Cap	(5) Wind. Profit, w/ Cap
Male	1.625	19.06	19.06	36.21	36.21
	(2.518)	(22.94)	(22.94)	(60.90)	(60.90)
Observations	329	329	329	329	329
Female Mean	12.00	54.82	41.40	105.4	85.13

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Score is the final score in the business plan competition, ranging from 1 to 20. Profits are expectations of the judge's with and without additional capital, and measured in thousands of birr. Win. specifications winsorize the variables at the 1 percent. Observations limited to judges that corrected answered verification questions on at least 75 percent of their evaluations. Specifications include judge and application fixed effects. Robust standard errors in parentheses.

Table A9: Judges Responsive to Application Information

	(1) Score	(2) Profit, w/o Cap	(3) Wind. Profit, w/o Cap	(4) Profit, w/ Cap	(5) Wind. Profit, w/ Cap
Male	-0.111	-14.73	2.499	-842.5	-7.358
	(0.118)	(69.24)	(4.257)	(800.8)	(8.057)
Observations	3542	3542	3542	3542	3542
Female Mean	12.00	42.41	42.42	736.6	85.32

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Score is the final score in the business plan competition, ranging from 1 to 20. Profits are expectations of the judge's with and without additional capital, and measured in thousands of birr. Win. specifications winsorize the variables at the 1 percent. Specifications include judge and application fixed effects. Robust standard errors in parentheses.

Table A10: Judges Responsive to Capital

	(1) Score	(2) Profit, w/o Cap	(3) Wind. Profit, w/o Cap	(4) Profit, w/ Cap	(5) Wind. Profit, w/ Cap
Male	-0.0409	-58.81	1.958	-1324.8	-3.953
	(0.132)	(107.1)	(4.197)	(1394.7)	(9.984)
Observations	2973	2973	2973	2973	2973
Female Mean	12.30	34.36	37.14	898.5	102.5

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Score is the final score in the business plan competition, ranging from 1 to 20. Profits are expectations of the judge's with and without additional capital, and measured in thousands of birr. Win. specifications winsorize the variables at the 1 percent. Observations limited to evaluations in which predictions with capital were greater than predictions without capital. Specifications include judge and application fixed effects. Robust standard errors in parentheses.

Table A11: Excludes 5 percent of judges wtih lowest variance of final scores

	(1) Score	(2) Profit, w/o Cap	(3) Wind. Profit, w/o Cap	(4) Profit, w/ Cap	(5) Wind. Profit, w/ Cap
Male	-0.105	-16.10	1.735	-864.0	-9.143
	(0.117)	(70.96)	(4.376)	(816.5)	(8.211)
Observations	3663	3544	3544	3592	3592
Female Mean	12.05	44.77	43.88	731.7	86.86

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Score is the final score in the business plan competition, ranging from 1 to 20. Profits are expectations of the judge's with and without additional capital, and measured in thousands of birr. Win. specifications winsorize the variables at the 1 percent. Observations limited to judges with variation in outcomes at least at the 5th percentile. Specifications include judge and application fixed effects. Robust standard errors in parentheses.

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Table A12: First Five Evaluations

	(1) Score	(2) Profit, w/o Cap	(3) Wind. Profit, w/o Cap	(4) Profit, w/ Cap	(5) Wind. Profit, w/ Cap
Male	2.195	-29.66	-29.66	45.13	44.97
	(4.520)	(63.82)	(63.82)	(66.87)	(66.69)
Observations	410	410	410	410	410
Female Mean	11.76	62.90	45.10	8.228	93.27

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Score is the final score in the business plan competition, ranging from 1 to 20. Profits are expectations of the judge's with and without additional capital, and measured in thousands of birr. Win. specifications winsorize the variables at the 1 percent. Observations are limited to the first round of applications given to the judge. Specifications include judge and application fixed effects. Robust standard errors in parentheses.

Table A13: No Judge Fixed Effects

	(1) Score	(2) Profit, w/o Cap	(3) Wind. Profit, w/o Cap	(4) Profit, w/ Cap	(5) Wind. Profit, w/ Cap
Male	-0.0328	-14.25	4.011	-750.1	-1.344
	(0.138)	(64.67)	(4.331)	(781.4)	(8.266)
Observations	3693	3693	3693	3693	3693
Female Mean	12.07	43.19	42.33	710.2	84.55

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Score is the final score in the business plan competition, ranging from 1 to 20. Profits are expectations of the judge's with and without additional capital, and measured in thousands of birr. Win. specifications winsorize the variables at the 1 percent. Specifications include judge and application fixed effects. Robust standard errors in parentheses.

Table A14: Effect of Gender on Return to Capital

	(1) Survival	(2) Profit	(3) Win. Profit	(4) Profit (IHS)	(5) Assets	(6) Win. Assets	(7) Assets (IHS)
Male	0.0605	-937.9	-9.446*	-0.0932	-582.6	-1.745	-0.0584
	(0.513)	(851.3)	(5.687)	(0.0906)	(710.4)	(11.17)	(0.0982)
Observations	3696	3696	3696	3696	3696	3696	3696
Female Mean	9.610	665.9	41.70	1.856	926.3	241.0	4.776

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Survival, Profits, and Assets are the difference in expectations of the judge's with and without additional capital (i.e., the return to capital). Profit and Assets are in thousands of birr. Survival is the probability of survival, from 0 to 100; Win. specifications winsorize the variables at the 1 percent; and IHS specifications transform the variables using the inverse hyperbolic sine transformation. Specifications include judge and application fixed effects. Robust standard errors in parentheses.

Table A15: Main specification robustness to endline sample

	(1) Score	(2) Overall Impress	(3) Value Prop	(4) Entrepreneurial	(5) Loan
Male	-0.0792	-0.0270	-0.0561	-0.0485	-0.00311
	(0.119)	(0.0632)	(0.0644)	(0.0671)	(0.0145)
Observations	3430	3430	3430	3430	3430
Female Mean	12.09	5.999	6.092	6.085	0.496

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Score is the final score in the business plan competition, determined by Overall Impression (Overall Impress) + .5* Value Proposition (Value Prop) + .5*Entreprenuerial Credibility (Entreprenuerial). Each of these subscores is on an increasing scale of 1 to 10. Loan indicates whether the application was forwarded by the judge to their own institution for loan consideration. Specifications include judge and application fixed effects. Sample is limited to those observed in endline survey. Robust standard errors in parentheses.

Table A16: Predicted Value of Gender for Business Performance

	(1) Firm Survival	(2) Firm Survival	(3) Profit	(4) Profit	(5) Win. Profit	(6) Win. Profit	(7) Firm Profits (IHS)	(8) Firm Profits (IHS)
Male	0.0269	0.0284	13317.3**	13645.5**	4539.4*	4922.0**	0.437	0.484
	(0.0245)	(0.0245)	(6094.1)	(6018.3)	(2345.1)	(2352.2)	(0.451)	(0.452)
Mean Final Score	0.00953**		2132.2		2366.1***		0.292***	
	(0.00421)		(1422.6)		(496.8)		(0.0863)	
Mean Loan Consideration		0.0825*		13033.9		22915.9***		2.994***
		(0.0439)		(21947.4)		(5487.5)		(0.944)
Constant	0.840***	0.839***	11827.8***	11638.3***	14144.8***	13991.0***	6.125***	6.107***
	(0.0186)	(0.0186)	(3053.6)	(3053.7)	(1524.4)	(1530.4)	(0.325)	(0.328)
r2	0.00702	0.00527	0.00950	0.00687	0.0379	0.0332	0.0157	0.0152
N	847	847	846	846	846	846	846	846

$* \ p < 0.10$, $** \ p < 0.05$, $*** \ p < 0.01$. Mean final score (loan consideration) is the relative mean for the applicant, in which the score or loan consideration has been demeaned by the judge average score or consideration of loan. Robust standard errors in parentheses.

Table A17: Prespecified endline variables

	(1) Ttl Bus Prof	(2) Win. Ttl Bus Prof	(3) Ttl Bus Prof (IHS)	(4) Hh Bus Prof	(5) Win. Hh Bus Prof	(6) Hh Bus Prof (IHS)	(7) Pers Income	(8) Win. Pers Income	(9) Pers Income (IHS)
Male	15684.4**	7802.6***	0.431	11343.0*	3783.3	-0.0877	15684.4**	7802.7***	0.442
	(6306.1)	(2699.3)	(0.437)	(6470.7)	(3130.4)	(0.416)	(6306.1)	(2699.3)	(0.432)
Mean Final Score	2549.4*	2730.4***	0.248***	2829.2*	3030.9***	0.184**	2549.4*	2730.4***	0.243***
	(1435.9)	(575.6)	(0.0841)	(1453.9)	(642.5)	(0.0800)	(1435.9)	(575.6)	(0.0831)
Constant	14098.3***	15829.0***	6.767***	20606.9***	22448.2***	7.701***	14098.7***	15829.3***	6.839***
	(3293.5)	(1639.1)	(0.312)	(3524.6)	(2067.4)	(0.291)	(3293.5)	(1639.1)	(0.309)
r2	0.0125	0.0423	0.0124	0.0100	0.0329	0.00671	0.0125	0.0423	0.0123
N	846	846	846	844	844	844	846	846	846

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Mean final score is the relative mean for the applicant, in which the score has been demeaned by the judge average score. Columns 1 to 3 reflect total business profits earned by the applicant from all their businesses, Columns 4 to 6 reflect all business profits earned by all members in the applicant's household, and Column 7 to 9 reflect all income earned by the applicant. Robust standard errors in parentheses.