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From Disparity to Equality

Strategic Targeting to Close Gender Gaps in Business Upgrading Programs

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Abstract

Business upgrading programs in developing economies often generate substantial gains for male entrepreneurs but limited average impacts for women, raising concerns about both efficiency and equity. This study develops a Program Readiness Scorecard (PRS)—a transparent, scalable tool based on 10 observable factors capturing both entrepreneurial resources and capabilities—to identify those most likely to benefit from such programs. Using pooled experimental data from firms in Uganda, South Africa, and Mexico, this paper shows that without targeting, firms led by men experience large and statistically significant gains, while those led by women have near zero average returns. Targeting that screens out entrepreneurs with the lowest scores on the PRS irrespective of gender improves women's outcomes but leaves a significant gap. Applying a higher PRS threshold—specifically, restricting eligibility to women in the top quartile of the PRS distribution—closes the gap entirely, as women with high scores achieve returns that are statistically indistinguishable from men's. These results are robust to multiple sensitivity checks. The findings have two broad policy implications. First, targeting based on the PRS can strengthen program outcomes for women-led firms while also identifying the cohort in need of remedial support prior to joining high-value initiatives. Second, beyond gender-focused programs, the PRS can be applied in a wider range of settings where scarce program resources must be directed toward enterprises with the greatest potential for sustained growth.

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Produced by the Research Support Team

From Disparity to Equality: Strategic Targeting to Close Gender Gaps in Business Upgrading Programs*

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1 Introduction

Among the 214 million microenterprises that comprise 84% of all firms worldwide (Haider et al. 2019), those owned by men generate more revenue and are more profitable than those owned by women, even when operating within the same sector (Ashraf et al. 2025; Hardy and Kagy 2018).[1] Recognizing the role of entrepreneurial ability in driving firm performance, governments and donors invest over $1 billion annually in business upgrading programs reaching 4 million to 5 million entrepreneurs (McKenzie et al. 2021), often with an explicit focus on women (Ubfal 2024)[2]. These programs include (but are not limited to) training, consulting, coaching, and modernization programs. Multinational companies also invest heavily in business upgrading programs to upskill their channel partners (e.g., retail entrepreneurs and distributors): for instance, Unilever's SAFAL program in India aims to equip 1.5 million entrepreneurs with business skills over the next decade, with a special focus on female entrepreneurs (Hindustan Unilever Limited 2024).

Despite these large investments, rigorous causal evaluations of business upgrading programs suggest a bleak pattern: on average, female entrepreneurs are unlikely to see *any* performance return from these programs, even when men get positive returns in the same program (e.g., Fiala 2018; Campos et al. 2025). We introduce the term *gender program gap* to describe the lower returns that female-led firms experience from business upgrading programs compared to their male-led counterparts.

In this paper, we make conceptual and empirical advances in understanding the gender program gap. *First*, we formalize the gender program gap in a conceptual framework adapted from Lucas Jr (1978), where female entrepreneurs face stricter credit constraints and larger barriers to acquire entrepreneurial ability at baseline, prior to any intervention. A business upgrading program is modeled as an exogenous ability shock. Tighter credit constraints prevent women from scaling capital to exploit the shock (*constraint attenuation*), while a lower baseline ability means the same shock translates into a smaller absolute profit gain (*low-ability attenuation*). These two forces generate a gender program gap. We then empirically document the gender program gap across countries and programs using a novel dataset that combines three randomized controlled trials (RCTs) involving thousands of entrepreneurs.

Second, we develop a new approach for closing the gap that is rooted in the practice of targeting. Rather than offering a service (here, a business upgrading program) indiscriminately, we propose a methodology for identifying and targeting the service to female

[1] This finding may not necessarily be true for formal non-micro businesses as noted in Grover and Viollaz (2025).

[2] Web Appendix Table W1 contains exemplar interventions for female entrepreneurs.

entrepreneurs who are "program ready" to realize higher returns. Scholars and practitioners highlight the need to target support effectively (McKenzie et al. 2021; Ubfal 2024), yet systematic approaches have rarely been proposed or evaluated. Identifying which attributes of female entrepreneurs can help realize returns from these programs is still underexplored. Building on our conceptual framework, we construct a Program Readiness Scorecard (PRS) consisting of ten observable factors that either signal slack credit constraints (*Endowments*, *Establishment*); or higher baseline entrepreneurial ability (e.g., *Expansion ambition*, *Experimentation*). We propose to target program offers to female entrepreneurs above a certain PRS threshold. In our framework, this subset of female entrepreneurs is predicted to generate the highest marginal returns to the intervention. Moreover, we contend that this PRS-based targeting method is both cost-effective and operationally straightforward, requiring only a small modification to recruitment processes: comprising a brief set of diagnostic questions at intake.

To study the gender program gap and evaluate whether targeted selection can narrow it, we draw on a unique dataset from three randomized controlled trials in Uganda, Mexico, and South Africa, testing distinct business upgrading programs with 2,595 entrepreneurs, 43% of them women. In Mexico and South Africa, the PRS instrument was not yet finalized at the time of recruitment; participants were instead screened using ad-hoc criteria. Nevertheless, in both countries the full set of variables underlying PRS were collected for every study participant, allowing us to compute scores ex-post and assess how counterfactual PRS-based targeting would have performed. By comparison, PRS was measured among all eligible entrepreneurs in Uganda and the top third of the scorers were selected for the study sample, irrespective of gender.

The study sample of N=2,595 entrepreneurs was randomized into a treatment group (offered a business upgrading program) or a control group (not offered a business upgrading program). Subsequently their performance was tracked over time, typically 24 months after baseline, enabling causal analysis of the program's long-term returns. Leveraging our experimental design, we estimate heterogeneous treatment effects, comparing average program returns by gender, and also contrasting high-PRS women-led firms with an average male-led business.

We begin by estimating program returns in the eligible population —the scenario in which business upgrading programs are offered indiscriminately to all eligible entrepreneurs. To guard against any potential bias from our gender-neutral screening, we use inverse-probability weighting to re-weight the study sample to match the full distribution of PRS scores in the eligible population. Our analysis of this re-weighted sample establishes a clear gender program gap: average treatment effects on a composite business performance index (sales

and profits) are large and significant for male entrepreneurs (0.166 standard deviations, p=0.042) but small and statistically indistinguishable from zero for female entrepreneurs. These findings provide the first rigorous, large-scale evidence of the gender program gap suggested in prior work.

Next, we show that even ad-hoc, gender-neutral screening, that is, excluding entrepreneurs with the lowest Program Readiness Scores, substantially improves returns for women entrepreneurs while having negligible effects on their male counterparts. Within the study sample, which was selected on higher PRS relative to the eligible population, female-led firms experience statistically significant gains of 0.068 SD on the performance index, corresponding to increases of 0.080 SD in monthly sales and 0.071 SD in monthly profits two years after the intervention. These results demonstrate that typical business upgrading programs *can* yield meaningful returns for women entrepreneurs but only when offered to those with sufficient readiness. With gender-neutral targeting, however, the gender program gap does not disappear: the average effect for female-led firms is only about 39% of the 0.171 SD return for male-led firms offered the same programs. Thus, at an average program cost of US $758, male entrepreneurs recoup program costs within 4 months, while female entrepreneurs require 7 months.

Finally, we simulate a counterfactual policy that targets business support to female-led firms with high readiness scores. When restricting eligibility to women in the top quartile of the Program Readiness Score (hereafter, high-PRS), the gender program gap closes entirely: the treatment effect for high-PRS women (0.166 SD, p=0.012) is essentially identical to that for average men (0.171 SD, p = 0.0001), with a negligible and statistically insignificant difference (Δ=0.005, p=0.951).

Our results are robust to multiple checks. The effect is not driven by differences in program take-up or compliance, by any single country in the multi-country sample, or by reliance on a composite performance index; it persists across each underlying sales and profit measure and is stable under alternative PRS thresholds and model specifications. We also benchmark our PRS-based targeting against a standard machine-learning (ML) approach, following Chernozhukov et al. (2018), which estimates group average treatment effects using a broader set of baseline covariates (e.g., firm size, sector) without theory-guided selection. This data-driven method detects no heterogeneity in program returns for women. In line with Bryan, Karlan, and Osman (2024), who show in a loan-targeting context that parsimonious, theory-driven covariate choice can outperform "kitchen-sink" ML specifications, our results demonstrate that the simple PRS matches or exceeds the predictive performance of more opaque ML alternatives, while preserving important advantages for implementation.

These results validate a new approach—targeting using the Program Readiness Scorecard—

for closing the gender program gap, with low implementation cost and complexity. Our targeting method does not require altering the content or pedagogical approach of business upgrading programs. In particular, other approaches explored in the literature to increase returns for female entrepreneurs, including tailoring programs with gender-specific program content (e.g., in ILO's GET Ahead program Bulte, Lensink, and Vu (2017)) and gender-specific mentorship (e.g., in Uganda Germann et al. (2024)), require changes that are costlier for providers and more context-dependent. Given that the top quartile of female entrepreneurs is still a sizable segment as women own a third of the 214 million micro-enterprises worldwide (Halim 2020), selection based on a PRS-type approach can yield promising outcomes for those ready to embrace growth. Speaking of inclusivity, we show that high-PRS women do not come from a narrow demographic: they have *more* children on average and may even operate very small firms.

Our analysis of the Program Readiness Scorecard (PRS) as a targeting instrument yields four policy insights. *First*, the PRS is intentionally inclusive: its additive structure and omission of direct performance metrics allow for multiple pathways to readiness and avoid privileging already-established firms. *Second*, PRS diagnostics identify the factors most strongly associated with readiness among women entrepreneurs, enabling targeted remedial interventions prior to enrollment in more sophisticated business upgrading programs. For instance, enhancing entrepreneurs' experimentation capacity and willingness to develop new products has the largest impact on PRS, offering a concrete focus for the design of preparatory interventions. *Third*, the PRS provides a basis for segmenting the provision of business upgrading services: dynamic, high-readiness entrepreneurs can access advanced programs through private providers, recouping costs within a reasonable timeframe through increased profits, while governments or public money focus on building baseline capabilities in lower-readiness firms. *Finally*, the PRS offers a transparent, theory-guided tool with broad applicability, ranging from funneling approaches to filtering out high-potential entrepreneurs and inclusion in the value-chains of Multinationals to competitive grant programs and investment selection.

Our research contributes to three strands of related literature. First, we advance the literature on gender gaps by formalizing and empirically validating the gender program gap. Although 30% of women worldwide in the nonfarm labor force are entrepreneurs and billions of dollars are invested in supporting them, little attention has been paid to gender gaps in the benefits from participating in business upgrading programs compared to wage gaps among employees (e.g., Barth, Kerr, and Olivetti (2021); Goldin et al. (2017)) or profit gaps among firms (e.g., Hardy and Kagy (2018); Delecourt and Fitzpatrick (2021)). Existing randomized evaluations of business upgrading programs have not systematically established

this stylized fact as they rely exclusively on female entrepreneur samples (De Mel, McKenzie, and Woodruff 2014; Karlan and Valdivia 2011; Valdivia 2015; Davies et al. 2024; Ubfal et al. 2022) or combine business support with financial interventions (Berge, Bjorvatn, and Tungodden 2015; Fiala 2018; Giné and Mansuri 2014). We are the first to propose a conceptual framework that underpins two mechanisms driving the gender program gap—tighter credit constraints and lower baseline entrepreneurial ability—and rigorously estimate the gender program gap using a unique dataset spanning multiple countries with varied programs.

Second, in validating a novel targeting approach to address this gap, we contribute to the literature on targeting in two distinct fields. In marketing, prior work has examined how to allocate instruments such as advertising, promotions, or salesforce effort (e.g., Dong, Manchanda, and Chintagunta (2009); Manchanda, Xie, and Youn (2008); Deng and Mela (2018)). We extend this body of work to a new domain—welfare-enhancing services—by offering the first causal evidence on targeting strategies that increase both adoption and impact among marginalized consumers, specifically female micro-entrepreneurs.

Third, we contribute to the emerging literature on targeting in development economics. Most existing work focuses on strategically allocating *finance*—to households (Haushofer et al. 2022) or to firms (Bryan, Karlan, and Osman 2024; Hussam, Rigol, and Roth 2022)—whereas we propose and experimentally validate a novel strategy to appropriately target businesses for *skill upgrading*. Existing approaches to firm targeting often rely on costly-to-measure variables, such as community impressions (Hussam, Rigol, and Roth 2022) or lengthy psychometric instruments (Bryan, Karlan, and Osman 2024). By contrast, our PRS-based approach is built on low-cost measures and is grounded in a flexible conceptual framework that can be adapted across sectors and contexts, reducing implementation barriers while preserving predictive power.

Our paper proceeds as follows. We describe our conceptual framework in Section 2, followed by the description of our dataset and targeting methodology in Section 3. We then present the estimates of the gender program gap in Section 4 and robustness checks in Section 5. Section 6 discusses the policy implications of our work. We conclude with some policy implications in Section 7.

2 Conceptual Background: The Gender Program Gap

This section presents a conceptual framework explaining the gender program gap and how targeted selection can potentially narrow it.

2.1 Attenuation Channels for Program Returns

An entrepreneur operating in industry j produces output using a standard Cobb–Douglas technology,

$$f(A, K, L) = AK^{\alpha}L^{\beta},$$

where $A > 0$ encompasses various aspects of entrepreneurial ability such as skills, knowledge, and attitudes, and $\alpha, \beta \in (0, 1)$ capture the elasticities of output with respect to capital and labor. The entrepreneur chooses inputs to maximize profits

$$\pi = p_j f(A, K, L) - rK - wL,$$

subject to a capital-specific credit constraint $rK \leq B$, where B reflects the collateralized borrowing limit. In line with empirical evidence for small firms in developing economies (Janes, Koelle, and Quinn 2025), we assume diminishing returns to scale, $\alpha+\beta < 1$, ensuring an interior optimum.

Following the literature (e.g., Campos et al. (2025)), we model business upgrading programs as a shock increasing A. Our focus is on the marginal effect of ability on optimal profits, $d\pi^*/dA$, and how this effect may be attenuated by two structural channels: (i) binding credit constraints and (ii) low baseline ability.

2.1.1 Credit constraint channel

When the credit constraint binds, the entrepreneur cannot adjust capital to its unconstrained optimum after a positive ability shock. Setting $rK_c^* = B$ and optimizing over L yields the constrained optimal profits,

$$\pi_c^* = pA\left(\frac{B}{r}\right)^{\alpha}(L_c^*)^{\beta} - wL_c^*.$$

Differentiating with respect to A, and substituting the optimal L_c^* gives the program impact under constraint:

$$\frac{d\pi_c^*}{dA} = p\left(\frac{\beta pA}{w}\right)^{\frac{\beta}{1-\beta}}\left(\frac{B}{r}\right)^{\frac{\alpha}{1-\beta}}.$$

This expression is increasing in B, with elasticity[3]:

$$\frac{\partial \ln(d\pi_c^*/dA)}{\partial \ln B} = \frac{\alpha}{1-\beta} > 0.$$

[3]Full derivation in Appendix Section W1.

reflecting complementarity between ability and capital in production. A higher borrowing limit allows entrepreneurs to deploy more capital in response to an ability improvement, amplifying marginal profit gains.

Link to gender gap: Evidence indicates female-led firms often face stringent borrowing limits (Grover and Viollaz 2025) due to barriers such as lender bias (Malmström et al. 2024; Guzman and Kacperczyk 2019), limited control over household finances (Jayachandran 2020), and discriminatory inheritance practices (Ubfal 2024). As a result, ability improvements from business upgrading programs may yield smaller gains for women entrepreneurs when credit constraints are binding.

2.1.2 Baseline ability channel

When the credit constraint does not bind ($B \geq rK_u^*$), the entrepreneur freely adjusts both capital and labor. Under profit maximization:

$$K_u^* = \left[pA\,\alpha^{1-\beta}\beta^{\beta}r^{\beta-1}w^{-\beta}\right]^{\frac{1}{1-\alpha-\beta}}, \qquad L_u^* = \frac{\beta r}{\alpha w}K_u^*,$$

The corresponding program impact is then:

$$\frac{d\pi_u^*}{dA} = p(K_u^*)^{\alpha}(L_u^*)^{\beta} \propto A^{\frac{\alpha+\beta}{1-\alpha-\beta}}.$$

with the elasticity of program returns with respect to baseline ability given by[4]:

$$\frac{\partial \ln(d\pi_u^*/dA)}{\partial \ln A} = \frac{\alpha+\beta}{1-\alpha-\beta} > 0.$$

Higher initial ability magnifies absolute profit gains from a given improvement in A, since more able entrepreneurs operate at larger efficient scale and mobilize inputs more productively. Entrepreneurs starting from a low baseline ability—for example, with limited agency, weaker managerial skills, or less time for their business—cannot as effectively translate a program's recommendations into productive changes, resulting in smaller realized gains.

Link to gender gap: Structural barriers often limit women's opportunities to accumulate entrepreneurial ability prior to program participation. Social norms may restrict mobility, professional networks, and time available for business activities (Jayachandran 2020), while the absence of role models can erode confidence and aspirations (Lafortune, Riutort, and Tessada 2018). Consistent with these constraints, women in developing economies report lower growth ambitions (Field et al. 2016) and reduced bandwidth for business due

[4]Full derivation in Appendix Section W1.

to household responsibilities (Ubfal 2024). Lower baseline A attenuates the translation of program content into performance gains.

2.2 Targeting Entrepreneurs on Program Readiness

The conceptual framework identifies two structural drivers of heterogeneity in marginal program returns: the entrepreneur's credit limit (B) and baseline entrepreneurial ability (A). Entrepreneurs with higher values of B and A are more prepared to translate the knowledge and practices delivered by a business upgrading program into profit gains. This implies a clear policy lever: improving the allocation of program slots by targeting firms whose observed characteristics signal both weaker credit constraints and stronger baseline ability. We operationalize this idea through a *Program Readiness Scorecard*, comprising of observable proxies E as follows:

$$\text{PRS} = g(E) = \gamma' E,$$

where E is a vector of observable proxies, chosen explicitly to map onto the theoretical constructs of B and A. This direct mapping grounds the PRS in theory, ensuring that the targeting rule is aligned with the underlying mechanisms that drive heterogeneous returns.
Credit-constraint proxies (B): To signal higher effective borrowing capacity, measures of the entrepreneur's startup capital (endowments) and the physical permanence of the business structure (establishment) are included.
Baseline ability proxies (A): Drawing on the management education literature, entrepreneurial ability can be decomposed into *knowledge*, *skills*, and *attitudes* (Schein 1967; Westera 2001).

- *Knowledge:* Captured through education and labor-market experience (Becker 1962), distinguishing between managerial and professional roles to reflect management and technical expertise. Market exposure serves as an additional proxy for awareness of product and consumer diversity.
- *Skills:* Ability to implement program content, proxied by managerial effectiveness—specifically sound record-keeping and separation of business from personal finances.
- *Attitudes:* Traits that promote adoption and sustained use of new practices, including experimentation, openness to external ideas, and ambition to expand (Kerr et al. 2018).

The 10 Es, their correspondence to our conceptual model, and their field measurement are summarized in Appendix Table A1. In Uganda, where the tool was first developed, these

ten conceptual factors were measured in a survey through extensive field engagement with stakeholders, including donors (governments and policy institutions), program implementers (the partner NGO), and entrepreneurs themselves. Using responses from the full eligible population, a logistic regression predicting membership in a higher-readiness cluster was estimated, and regression coefficients were converted to normalized point values that generate a score out of 100. Appendix Table A2 reports the final scoring system and weights.[5]

2.3 Testable Hypotheses

The conceptual framework yields the following predictions for marginal program returns:

Hypothesis 1 (Gender program gap)**.** *Women benefit less from business upgrading programs.*

If female-led firms face tighter credit constraints ($B^F < B^M$) and lower baseline entrepreneurial ability ($A^F < A^M$), then average program returns will be lower for women than for men.

$$\text{ATE}^M > \text{ATE}^F.$$

Hypothesis 2 (Targeting implication)**.** *Selecting entrepreneurs based on PRS, either in a gender neutral or targeted manner, narrows the gender program gap.*

Gender-neutral screening that drops the lowest-PRS entrepreneurs increases the average returns, especially for women-led firms, under the assumption that women are more constrained on credit and baseline skills. An increase in ATE^F, thus, narrows the differences in returns. Furthermore, restricting program offers to high-PRS women above a certain threshold in a more targeted manner may possibly close the gap: $\text{ATE}^F \approx \text{ATE}^M$.

3 Data Description

This section describes our unique dataset comprising three randomized evaluations of business upgrading programs in Uganda, South Africa, and Mexico. In doing so, we also present where our targeting tool—the Program Readiness Scorecard—fits into this recruitment process.

[5]For robustness, we also estimate Group Average Treatment Effects (GATES) using the random-forest approach in Chernozhukov et al. (2018). Although results are similar, the targeting rule is opaque with low implementability.

3.1 Eligible Population

Program stakeholders define eligibility criteria for business upgrading programs, typically based on policy or commercial objectives such as firm size (e.g., fewer than 10 employees), sector (e.g., retail), and location (e.g., urban municipalities). From the universe of firms enumerated in national censuses or business registries, program implementers contact those meeting these criteria through physical canvassing and media channels. Entrepreneurs who express interest and meet practical implementation requirements (e.g., being available during the program period) comprise the eligible population. Below, we describe the eligible population in our interventions in Uganda, South Africa, and Mexico.

Uganda. The NGO partner Grow Movement sought to assist small-scale entrepreneurs in any sector within greater Kampala. A geographically exhaustive canvassing effort identified approximately 20,000 entrepreneurs. Of these, 3,936 met practical implementation criteria—fluency in English, operation from a permanent business location, and willingness to participate—constituting the eligible population.

South Africa. The NGO partner Business Bridge focused on small-scale entrepreneurs in greater Cape Town. Canvassing identified approximately 10,000 entrepreneurs, of whom 1,951 met the same practical implementation criteria used in Uganda. They form the eligible population.

Mexico. Policy partners in the Ministry of Economy aimed to improve the productivity of small-scale retail firms in Mexico City. Canvassing identified roughly 10,000 firms operating in the past month. Of these, 1,563 met practical implementation criteria—operation from a permanent business location, and willingness to participate—forming the eligible population.

3.2 Screening Procedure

From the eligible population, the implementers followed a PRS-based approach in screening the sample of potential program beneficiaries, with the process being more formal in Uganda, while it was less systematic in South Africa and Mexico.

Uganda: PRS-Based Selection. For the 3,936 entrepreneurs in the eligible population, enumerators administered a 15-minute PRS survey that generated a total score out of 100. Top scorers were invited into the study for the opportunity to receive randomized offers of business upgrading services. Entrepreneurs in the bottom two-thirds of the PRS distribution were excluded. This yielded a selected sample of N=930 entrepreneurs.

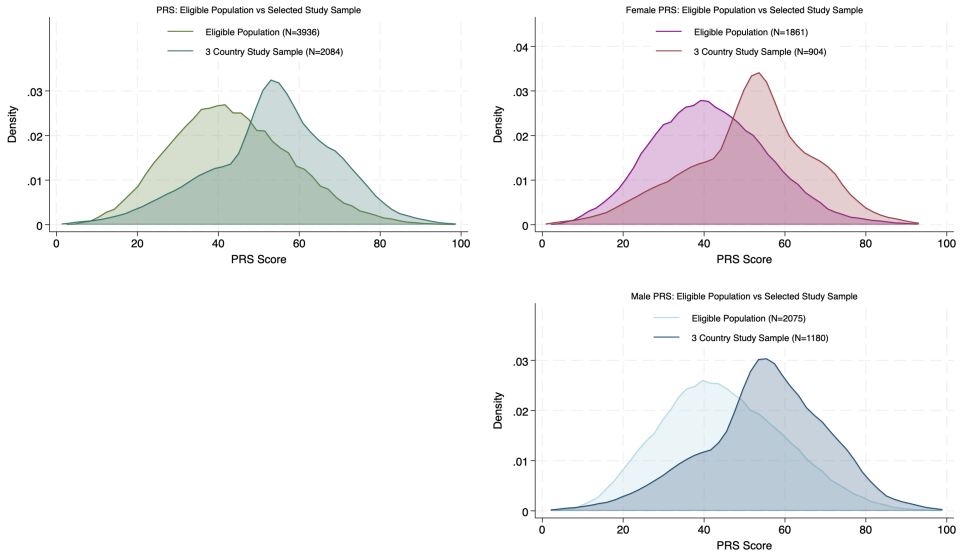
Mexico and South Africa: Ad-hoc Screening. As the scoring methodology for the PRS tool had not yet been finalized, implementers applied ad-hoc but gender-neutral screening. In particular, entrepreneurs judged to have low commitment to growing their business were

dropped from the sample of potential beneficiaries. PRS survey was nonetheless conducted prior to randomization, allowing us to compute PRS scores ex-post intervention. The selected samples comprise N=852 entrepreneurs in South Africa and N=813 in Mexico.

Our (gender-neutral) selection procedures results in an over-representation of entrepreneurs with higher PRS in the selected sample of potential beneficiaries relative to the eligible population (Figure 1). Consistent with the targeting criteria, the sample distribution has greater mass at higher PRS values (e.g., above 50) in the full sample (panel A), the female subsample (panel B), and the male subsample (panel C).[6]

As PRS thresholds for inclusion were not strictly enforced, particularly in Mexico and South Africa, we still have a large number of low-PRS entrepreneurs in the sample. This variation facilitates our simulations of average treatment effects in the eligible population using inverse-probability weighting: our inclusion model captures selection probabilities as a function of PRS and other covariates, allowing low-PRS entrepreneurs to receive higher weights in these analyses. The presence of high- and low-PRS firms in the sample also enables counterfactual exercises—within each country—comparing actual returns to those under strictly applied score thresholds targeting high-PRS women.

Figure 1: Targeting on PRS—Eligible Population vs. Selected Study Sample



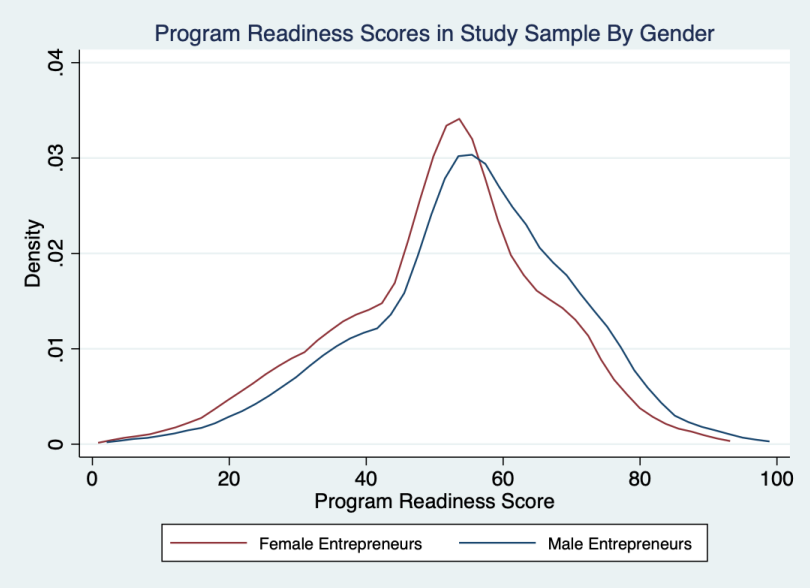
Notes: The eligible population constitutes N=3,936 firms for whom the Program Readiness Score was measured. The selected sample refers to the N=2,595 firms who were further selected to be included in RCT samples across three studies in Uganda, Mexico, and South Africa, excluding entrepreneurs attriting at endline.

Across all three countries, the final selected sample includes N=2,595 entrepreneurs, with

[6]The full PRS distribution is proxied using Uganda's eligible population; we later discuss robustness to potential cross-country differences.

N=1,117 or 43% women, which provides sufficient power to study gender program gaps. Appendix Table A3, summarizes the characteristics of the sample at baseline, suggesting that these are not subsistence-level businesses: an average firm has monthly sales of US$ 1,928. Drawing on this sample, we plot the PRS distribution for male- and female-led firms, (Figure 2), which shows that the distribution for women is shifted left relative to men and their mean PRS is 51.37 while men's is 55.19. This difference of 3.82 points (+7.45%) is statistically significant at the 1% level and indicative of stronger constraints on aspects such as credit and baseline entrepreneurial productivity. This pattern is consistent with our conceptual model, in which the PRS incorporates proxies for credit constraints and baseline entrepreneurial ability. The left-shifted PRS distribution among women suggests they may face tighter credit limits $B^F < B^M$, lower baseline ability A or both.

Figure 2: Male Entrepreneurs have Higher Program Readiness Scores



Notes: Kernel density estimates of the Program Readiness Score distribution are plotted by entrepreneur gender for the N=2,595 firms in selected study samples across Uganda, Mexico, and South Africa.

3.3 Randomization of Program Offers

Entrepreneurs in the screened sample were randomly assigned to treatment and control groups to estimate the causal effects of business upgrading programs. Firms in the treatment groups received fully subsidized upgrading support, while those in the control groups were not offered any intervention during the study period.

In *Uganda*, entrepreneurs were paired with management professionals in advanced economies for six months of one-on-one coaching via Skype, which cost roughly US $600–800 per en-

trepreneur, similar to newer digitally-enabled programs (e.g. Davies et al. (2024); Otis et al. (2024)).In *Mexico*, entrepreneurs received thirteen one-on-one consulting visits from a university student, aimed at modernizing the firm in both customer-facing and internal operations. The cost was approximately US$675 per entrepreneur, comparable to consulting interventions evaluated in prior work (e.g., Bloom et al. (2013)). In South Africa, entrepreneurs participated in a ten-week classroom training (eight hours per week) focused on either marketing or finance, delivered at a cost of about US$900 per entrepreneur, resembling classroom-based programs studied in the literature (e.g., Giné and Mansuri (2021)). Sample sizes and treatment assignments for each setting are reported in Appendix Table A4.

3.4 Performance Data

Our dataset is longitudinal with two observations per entrepreneur: a baseline audit before randomization and an endline audit 24 months post-endline, after any interventions. We collect monthly sales and profits, converted to 2023 US$ using appropriate market exchange rates, in two approaches: (a) aided recall, where entrepreneurs report their last complete month's figures from memory; and (b) anchor-adjusted method, which iterates through daily and weekly estimates and cost breakdowns while verifying any available financial records. From these we construct four distinct measures of a firm's financial performance: anchor-adjusted sales and profits; and average of anchor-adjusted and aided-recall sales and profits, each winsorized at 1% in both tails and standardized. Our preferred dependent variable is constructed as an overall performance index that averages these four standardized measures.[7]

4 The Gender Program Gap

We first estimate the gender program gap in the eligible population, absent any PRS-based screening, and then in the selected sample first with gender-neutral screening and subsequently with gender-based targeting.

4.1 Eligible Population

A key empirical challenge in estimating the gender program gap in the eligible population, absent any PRS-based screening, is that the randomized study sample was drawn using criteria that over-represent higher-PRS entrepreneurs. To recover estimates for the eligible

[7] We prefer this index because combining correlated outcomes improves statistical power and avoids multiple-testing issues for effects in the same direction (Drexler, Fischer, and Schoar 2014). We assign equal weights to each measure as we are agnostic about their relative precision.

population, we apply inverse probability weighting, modeling inclusion in the targeted sample as a function of PRS and other covariates. Complete PRS data are available only for Uganda,[8] which provides the empirical basis for constructing weights and approximating the full PRS distribution in other settings.

$$\Pr(D_i = 1 \mid \text{PRS}_i) = \Phi(\alpha + \beta\, \text{PRS}_i) \tag{1}$$

where $D_i = 1$ if entrepreneur i is included in the selected sample and $D_i = 0$ otherwise. The predicted probability $\hat{p}_i$ is used to construct inverse-probability weights which re-weight the study sample to match the eligible-population PRS distribution.

$$\hat{p}_i = \Pr(D_i = 1 \mid \text{PRS}_i).$$

We then estimate intent-to-treat regressions applying the inverse-probability weights $w_i = \frac{1}{\hat{p}_i}$. We estimate an ANCOVA model of the following form:

$$Y_{i,1} \;=\; \alpha \;+\; \beta\, T_i \;+\; \gamma\, F_i \;+\; \delta\left(T_i \times F_i\right) \;+\; \theta_1\, Y_{i,0} \;+\; \theta_2\, X_{i,0} \;+\; \mu_{\text{country}[i]} \;+\; \varepsilon_i, \tag{2}$$

where $Y_{i,1}$ is the endline outcome (e.g., overall performance index, monthly sales, monthly profit), $Y_{i,0}$ is the baseline value of that outcome, T_i is an indicator for randomized assignment to treatment, F_i is an indicator for female. To examine treatment effects by gender, we run Equation (2) on the male-only study sample (excluding the F_i and $T_i \times F_i$ terms) and the female-only study sample (again excluding the F_i and $T_i \times F_i$ terms). In each case, the coefficient on T_i captures the average treatment effect for that subgroup. When we pool both genders, we include F_i and $T_i \times F_i$. Here, β captures the average treatment effect for men, and $\beta + \delta$ captures the average treatment effect for women. A statistically significant δ indicates a difference in treatment effects by gender (i.e., evidence of a gender program gap).

Following standard ANCOVA specifications (McKenzie 2012), our regressions also includes baseline covariates $X_{i,0}$: sector dummies (2-digit SIC Categories); business registration status; whether the current business owner founded the business; owner age; marital status; and number of children. Finally, $\mu_{\text{country}[i]}$ is a fixed effect for the country in which entrepreneur i is located. These controls help with precision and importantly, ensure our treatment effect (i.e., program return) estimates are based on comparisons while holding constant baseline performance, firm sector, demographic characteristics, and country.

[8] We use Uganda's eligible-population PRS distribution to approximate those in Mexico and South Africa. This assumption may not hold if the underlying program readiness differs; we therefore interpret results with this caveat.

Table 1, columns (1)–(3) present estimates of equation 2; the DV is the overall performance index of monthly sales and profits at endline. These estimates provide causal evidence of the gender program gap in a large sample with diverse business upgrading programs. In the female-only subsample (Column 1), the point estimate of the treatment effect is 0.0430 SD and statistically indistinguishable from zero. In contrast, for the male-only subsample (Column 2), the treatment effect is 0.166 SD and statistically significant at the 1% level. In Column (3), the difference between these two effects (δ) is 0.104 SD and statistically significant at the 5% level, indicating that men benefit more from business upgrading programs than women. These findings systematically establish the gender program gap across diverse countries and programs, as articulated in Hypothesis 1.

4.2 Selected Sample, with Gender-Neutral Screening

We now examine the gender program gap in our study sample that screens the eligible population with the PRS-based approach, albeit in a gender-neutral manner.

Table 1 Columns (4)-(6) present estimates of program returns under our initial, gender-neutral selection steps where roughly the lowest PRS-for both men and women entrepreneurs —were excluded from the study samples. We again focus on the overall performance index DV, which averages the four standardized monthly sales and profits measures at endline. Given the finding that the PRS distribution for female-led firms is shifted to the left (Figure 2)—consistent with more binding financial constraints ($B^F < B^M$) and lower baseline ability ($A^F < A^M$)—we test **Hypothesis 2**: screening out the lowest PRS entrepreneurs from the sample in a gender-neutral manner raises ATE^F but still leaves $\text{ATE}^F < \text{ATE}^M$.

Two findings stand out. *First*, unlike the null returns observed for female entrepreneurs in Columns (1) and (3), female entrepreneurs in the study sample now realize a positive and statistically significant treatment effect of 0.0678 SD (Column 4). Thus, we provide the first rigorous evidence that standard business upgrading programs, when preceded by some initial PRS-based screening, can benefit female entrepreneurs. For men, the estimated coefficient remains large at 0.177 SD (Column 5).

Table 1: The Gender Program Gap in Business Upgrading Programs

DV: Business Performance Index	**In Eligible Population**			**In Study Sample**		
	(1) Female	(2) Male	(3) Full Sample	(4) Female	(5) Male	(6) Full Sample
Treat	0.0430	0.166***		0.0678**	0.177***	
	(0.0290)	(0.0419)		(0.0331)	(0.0440)	
Female + Treat			0.0507			0.0752**
			(0.0312)			(0.0333)
Male + Treat			0.177***			0.201***
			(0.0358)			(0.0393)
Male + Control			0.0225			0.0301
			(0.0366)			(0.0371)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean: Base Group	-0.200	-0.0384	-0.200	-0.200	-0.0384	-0.200
SD: Base Group	0.485	0.872	0.485	0.485	0.872	0.485
δ: Male TE - Female TE			0.104			0.0962
p: Male TE = Female TE			0.0452			0.0778
Obs.	904	1180	2084	904	1180	2084

Notes: Estimates presented are from linear regressions of our business performance DV on treatment assignment and where relevant, it's interaction with gender. Observations are at the entrepreneur-level, pooled across samples from three countries: Uganda (N = 735), Mexico (N = 738), and South Africa (N=611). The DV is an index averaging four standardized business performance variables measured at Endline (converted to USD using appropriate market exchange rates for comparability across countries): i) an aided-recall measure of monthly sales winsorized 1% on both tails, ii) an anchor-adjusted measure of monthly sales winsorized 1% on both tails, iii) an aided-recall measure of monthly profits winsorized 1% on both tails, and iv) an anchor-adjusted measure of monthly profits winsorized 1% on both tails. Robust standard errors are in parentheses. P-values are highlighted as: p $< 0.1^{*}$ p $<0.05^{**}$ p $< 0.01^{***}$

Second, the gender program gap still persists. Female entrepreneurs' program return of 0.068 SD is only about 38% of the 0.177 SD return for male (Column 3), and the estimated δ=0.0962 SD (gender difference in treatment effects) is significantly different from zero. While initial screening improves outcomes for female entrepreneurs relative to indiscriminate program offers to the eligible population, they still gain less compared to their male counterparts. Appendix Table B1 demonstrates that this pattern is consistent across all alternative performance outcomes.

To understand the economic significance of the remaining gender program gap, we compute the time period needed to recover the cost of the program, based on the average expected profits of the entrepreneurs. Per Appendix Table B1 Column (9)), a screened male entrepreneur expects the average treatment effect (ATE) to be an incremental US$210 in monthly profits while the average female entrepreneur's point estimate of profit increase is $92. Given that the average cost of business upgrading programs in our setting is US$758, a male entrepreneurs would recover program costs in approximately four months, while it would at least seven months for females to recoup the program costs. This slower cost recovery may dampen both the supply and demand for business support services among women, consistent with evidence that entrepreneurs exhibit low willingness to pay when perceived returns are limited (Maffioli, McKenzie, and Ubfal 2023).

4.3 Targeted Female Entrepreneurs Sample

We next assess whether targeted selection of high-PRS female entrepreneurs closes the gender program gap. Table 2 extends our previous HTE analysis by splitting female entrepreneurs into those with high-PRS (top-quartile, i.e., at least 61) and those with low-PRS (scores below 61). Columns (1)–(3) present the estimated HTE on the overall performance index, monthly sales, and monthly profits. Our results in Column (1) suggests that an average male entrepreneur obtains a statistically significant (at 1% level) treatment effect of 0.165 SD (row i) on the overall performance index, while the comparable effect for high-PRS women stands at 0.178 SD (row v). By comparison, low-PRS women obtain null treatment effects, with point estimate of 0.0457 SD being far below an average male and a high-PRS female. This group of low-PRS women entrepreneurs continue to exhibit the gender program gap. The difference in treatment effects between low-PRS women and average men is estimated at 0.119 SD and is statistically significant at the 5% level (row iii and iv), while high-PRS women have program returns that are not significantly different from those of the average male entrepreneur (rows vii and viii).[9] This pattern is consistent across other

[9]Table C1 compares key demographics such as age, marital status, and number of children for women in the top quartile of the PRS (to be targeted for business upgrading programs) versus those in the bottom three quartiles.

measures of firm performance: monthly sales and profits composites shown in Columns (2) and (3).[10]

5 Robustness Checks

We confirm the robustness of our finding—that targeting high-PRS female entrepreneurs can eliminate the gender program gap—through a series of checks, outlined below along with the main econometric considerations.

5.1 Selection Bias in Program Take-up

A potential concern is that observed subgroup differences in program returns reflect variation in take-up or compliance rather than true treatment effects. Appendix Table C3 addresses this by showing that both the probability of taking up the business upgrading offer and subsequent compliance (completion of most sessions) are statistically similar for high- and low-PRS women entrepreneurs. This rules out selection at the take-up or compliance stage as the driver of heterogeneous returns. The divergence emerges *after* compliance, consistent with the attenuation channels of tighter credit constraints and lower baseline ability in our conceptual framework.

5.2 Estimation Bias from Single Country Data

In multi-country analyses, there may be concerns that pooled estimates may be driven by a single country's data. If one country contributes the bulk of the effect, pooled results could misrepresent the generalizability of findings across contexts. Appendix Table C4 addresses this by replicating the main estimation (Table 2, Column 1) while sequentially omitting one country at a time. Our results remain qualitatively unchanged, indicating that no single country drives the findings.

While there are small demographic differences—low-PRS women are slightly older (37.9 versus 35.6 years of age) and have marginally fewer children (1.61 versus 1.84)—overall, our tool does not concentrate on a narrow demographic of women.

[10] In Appendix Table C2, we explore the value of PRS-based targeting for male entrepreneurs. We find that targeting high-PRS men does not yield a significantly higher program return than low-PRS men (δ_{male}=0.034 SD, p=0.767). This limited differential is consistent with our conceptual framework: when the prevalence of the frictions that PRS is designed to detect—binding credit constraints and low baseline entrepreneurial ability—is low within a group, targeting on PRS yields minimal gains. For male entrepreneurs in our study contexts, these frictions appear less severe.

Table 2: Closing the Gender Program Gap: Targeting Women w. High Program Readiness

	(1) **Index**	(2) Monthly Sales	(3) Monthly Profits
Male + Treat	0.199***	0.198***	0.228***
	(0.0405)	(0.0413)	(0.0472)
Male + Control	0.0334	0.0280	0.0716
	(0.0421)	(0.0433)	(0.0475)
High PRS Female + Treat	0.195***	0.164**	0.258***
	(0.0709)	(0.0681)	(0.0937)
High PRS Female + Control	0.0170	0.00133	0.0710
	(0.0629)	(0.0650)	(0.0709)
Low PRS Female + Treat	0.0457	0.0596*	0.0378
	(0.0347)	(0.0355)	(0.0384)
Country FE	Yes	Yes	Yes
Controls Incl.	Yes	Yes	Yes
Mean of DV: Low PRS Female C	-0.244	-0.254	-0.220
SD of DV: Low PRS Female C	0.350	0.399	0.355
(i) TE: Male	0.165	0.170	0.156
(ii) p: Male TE = 0	0.000138	0.000161	0.00240
(iii) δ_{low}: Male TE - Low PRS Female TE	0.119	0.111	0.118
(iv) p: Male TE = Low PRS Female TE	0.0309	0.0543	0.0642
(v) TE: High PRS Female	0.178	0.162	0.187
(vi) p: High PRS Female TE = 0	0.0398	0.0593	0.0888
(vii) δ_{high}: Male TE - High PRS Female TE	-0.0129	0.00786	-0.0312
(viii) p: Male TE = High PRS Female TE	0.892	0.935	0.792
Obs.	2084	2084	1955

Notes: Estimates presented are from linear regressions of DVs on the interaction of treatment assignment and gender and upper-quartile PRS membership, with observations at the entrepreneur-level, pooled across samples from three countries: Uganda (N = 735), Mexico (N = 736), and South Africa (N=611). The DV in column (2) is the average of two measures of monthly sales of the firm at Endline (converted to USD using appropriate market exchange rates for comparability across countries): i) an aided-recall measure winsorized 1% on both tails then standardized for interpretability and ii) an anchor-adjusted measure winsorized 1% on both tails then standardized for interpretability. The DV in column (3) is the average of two measures of monthly profits of the firm at Endline (converted to USD using appropriate market exchange rates for comparability across countries): i) an aided-recall measure winsorized 1% on both tails then standardized for interpretability and ii) an anchor-adjusted measure winsorized 1% on both tails then standardized for interpretability. The DV in column (1) is an index averaging the four standardized DVs described above. Regressions include the following controls: sector dummies (2-digit SIC Categories); business registration status; entrepreneur age; marital status; number of children; and founder status. Robust standard errors are in parentheses. P-values are highlighted as: p < 0.1* p <0.05** p < 0.01***

5.3 Alternative Performance Measures

When using a composite performance index as the main dependent variable, there may be concern that the estimated treatment effect may be driven disproportionately by one underlying outcome, rather than reflecting a consistent pattern across all components. This could overstate the impact of the program if only a single measure responds to treatment. By re-estimating the model separately for each of the four individual business performance metrics—two monthly sales measures (anchor-adjusted and average) and two monthly profit measures (anchor-adjusted and average), in Appendix Table C5, we demonstrate that the pattern of results holds across all four measures.

5.4 Sample Attrition in Surveys

A primary econometric concern is whether attrition between baseline and endline disrupts the balance achieved by random assignment. If post-attrition treatment and control groups differ systematically in baseline business or entrepreneur characteristics, the estimates could be sensitive to the inclusion of these covariates in the ANCOVA specification. We address this concern by re-estimating the model without baseline covariates and find that the coefficients on treatment effects remain stable (Appendix Table C6), consistent with the covariates serving to improve precision rather than to correct post-attrition imbalance.

5.5 Alternative PRS Threshold

Using an alternative threshold of the PRS yields consistent qualitative patterns: across terciles (Appendix Table C7) and quintiles (Appendix Table C8), male entrepreneurs continue to show positive and significant average treatment effects, while female entrepreneurs in the bottom segments show null effects and those in the top segments achieve returns statistically indistinguishable to men. However, the magnitude of the gap in returns narrows most precisely under the upper-quartile definition.

5.6 Comparison with Machine Learning-Based Targeting

We explore how machine learning methods perform in detecting heterogeneity in program returns for female entrepreneurs relative to our preferred, theory-based PRS approach. Following Chernozhukov et al. (2018), we estimate the group average treatment effects (GATES) for four quartiles of women entrepreneurs and test for statistically significant heterogeneity. The algorithm is implemented twice: (i) using only the ten E factors and (ii) using the full

baseline covariate set (the Es plus firm performance at baseline and other controls included in our ANCOVA specification).

Appendix Figure C1 presents the quartile-specific GATES; panel A (10 Es only) shows that the top quartile of women entrepreneurs achieve statistically significant program returns, with magnitudes converging to the average program return for their male counterparts (GATE for Q4 = 0.176 SD, $p = 0.009$).[11] Panel B (all baseline covariates) fails to reject the null of no heterogeneity ($p = 0.8972$), indicating that the inclusion of additional covariates dilutes the signal for program readiness. This result parallels Bryan, Karlan, and Osman (2024), who find in a small-sample loan-targeting context that theory-guided covariate selection can outperform "kitchen-sink" approaches. In sum, while ML methods corroborate the existence of a segment of women who can achieve high returns from business upgrading programs, they produce a less transparent targeting rule relative to our theory-guided PRS approach.

6 Policy Discussion

Our results validate the PRS as a practical, theory-driven targeting tool that can identify female micro- and small-enterprise entrepreneurs able to achieve program returns comparable to those of men. It is easily implementable: the underlying factors are inexpensive to measure through short survey questions and adaptable across contexts, as they can be measured and scored in different ways. Anchored in our conceptual framework, the tool leverages observable proxies for weaker credit constraints (B) and higher baseline entrepreneurial ability (A), providing a transparent and generalizable basis for resource allocation. This section clarifies the key features and broader implications of the PRS-based targeting approach.

6.1 Inbuilt Inclusivity in Design

First, the PRS is intentionally inclusive. Three design choices ensure multiple pathways to program readiness. *First*, we omit any direct measure of current business performance, such as sales or profits to avoid privileging already established firms and to improve measurement reliability. For example, low sales or profits in a single round may reflect idiosyncratic shocks (e.g., a temporary slump), whereas the underlying factors captured by the PRS remain relatively stable over time. While prior research finds that larger firms tend to benefit most from business upgrading programs (Valdivia 2015; Grover and Imbruno 2020), such

[11] A Wald test rejects the null of no heterogeneity ($p = 0.0115$), and entrepreneurs in this top quartile differ significantly from the bottom three quartiles on eight of the ten E factors.

indicators may simply proxy for pre-existing socioeconomic advantages—such as inheriting a large enterprise—rather than for the underlying merit that enables entrepreneurs to absorb and implement program insights. *Second*, we include several factors beyond the firm's endowment of startup capital, which could reflect socioeconomic advantage rather than absorptive capacity for program content. *Third*, the PRS has an additive index rather than a multiplicative scoring structure, allowing entrepreneurs to qualify by excelling in certain dimensions even if they score lower in others. This additive structure broadens inclusion by recognizing multiple routes to program readiness. These design features facilitate substantial diversity in program readiness profiles of entrepreneurs. Case studies of female entrepreneurs in the top quartile of the PRS, presented in Appendix Table D1, highlight the sources of program readiness.

6.2 Guide Remedial Interventions

The PRS can potentially provide actionable diagnostic information on where remedial interventions could most effectively prepare female entrepreneurs for business upgrading programs. To identify the factors that most strongly predict their program readiness, we regress an indicator for being in the top quartile of PRS equal to 1 if in the top quartile, (0 otherwise) on the standardized values of each of the ten E factors for the female-only subsample.[12] Figure 3 plots the resulting coefficients and 95% confidence intervals.[13]

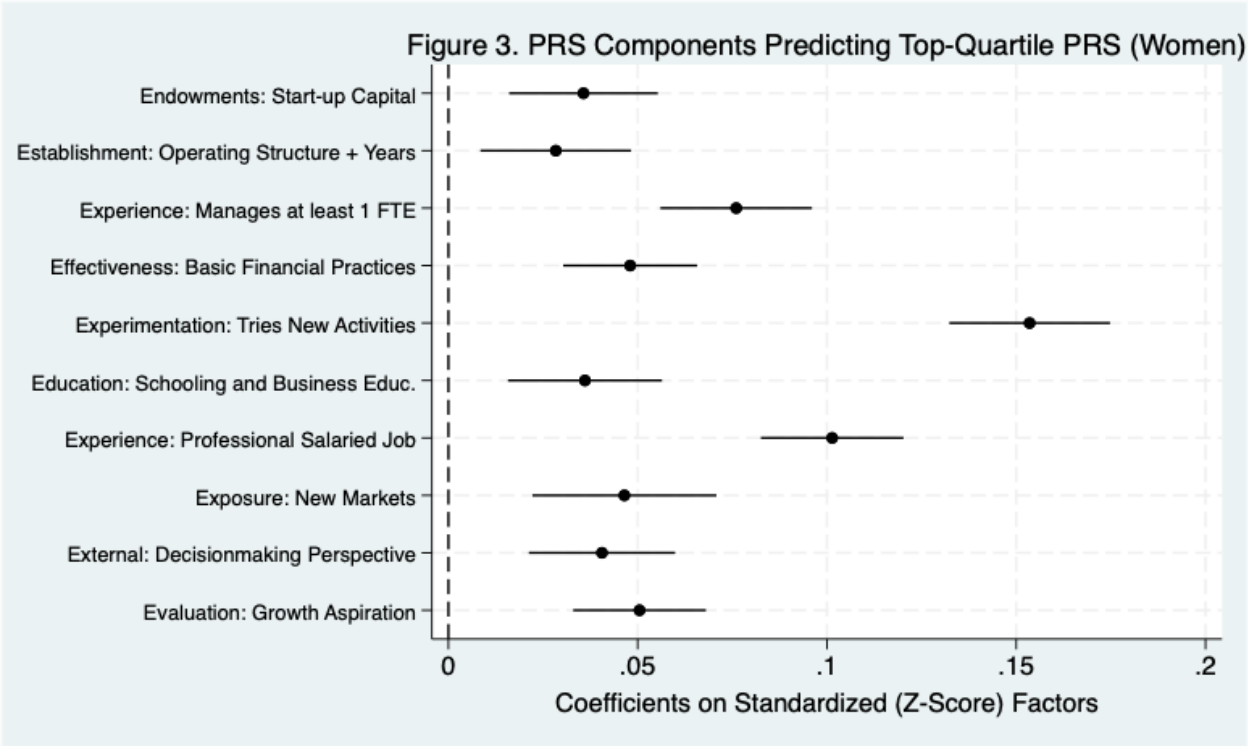
Four factors emerge as the strongest predictors. The largest coefficient comes from *Experimentation* (i.e., willingness to develop new products, implement new marketing practices, and attract new customers). We note that experimentation constitutes a route to high program readiness that does not necessarily derive from pre-existing socioeconomic privileges. The next largest coefficients come from *Experience: Professional* (holding a job in a firm with more than ten employees, which builds exposure to systems and processes) and *Experience: Managerial* (managing one or more full-time employees, which enhances leadership and resource allocation skills). The fourth highest coefficient is *Evaluation* (enumerators' assessment of growth aspirations), which again reflects a more meritocratic dimension of readiness.

Table D3 in the Appendix links these findings to concrete remedial interventions that enhance specific PRS factors. For example, in an attempt to foster *experimentation*, the Wavumbuzi Entrepreneurship Challenge in South Africa, Rwanda, and Kenya encourages

[12] Pairwise correlations across the ten E factors are low (Appendix Table D2): the highest correlation coefficient is 0.171, between **Endowments** and **Effectiveness**. Each factor captures distinct entrepreneurial characteristics, allowing them to be entered simultaneously in the regression.

[13] As a validity check, all ten factors are positively and significantly associated with high readiness—enhancing any of them would raise the likelihood that a woman entrepreneur benefits from an upgrading program.

Figure 3: Upper Quartile (High-)Program Readiness and Ten Underlying Factors



Notes: Coefficients from a regression of upper quartile (high-)PRS membership on underlying factors are presented along with their 95% confidence intervals from the female-only study sample.

secondary-school students to form revenue-generating business clubs and cultivate socio-emotional skills such as grit and goal-setting. The South Asian Women in Power Sector Professional Network (WePOWER) helps women accumulate relevant work experience before founding a firm, strengthening the *Experience: Professional* and *Experience: Managerial*.

6.3 Identify Segments for Public and Private Investment

In the micro- and small-enterprise segment, our results show that female entrepreneurs in the upper tail of the PRS distribution can, on average, recoup the costs of business upgrading programs within a reasonable number of months through higher profits. This payoff profile creates space for differentiated provision. The PRS can serve as a segmentation tool to align program type and provider with entrepreneurs' readiness levels.

For high-PRS entrepreneurs—whether female or male—the short cost-recovery window implies a clear role for private markets. Private training providers, consultants, and multi-national firms can offer more sophisticated upgrading services to these dynamic firms, who are both willing and able to pay out-of-pocket and can translate program content into rapid

profit gains. The PRS can also help corporations identify which partner entrepreneurs or channel distributors are most ready to benefit from joint upgrading initiatives.

In contrast, for low-PRS micro and small firms, willingness and ability to pay for upgrading services are more limited, and the likelihood of recouping investment without prior capability strengthening is low. For these firms, the primary public policy role is to build baseline entrepreneurial ability—improving managerial skills, operational effectiveness, and other readiness factors—before exposing them to more complex and costly upgrading programs. If readiness gaps are not addressed first, the probability of deriving meaningful benefits from sophisticated training is low, leading to wasted public resources and lost time for entrepreneurs.

Thus, the PRS can guide a complementary division of labor: private markets focus on the more dynamic firms with short payback horizons, while governments and donors concentrate on readiness-building among lower-PRS firms, thus equipping them to participate effectively in advanced upgrading opportunities. This sequencing both minimizes wasted investment and maximizes the long-term impact of enterprise support.

6.4 Broader Applications of the PRS-Based Tool

The PRS tool could be applied more broadly, for example, in investment selection by development finance institutions, in targeting firms for inclusion in value chain upgrading initiatives, or in screening applicants for competitive grant and accelerator programs. For instance, the World Bank is implementing a funneling approach in Malawi and Mozambique—a tiered model that offers broad initial support to many enterprises and then concentrates more costly interventions on a subset of the most promising ones (Grover 2021). The PRS can serve as a practical tool for such funneling approaches by identifying the enterprises that are most likely to benefit from intensive, higher-cost support in later stages. In each case, the PRS can be constructed from theory, and offers a transparent and data-driven method for guiding scarce resources toward firms with the greatest potential to benefit from the upgrading program.

7 Conclusion

This paper develops and tests a Program Readiness Scorecard (PRS) to identify female entrepreneurs most likely to benefit from business upgrading programs and applies it to a pooled experimental sample of small-scale firms in Mexico, South Africa and Uganda. The PRS combines ten observable E factors capturing proxies for credit constraints and baseline

entrepreneurial ability, and is designed to be scalable and flexible in its selection criteria, and can be customized to apply across contexts. Our research yields three central empirical findings. *First*, in the eligible population absent any PRS-based screening, women entrepreneurs show no measurable program gains compared to large and significant gains for men, producing a gender program gap of 0.104 SD. *Second*, gender-neutral PRS screening—excluding the lowest-readiness entrepreneurs of both genders—raises women's average program return, but this remains only 38% of the men's return, with a persistent gender program gap of 0.096 SD. In economic terms, screened male entrepreneurs gain an average of US$ 210 in monthly profits, recovering typical program costs (US$ 758) in about four months, whereas screened female entrepreneurs gain US$ 92 per month, requiring seven months to recover costs. *Third*, when targeting is applied to the top quartile of women by PRS, their average return rises to a level that is statistically indistinguishable from that of their male counterparts—while low-PRS women continue to see null gains. Our results are robust to a number of sensitivity tests. Machine-learning methods also identify the top quartile of women as high-return participants, though the PRS provides a more transparent and policy-practical targeting rule.

Future research may examine other underlying factors for constructing PRS, explore the cost-effectiveness of PRS-based targeting at scale, and test the impact of remedial interventions aimed at raising PRS scores among disadvantaged groups and over longer periods of time. In this research, while we examine a range of countries, from low-income to upper-middle income, future research can examine whether the PRS generalizes to other contexts where social and cultural norms around women are more stringent, or among other disadvantaged groups such as entrepreneurs among the internally displaced population in fragile and conflict settings. In addition, while we propose the PRS in the context of interventions that enhance participants' managerial capital, future research can examine whether the PRS generalizes to financial capital interventions.

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Appendix A: Conceptual Framework

Table A1: The Program Readiness Scorecard Factors

Model Parameter	**Proxy component**	**Factor**	**Example of Field Measurement**
B: Credit Constraint	Financial capital	Endowments	Amount of money spent to start or acquire the business
		Establishment	Business activities performed in a large building for more than one year
A: Baseline Ability	Knowledge	Education	Completed high school or higher; completed another business support program
		Experience: Managerial	Manages more than one full-time employee
		Experience: Professional	Held a job (regular monthly wage) for $>$ 3 months in a firm with $>$10 employees
		Exposure	Visited two or more countries, or lived in another country for $>$6 months
	Skills	Effectiveness	Keeps business finances separate from personal finances; maintains records
	Attitudes	Experimentation	Developed new products, offered new market campaigns, expanded location
		External orientation	Taking multiple perspectives when making decisions: customers, competitors, and employees
		Evaluation	Enumerator's assessment of desire to grow revenue by 20% and add an employee next year

Table A2: Program Readiness Scorecard: Scoring System

Factor	**Max Score**	**Criteria**
Endowment	5 points	Above-median startup capital
Establishment	4 points	Business in large + non-home structure for over 1 year
Education	6 points	Completed post-secondary schooling and prior business support program
Experience: P	10 points	Job in firm with $\geq$ ten FTE
Experience: M	6 points	Employing at least one FTE or two PTE
Exposure	5 points	Lived abroad (or visited $\geq$ 2 markets)
Effectiveness	13 points	5 pts if separates finances; 8 pts for formal recordkeeping
Experimentation	35 points	5 pts for each new: (i) product, (ii) customer type, (iii) channel, (iv) campaign, (v) process, (vi) quality upgrade, (vii) premise upgrade
External	6 points	Takes all three of the following perspectives for decisions: customers, competitors, employees
Evaluation	10 points	Enumerators rates their growth aspirations as "excellent"

Table A3: Summary Statistics for Businesses in Study Sample

	Mean	SD	Min	Max	N
Performance Variables					
Monthly Sales (USD)	1927.71	2996.79	21	19641	2595
Monthly Profits (USD)	389.40	938.05	-1616	7752	2595
Entrepreneur Characteristics					
Gender (Female=1)	0.43	*n.a*	0	1	2595
Age	36.21	12.53	0	84	2595
Married	0.50	*n.a*	0	1	2593
Number of Dependents	1.69	1.80	0	20	2595
Founded Business	0.76	*n.a*	0	1	2595
Business Characteristics					
Registered Business	0.36	0.48	0	1	2595
Business Sector					
Agriculture	0.01	*n.a*	0	1	2595
Construction	0.03	*n.a*	0	1	2595
Basic Manufacturing	0.06	*n.a*	0	1	2595
Advanced Manufacturing	0.03	*n.a*	0	1	2595
Energy and Transportation	0.01	*n.a*	0	1	2595
Retailing	0.54	*n.a*	0	1	2595
Wholesaling	0.02	*n.a*	0	1	2595
Finance, Insurance, and Real Estate	0.01	*n.a*	0	1	2595
Consumer Services	0.23	*n.a*	0	1	2595
Professional Services	0.04	*n.a*	0	1	2595

Notes: This table presents summary statistics on the N=2,595 firms in selected study samples across Uganda, Mexico, and South Africa. The measures were collected at baseline (prior to randomization) at the business location. All monetary values are inflation-adjusted and expressed in 2023 USD.

Table A4: Sample Sizes for the Study Sample

	Uganda			**South Africa**			**Mexico**		
	Male	Female	All	Male	Female	All	Male	Female	All
N_{total}	561	369	930	471	381	852	446	367	813
N_{treat}	322	208	530	299	237	536	282	257	539
(%)	(57.40)	(56.37)	(56.99)	(63.48)	(62.20)	(62.91)	(63.23)	(70.03)	(66.30)
$N_{control}$	239	161	400	172	144	316	164	110	274
(%)	(42.60)	(43.63)	(43.01)	(36.52)	(37.80)	(37.09)	(36.77)	(29.97)	(33.70)

Notes: This table lists sample sizes by treatment assignment and gender across the samples from three countries: Uganda, South Africa, and Mexico.

Appendix B: Estimating the Gender Program Gap

Table B1: Positive Program Returns for Women through Initial (Gender-Neutral) Selection: Individual DVs

	Performance Composite			Monthly Sales (Std.)			Monthly Profits (Std.)		
	(1) Female	(2) Male	(3) All	(4) Female	(5) Male	(6) All	(7) Female	(8) Male	(9) All
Treat	0.0678**	0.177***		0.0750**	0.177***		0.0657*	0.168***	
	(0.0331)	(0.0440)		(0.0341)	(0.0451)		(0.0392)	(0.0519)	
Female + Treat			0.0752**			0.0803**			0.0711*
			(0.0333)			(0.0338)			(0.0391)
Male + Treat			0.201***			0.194***			0.232***
			(0.0393)			(0.0392)			(0.0473)
Male + Control			0.0301			0.0191			0.0707*
			(0.0371)			(0.0391)			(0.0413)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean: Base Group	-0.200	-0.0384	-0.200	-0.207	-0.0272	-0.207	-0.174	-0.0262	-0.174
SD: Base Group	0.485	0.872	0.485	0.533	0.938	0.533	0.484	0.889	0.484
δ: Male TE − Female TE			0.0962			0.0945			0.0902
p: Male TE = Female TE			0.0778			0.0937			0.158
Obs.	904	1180	2084	904	1180	2084	843	1112	1955

Notes: Estimates presented are from linear regressions of DVs on treatment assignment and where relevant, it's interaction with gender. Observations are at the entrepreneur level, pooled across samples from three countries: Uganda (N = 735), Mexico (N = 738), and South Africa (N=611). The DV in columns (4)-(6) is the average of two measures of monthly sales of the firm at Endline (converted to USD using appropriate market exchange rates for comparability across countries): i) an aided-recall measure winsorized 1% on both tails then standardized for interpretability and ii) an anchor-adjusted measure winsorized 1% on both tails then standardized for interpretability. The DV in columns (7)-(9) is the average of two measures of monthly profits of the firm at Endline (converted to USD using appropriate market exchange rates for comparability across countries): i) an aided-recall measure winsorized 1% on both tails then standardized for interpretability and ii) an anchor-adjusted measure winsorized 1% on both tails then standardized for interpretability. The DV in column (1)-(3) is an index averaging the four standardized DVs described above. Robust standard errors are in parentheses. P-values are highlighted as: p < 0.1* p <0.05** p < 0.01***

Appendix C: Closing the Gender Program Gap

Table C1: Demographics of High versus Low PRS Women Entrepreneurs

	(1) Low PRS Women		(2) High PRS Women		F-test for balance across all groups	
Variable	N	Mean/(SE)	N	Mean/(SE)	N	F-stat/P-value
Age (Years)	847	37.915	270	35.600	1117	6.837***
		(0.444)		(0.721)		0.009
Married	846	0.496	270	0.548	1116	2.189
		(0.017)		(0.030)		0.139
Number of Children	847	1.613	270	1.841	1117	3.739*
		(0.058)		(0.104)		0.053
Founded Business Herself	847	0.764	270	0.722	1117	1.914
		(0.015)		(0.027)		0.167
Formally Registered Biz	847	0.315	270	0.374	1117	3.213*
		(0.016)		(0.030)		0.073

This table compares demographics and entrepreneur characteristics for high (Q4) vs. low PRS women entrepreneurs. P-values are highlighted as: $p < 0.1^{*}$ $p < 0.05^{**}$ $p < 0.01^{***}$

Table C2: Targeting Men w. High Program Readiness is Less Impactful

	(1) **Index**	(2) Monthly Sales	(3) Monthly Profits
High PRS Male + Treat	0.267***	0.255***	0.340***
	(0.0862)	(0.0849)	(0.101)
High PRS Male + Control	0.0758	0.00489	0.193**
	(0.0729)	(0.0815)	(0.0896)
Low PRS Male + Treat	0.180***	0.183***	0.197***
	(0.0417)	(0.0427)	(0.0488)
Low PRS Male + Control	0.0229	0.0364	0.0392
	(0.0443)	(0.0461)	(0.0493)
High PRS Female + Treat	0.197***	0.165**	0.261***
	(0.0709)	(0.0681)	(0.0938)
High PRS Female + Control	0.0199	0.00264	0.0767
	(0.0627)	(0.0650)	(0.0707)
Low PRS Female + Treat	0.0453	0.0594*	0.0367
	(0.0346)	(0.0355)	(0.0382)
Country FE	Yes	Yes	Yes
Controls Incl.	Yes	Yes	Yes
(i) TE: High PRS Male	0.191	0.250	0.147
(ii) p: High PRS Male TE = 0	0.0687	0.0253	0.247
(iii) TE: Low PRS Male	0.157	0.146	0.158
(iv) p: Low PRS Male TE = 0	0.000713	0.00257	0.00366
(v) δ_{male}: High PRS Male TE - Low PRS Male TE	0.0341	0.103	-0.0104
(vi) p: High PRS Male TE = Low PRS Male TE	0.767	0.398	0.940
Obs.	2084	2084	1955

Notes: Estimates presented are from linear regressions of DVs on the interaction of treatment assignment and gender and upper-quartile PRS membership, with observations at the entrepreneur-level, pooled across samples from three countries: Uganda (N = 735), Mexico (N = 736), and South Africa (N=611). The DV in column (2) is the average of two measures of monthly sales of the firm at Endline (converted to USD using appropriate market exchange rates for comparability across countries): i) an aided-recall measure winsorized 1% on both tails then standardized for interpretability and ii) an anchor-adjusted measure winsorized 1% on both tails then standardized for interpretability. The DV in column (3) is the average of two measures of monthly profits of the firm at Endline (converted to USD using appropriate market exchange rates for comparability across countries): i) an aided-recall measure winsorized 1% on both tails then standardized for interpretability and ii) an anchor-adjusted measure winsorized 1% on both tails then standardized for interpretability. The DV in column (1) is an index averaging the four standardized DVs described above. Regressions include the following controls: sector dummies (2-digit SIC Categories); business registration status; entrepreneur age; marital status; number of children; and founder status. Robust standard errors are in parentheses. P-values are highlighted as: $p < 0.1^{*}$ $p < 0.05^{**}$ $p < 0.01^{***}$

Table C3: Intervention Take-up by Program Readiness Scores

	(1) Adopted	(2) Complied	(3) Adopted	(4) Complied
High PRS Female + Treat	-0.0217	-0.0265		
	(0.0292)	(0.0392)		
PRS (Continuous)			-0.0000765	-0.000219
			(0.000840)	(0.00111)
Country FE	Yes	Yes	Yes	Yes
Controls Incl.	Yes	Yes	Yes	Yes
Mean of DV: Low PRS Female + T	0.887	0.777		
Obs.	701	701	701	701

Notes: Estimates presented are from linear regressions of intervention takeup DVs on Program Readiness variables, with observations at the entrepreneur-level, in the sample of female-and-treated (N=701) entrepreneurs. The DV in columns (1) and (3) is whether the entrepreneur attended any sessions of the treatment—i.e. they were an adopter. The DV in columns (2) and (4) is whether the entrepreneur attended the majority sessions of the treatment—i.e. they were a complier. Regressions include the following controls: sector dummies (2-digit SIC Categories); business registration status; entrepreneur age; marital status; number of children; and founder status. Robust standard errors are in parentheses. P-values are highlighted as: $p < 0.1^{*}$ $p < 0.05^{**}$ $p < 0.01^{***}$

Figure C1: Closing the Gender Program Gap using Machine Learning Methods

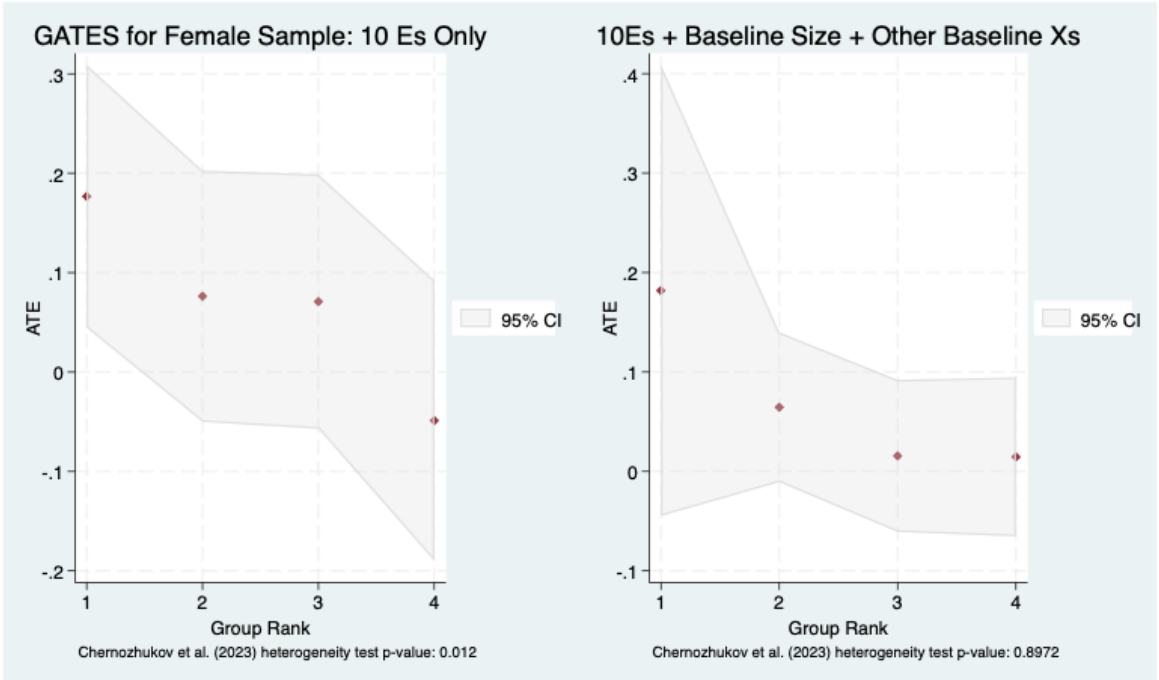


Table C4: Robustness Check on Closing the Gender Gap: Two-country Samples

	Business Performance Index		
	(1) MX Omitted	(2) SA Omitted	(3) UG Omitted
Male + Treat	0.240***	0.121***	0.243***
	(0.0514)	(0.0349)	(0.0600)
Male + Control	0.0625	0.0108	0.0240
	(0.0537)	(0.0355)	(0.0615)
High PRS Female + Treat	0.223**	0.0406	0.335***
	(0.0950)	(0.0496)	(0.105)
High PRS Female + Control	0.0333	-0.0162	0.0100
	(0.0750)	(0.0504)	(0.112)
Low PRS Female + Treat	0.0442	0.00541	0.0838*
	(0.0448)	(0.0303)	(0.0498)
Country FE	Yes	Yes	Yes
Controls Incl.	Yes	Yes	Yes
Mean of DV: Low PRS Female C	-0.276	-0.265	-0.191
SD of DV: Low PRS Female C	0.331	0.295	0.409
(i) TE: Male	0.178	0.110	0.219
(ii) p: Male TE = 0	0.00129	0.00854	0.000359
(iii) δ_{low}: Male TE - Low PRS Female TE	0.133	0.105	0.135
(iv) p: Male TE = Low PRS Female TE	0.0573	0.0434	0.0846
(v) TE: High PRS Female	0.189	0.0567	0.325
(vi) p: High PRS Female TE = 0	0.0933	0.389	0.0198
(vii) δ_{high}: Male TE - High PRS Female TE	-0.0118	0.0535	-0.106
(viii) p: Male TE = High PRS Female TE	0.922	0.488	0.479
Obs.	1346	1473	1349

Notes: Estimates presented are from linear regressions of DVs on the interaction of treatment assignment and gender and upper-quartile PRS membership, with observations at the entrepreneur level, pooled across samples from three countries: Uganda (N = 735), Mexico (N = 736), and South Africa (N=611). The DV is an index averaging four standardized variables: i) an aided-recall measure of sales winsorized 1% on both tails, ii) an anchor-adjusted measure of sales winsorized 1% on both tails, iii) an aided-recall measure of profits winsorized 1% on both tails and iv) an anchor-adjusted measure of profits winsorized 1% on both tails. P-values are highlighted as: p < 0.1* p <0.05** p < 0.01***

Table C5: Robustness Check on Closing the Gender Gap: Individual DVs

	Monthly Sales		Monthly Profits	
	(1) Anchor-Adjusted	(2) Average	(3) Anchor-Adjusted	(4) Average
Male + Treat	0.197***	0.204***	0.229***	0.229***
	(0.0428)	(0.0407)	(0.0478)	(0.0475)
Male + Control	0.0313	0.0300	0.0795	0.0685
	(0.0443)	(0.0431)	(0.0502)	(0.0461)
High PRS Female + Treat	0.165**	0.168**	0.250**	0.269***
	(0.0687)	(0.0699)	(0.0982)	(0.0940)
High PRS Female + Control	0.00841	-0.000862	0.0873	0.0599
	(0.0645)	(0.0665)	(0.0753)	(0.0712)
Low PRS Female + Treat	0.0558	0.0627*	0.0147	0.0609
	(0.0359)	(0.0361)	(0.0388)	(0.0391)
Country FE	Yes	Yes	Yes	Yes
Controls Incl.	Yes	Yes	Yes	Yes
Mean of DV: Low PRS Female C	-0.248	-0.259	-0.216	-0.224
SD of DV: Low PRS Female C	0.400	0.402	0.368	0.356
(i) TE: Male	0.165	0.174	0.149	0.161
(ii) p: Male TE = 0	0.000272	0.000136	0.00594	0.00135
(iii) δ_{low}: Male TE - Low PRS Female TE	0.109	0.111	0.135	0.0999
(iv) p: Male TE = Low PRS Female TE	0.0588	0.0564	0.0429	0.115
(v) TE: High PRS Female	0.156	0.168	0.163	0.209
(vi) p: High PRS Female TE = 0	0.0656	0.0598	0.164	0.0584
(vii) δ_{high}: Male TE - High PRS Female TE	0.00892	0.00561	-0.0136	-0.0481
(viii) p: Male TE = High PRS Female TE	0.925	0.955	0.914	0.686
Obs.	2084	2084	1955	1955

Notes: Estimates presented are from linear regressions of DVs on the interaction of treatment assignment and gender and upper-quartile PRS membership, with observations at the entrepreneur level, pooled across samples from three countries: Uganda (N = 735), Mexico (N = 736), and South Africa (N=611). P-values are highlighted as: p < 0.1* p <0.05** p < 0.01***

Table C6: Robustness Check on Closing the Gender Gap: No Controls Incl.

	(1) Index	(2) Monthly Sales	(3) Monthly Profits
Male + Treat	0.207***	0.195***	0.254***
	(0.0410)	(0.0408)	(0.0490)
Male + Control	0.0364	0.0204	0.0935**
	(0.0396)	(0.0406)	(0.0438)
High PRS Female + Treat	0.191***	0.155**	0.263***
	(0.0688)	(0.0671)	(0.0901)
High PRS Female + Control	0.0235	0.00332	0.0930
	(0.0605)	(0.0636)	(0.0686)
Low PRS Female + Treat	0.0476	0.0588*	0.0417
	(0.0342)	(0.0350)	(0.0378)
Mean of DV: Low PRS Female C	-0.244	-0.254	-0.220
SD of DV: Low PRS Female C	0.350	0.399	0.355
(i) TE: Male	0.171	0.174	0.160
(ii) p: Male TE = 0	0.000108	0.000125	0.00207
(iii) δ_{low}: Male TE - Low PRS Female TE	0.123	0.116	0.119
(iv) p: Male TE = Low PRS Female TE	0.0267	0.0436	0.0639
(v) TE: High PRS Female	0.168	0.152	0.170
(vi) p: High PRS Female TE = 0	0.0479	0.0761	0.115
(vii) δ_{high}: Male TE - High PRS Female TE	0.00274	0.0226	-0.00953
(viii) p: Male TE = High PRS Female TE	0.977	0.814	0.936
Obs.	2084	2084	1955

Notes: Estimates presented are from linear regressions of DVs on the interaction of treatment assignment and gender and upper-quartile PRS membership, with observations at the entrepreneur level, pooled across samples from three countries: Uganda (N = 735), Mexico (N = 736), and South Africa (N=611). The DV in column (2) is the average of two measures of monthly sales of the firm at Endline (converted to USD using appropriate market exchange rates for comparability across countries): i) an aided-recall measure winsorized 1% on both tails then standardized for interpretability and ii) an anchor-adjusted measure winsorized 1% on both tails then standardized for interpretability. The DV in column (3) is the average of two measures of monthly profits of the firm at Endline (converted to USD using appropriate market exchange rates for comparability across countries): i) an aided-recall measure winsorized 1% on both tails then standardized for interpretability and ii) an anchor-adjusted measure winsorized 1% on both tails then standardized for interpretability. The DV in column (1) is an index averaging the four standardized DVs described above. Robust standard errors are in parentheses. P-values are highlighted as: $p < 0.1^{*}$ $p < 0.05^{**}$ $p < 0.01^{***}$

Table C7: Robustness Check on Closing the Gender Gap: Terciles of Program Readiness

	(1) Index	(2) Monthly Sales	(3) Monthly Profits
Male + Treat	0.214***	0.203***	0.248***
	(0.0434)	(0.0441)	(0.0502)
Male + Control	0.0495	0.0332	0.0918*
	(0.0446)	(0.0459)	(0.0500)
High PRS Female + Treat	0.190***	0.161***	0.243***
	(0.0603)	(0.0582)	(0.0775)
High PRS Female + Control	0.0566	0.0149	0.107*
	(0.0508)	(0.0526)	(0.0574)
Low PRS Female + Treat	0.0533	0.0562	0.0470
	(0.0388)	(0.0396)	(0.0425)
Country FE	Yes	Yes	Yes
Controls Incl.	Yes	Yes	Yes
Mean of DV: Low PRS Female C	-0.241	-0.249	-0.221
SD of DV: Low PRS Female C	0.358	0.401	0.370
(i) TE: Male	0.165	0.170	0.156
(ii) p: Male TE = 0	0.000141	0.000164	0.00247
(iii) δ_{low}: Male TE - Low PRS Female TE	0.112	0.114	0.109
(iv) p: Male TE = Low PRS Female TE	0.0531	0.0581	0.0991
(v) TE: High PRS Female	0.134	0.146	0.136
(vi) p: High PRS Female TE = 0	0.0390	0.0237	0.102
(vii) δ_{high}: Male TE - High PRS Female TE	0.0311	0.0244	0.0201
(viii) p: Male TE = High PRS Female TE	0.684	0.754	0.834
Obs.	2084	2084	1955

Notes: Estimates presented are from linear regressions of DVs on the interaction of treatment assignment and gender and upper-tercile PRS membership, with observations at the entrepreneur level, pooled across samples from three countries: Uganda (N = 735), Mexico (N = 736), and South Africa (N=611). The DV in column (2) is the average of two measures of monthly sales of the firm at Endline (converted to USD using appropriate market exchange rates for comparability across countries): i) an aided-recall measure winsorized 1% on both tails then standardized for interpretability and ii) an anchor-adjusted measure winsorized 1% on both tails then standardized for interpretability. The DV in column (3) is the average of two measures of monthly profits of the firm at Endline (converted to USD using appropriate market exchange rates for comparability across countries): i) an aided-recall measure winsorized 1% on both tails then standardized for interpretability and ii) an anchor-adjusted measure winsorized 1% on both tails then standardized for interpretability. The DV in column (1) is an index averaging the four standardized DVs described above. Robust standard errors are in parentheses. P-values are highlighted as: p < 0.1* p <0.05** p < 0.01***

Table C8: Robustness Check on Closing the Gender Gap: Quintile of Program Readiness

	(1) **Index**	(2) Monthly Sales	(3) Monthly Profits
Male + Treat	0.194***	0.192***	0.224***
	(0.0400)	(0.0407)	(0.0466)
Male + Control	0.0288	0.0212	0.0680
	(0.0416)	(0.0427)	(0.0471)
High PRS Female + Treat	0.196**	0.160**	0.267***
	(0.0780)	(0.0750)	(0.103)
High PRS Female + Control	-0.00186	-0.0309	0.0680
	(0.0685)	(0.0721)	(0.0783)
Low PRS Female + Treat	0.0451	0.0561	0.0383
	(0.0338)	(0.0345)	(0.0375)
Country FE	Yes	Yes	Yes
Controls Incl.	Yes	Yes	Yes
Mean of DV: Low PRS Female C	-0.241	-0.249	-0.219
SD of DV: Low PRS Female C	0.347	0.396	0.351
(i) TE: Male	0.165	0.170	0.156
(ii) p: Male TE = 0	0.000137	0.000160	0.00239
(iii) δ_{low}: Male TE - Low PRS Female TE	0.120	0.114	0.118
(iv) p: Male TE = Low PRS Female TE	0.0283	0.0446	0.0631
(v) TE: High PRS Female	0.198	0.190	0.199
(vi) p: High PRS Female TE = 0	0.0407	0.0506	0.106
(vii) δ_{high}: Male TE - High PRS Female TE	-0.0328	-0.0200	-0.0427
(viii) p: Male TE = High PRS Female TE	0.752	0.850	0.743
Obs.	2084	2084	1955

Notes: Estimates presented are from linear regressions of DVs on the interaction of treatment assignment and gender and upper-quintile PRS membership, with observations at the entrepreneur level, pooled across samples from three countries: Uganda (N = 735), Mexico (N = 736), and South Africa (N=611). The DV in column (2) is the average of two measures of monthly sales of the firm at Endline (converted to USD using appropriate market exchange rates for comparability across countries): i) an aided-recall measure winsorized 1% on both tails then standardized for interpretability and ii) an anchor-adjusted measure winsorized 1% on both tails then standardized for interpretability. The DV in column (3) is the average of two measures of monthly profits of the firm at Endline (converted to USD using appropriate market exchange rates for comparability across countries): i) an aided-recall measure winsorized 1% on both tails then standardized for interpretability and ii) an anchor-adjusted measure winsorized 1% on both tails then standardized for interpretability. The DV in column (1) is an index averaging the four standardized DVs described above. Robust standard errors are in parentheses. P-values are highlighted as: p < 0.1* p <0.05** p < 0.01***

Appendix D: Discussion and Implications

Entrepreneur A, who operates a retail store in Mexico, started her business with US $100 and no college education but qualifies as being in the upper quartile through higher effectiveness—separating personal and business finances and keeping meticulous handwritten notes of inflows and outflows. Her establishment is minimal, as she operates out of a room attached to her house. In contrast, Entrepreneur B has a medical degree and runs a clinic in Uganda. She qualifies as being in the upper quartile of program readiness by virtue of her endowments, education, and establishment (a clinic in a large building). Exhibiting yet another path to the upper quartile, Entrepreneur C, who opened a beauty salon in South Africa, demonstrates superior exposure through living abroad—she was an immigrant from another African country—and superior experience from working a service job at a large firm. None of the entrepreneurs have high monthly sales (ex-ante firm size), as shown in the third row of Table D1, indicating the ability of our approach to identify "diamonds in the rough."

Table D1: Diverse Routes to High Program Readiness for Women Entrepreneurs

	Entrepreneur A **Mexico**	**Entrepreneur B** **Uganda**	**Entrepreneur C** **South Africa**
			
Biography	Did not complete college, opened retail store in 2008	Completed medical degree, opened clinic in 2010	Migrated from an African country, opened beauty salon in 2013
Monthly sales	$2679	$269	$1624
PRS	**70**	**66**	**80**
Strengths	Education: Prior business training Effectiveness: Separates finances	Endowment: Startup Capital=$1000 Establishment: Large building	Exposure: Lived abroad Experience: Job at large firm
Weaknesses	Endowments: Startup Capital=$100 Establishment: Shop attached to house	Employer: 1 Part-time Employee Experimentation: Few new activities	External: Rarely focuses on customers or competition

Table D2: Correlation Matrix of Program Readiness Factors

	Endowments	Establishment	Employer	Effectiveness	Experimentation	Education	Experience	Exposure	External	Evaluation
Endowments	1.00									
Establishment	-0.01	1.00								
Employer	0.13***	0.04**	1.00							
Effectiveness	0.17***	-0.06***	0.09***	1.00						
Experimentation	0.04**	-0.05**	0.13***	0.11***	1.00					
Education	0.17***	-0.06***	0.09***	0.12***	0.12***	1.00				
Experience	0.06***	-0.02	-0.01	0.03	-0.07***	0.12***	1.00			
Exposure	0.14***	0.04**	0.09***	-0.01	0.07***	0.11***	0.04**	1.00		
External	0.12***	-0.06***	0.05**	0.10***	0.07***	0.07***	-0.01	-0.04*	1.00	
Evaluation	0.04*	-0.10***	0.00	-0.01	0.12***	0.09***	0.02	0.02	0.10***	1.00

Notes: P-values are highlighted as: p < 0.1* p <0.05** p < 0.01***

Table D3: Remedial Interventions

Factor	**Increase**	**Related substantive change**	**Remedial intervention to induce change**	**Example remedial intervention**
Endowment	5 points	Capital used to start or buy business greater than median	Grants, credit, loans	World Bank Women Entrepreneurs Finance Initiative, USD 1 billion in financing aimed at supporting women-led businesses at early stages of growth
Establish-ment	10 points	Moving business from home to strip mall, store, or retail building for more than an year	Constructing market promotion centers and production facilities, making them available to women	Premises and Markets initiative from Support for Growth-oriented women
Experience(M)	10 points	Employing one or more full time employees or two part time employees	Grants, credit, loans	World Bank Women Entrepreneurs Finance Initiative, USD 1 billion in financing aimed at supporting women-led business at early stages of growth
Education	5 points	Completing post-secondary education or more	Secondary schooling	UNESCOs Global Education Coalition
Experience(P)	10 points	Holding a salaried job in a firm with more than ten employees	Labor market upskilling and placement programs	South Asia Women in Power Sector Professional Network (WePOWER)

Remedial Interventions

Factor	**Increase**	**Related substantive change**	**Remedial intervention to induce change**	**Example remedial intervention**
Exposure	5 points	Visiting two or more markets	Exchange programs; visting new markets	High school/ Undergraduate exchange programs ITC SheTrades Hubs bring together female entrepreneurs from different markets (e.g., Mauritius and Kenya) to learn from each other and find new markets
Effectiveness	14 points	Keeping records and separating business finances from personal finances	Individual financial literacy	Peru's National Financial Inclusion strategy providing school-based financial education to all primary and secondary students.
Experiment-ation	12 points	Developing new products, implementing, new marketing practices, and attracting new regular customers	Entrepreneurial skills, Personal initiative, Risk taking	Wavumbuzi Entrepreneurship Challenge in secondary schools in South Africa, Kenya, and Rwanda

Remedial Interventions

Factor	**Increase**	**Related substantive change**	**Remedial intervention to induce change**	**Example remedial intervention**
External	5 points	Scoring greater than median on any one of these psychological questions 1) looking at everybody's side of a disagreement 2) taking time to listen to employees and partners arguments, and 3) taking others' perspectives while offering products/ services	Socio-emotional skills	Wavumbuzi Entrepreneurship Challenge in secondary schools in South Africa, Kenya, and Rwanda
Evaluation	5 points	Demonstrating excellent aspiration to grow (as evaluated by enumerator)	Socio-emotional skills such as goal setting and grit	Wavumbuzi Entrepreneurship Challenge in secondary schools in South Africa in South Africa, Kenya, and Rwanda

Web Appendix

W1: Derivations and Comparative Statics

Throughout let $p \equiv p_j$, $A > 0$, $r, w > 0$, $0 < \alpha, \beta < 1$, and $\alpha + \beta < 1$. The production function is $f(A, K, L) = AK^{\alpha}L^{\beta}$. The credit constraint is $rK \leq B$.

W1.1 KKT conditions

The problem is

$$\max_{K,L \geq 0} \ \pi = pAK^{\alpha}L^{\beta} - rK - wL \quad \text{s.t. } rK \leq B.$$

Lagrangian:

$$\mathcal{L} = pAK^{\alpha}L^{\beta} - rK - wL + \lambda(B - rK).$$

First order and complementary slackness conditions:

$$\begin{aligned} &\partial_K \mathcal{L}: \ \alpha pAK^{\alpha-1}L^{\beta} - r - \lambda r = 0, \\ &\partial_L \mathcal{L}: \ \beta pAK^{\alpha}L^{\beta-1} - w = 0, \\ &\quad \lambda \geq 0, \quad B - rK \geq 0, \quad \lambda(B - rK) = 0. \end{aligned}$$

W1.2 Unconstrained interior solution ($\lambda = 0$)

FOCs:

$$\alpha pAK^{\alpha-1}L^{\beta} = r, \qquad \beta pAK^{\alpha}L^{\beta-1} = w.$$

Factor ratio:

$$\frac{L}{K} = \frac{\beta r}{\alpha w}. \tag{U1}$$

From the first FOC,

$$pAK^{\alpha}L^{\beta} = \frac{r}{\alpha}K.$$

Use $L = (\beta r/(\alpha w))K$ to get

$$K^{\alpha+\beta-1} = \frac{r}{\alpha pA}\Big(\frac{\alpha w}{\beta r}\Big)^{\beta}.$$

Because $\alpha + \beta < 1$,

$$K_u^* = \Big[pA\,\alpha^{1-\beta}\beta^{\beta}r^{\beta-1}w^{-\beta}\Big]^{\frac{1}{1-\alpha-\beta}}, \qquad L_u^* = \frac{\beta r}{\alpha w}K_u^*. \tag{U2}$$

Cost shares from the FOCs:

$$rK = \alpha\, pAK^{\alpha}L^{\beta}, \qquad wL = \beta\, pAK^{\alpha}L^{\beta}. \tag{U3}$$

Hence profits at the unconstrained optimum:

$$\pi_u^* = (1-\alpha-\beta)\, pAK^{\alpha}L^{\beta}\Big|_{(K_u^*, L_u^*)}. \tag{U4}$$

Program impact and elasticity in A. By the envelope theorem,

$$\frac{d\pi_u^*}{dA} = p\, K_u^{*\alpha} L_u^{*\beta}. \tag{U5}$$

Using U4,

$$\frac{d\pi_u^*}{dA} = \frac{\pi_u^*}{(1-\alpha-\beta)\, A}. \tag{U6}$$

Log differentiate U6 with respect to A:

$$\frac{d\ln(d\pi_u^*/dA)}{d\ln A} = \frac{d\ln \pi_u^*}{d\ln A} - 1. \tag{U7}$$

From U2, $K_u^*, L_u^* \propto A^{1/(1-\alpha-\beta)}$, so

$$\pi_u^* \propto A^{1/(1-\alpha-\beta)} \;\Rightarrow\; \frac{d\ln \pi_u^*}{d\ln A} = \frac{1}{1-\alpha-\beta}.$$

Substitute into U7:

$$\boxed{\frac{d\ln(d\pi_u^*/dA)}{d\ln A} = \frac{\alpha+\beta}{1-\alpha-\beta}}. \tag{U8}$$

An equivalent level expression from U5 and U2:

$$\frac{d\pi_u^*}{dA} = C_u\, p^{\frac{1}{1-\alpha-\beta}} A^{\frac{\alpha+\beta}{1-\alpha-\beta}}\, r^{\frac{\beta}{1-\alpha-\beta}}\, w^{-\frac{\beta}{1-\alpha-\beta}}, \quad C_u = \alpha^{\frac{1-\beta}{1-\alpha-\beta}} \beta^{\frac{\beta}{1-\alpha-\beta}}. \tag{U9}$$

Threshold separating regions. Define the implied capital spending at the unconstrained optimum:

$$B^* \equiv rK_u^* = r\Big[pA\,\alpha^{1-\beta}\beta^{\beta} r^{\beta-1} w^{-\beta}\Big]^{\frac{1}{1-\alpha-\beta}}. \tag{U10}$$

If $B \geq B^*$ the constraint is slack. If $B < B^*$ the constraint binds.

W1.3 Binding credit constraint ($\lambda > 0$)

Complementary slackness implies $K_c^* = \frac{B}{r}$. The labor FOC remains:

$$\beta pAK^{\alpha}L^{\beta-1} = w.$$

Solve for L at $K = K_c^*$:

$$L_c^* = \Big(\frac{\beta pA}{w}\Big)^{\frac{1}{1-\beta}} \Big(\frac{B}{r}\Big)^{\frac{\alpha}{1-\beta}}. \tag{C1}$$

Profits at the constrained optimum:

$$\pi_c^* = pA\Big(\frac{B}{r}\Big)^{\alpha}(L_c^*)^{\beta} - wL_c^*. \tag{C2}$$

Program impact and elasticities. Envelope theorem:

$$\frac{d\pi_c^*}{dA} = p\,K_c^{*\alpha}L_c^{*\beta} = p\Big(\frac{\beta pA}{w}\Big)^{\frac{\beta}{1-\beta}}\Big(\frac{B}{r}\Big)^{\frac{\alpha}{1-\beta}}. \tag{C3}$$

Elasticities follow by log differentiation of equation (C3):

$$\boxed{\frac{d\ln(d\pi_c^*/dA)}{d\ln A} = \frac{1}{1-\beta}}, \qquad \boxed{\frac{d\ln(d\pi_c^*/dA)}{d\ln B} = \frac{\alpha}{1-\beta}}. \tag{C4}$$

Level derivatives:

$$\frac{\partial(d\pi_c^*/dA)}{\partial A} = \frac{1}{(1-\beta)A}\,\frac{d\pi_c^*}{dA}, \qquad \frac{\partial(d\pi_c^*/dA)}{\partial B} = \frac{\alpha}{(1-\beta)B}\,\frac{d\pi_c^*}{dA}. \tag{C5}$$

W1.4 Piecewise expression and continuity

Combine equations (U9) and (C3):

$$\frac{d\pi^*}{dA} = \begin{cases} C_u\,p^{\frac{1}{1-\alpha-\beta}}A^{\frac{\alpha+\beta}{1-\alpha-\beta}}\,r^{\frac{\beta}{1-\alpha-\beta}}\,w^{-\frac{\beta}{1-\alpha-\beta}}, & B \geq B^*, \\ p\Big(\frac{\beta pA}{w}\Big)^{\frac{\beta}{1-\beta}}\Big(\frac{B}{r}\Big)^{\frac{\alpha}{1-\beta}}, & B < B^*. \end{cases}$$

At $B = B^*$, $K_c^* = K_u^*$, $L_c^* = L_u^*$, and $d\pi^*/dA$ coincides from both sides.

W1.5 Comparative statics summary

- If $B \geq B^*$ (slack), $d\pi_u^*/dA$ is increasing in A with elasticity $(\alpha+\beta)/(1-\alpha-\beta)$ and independent of B.
- If $B < B^*$ (binding), $d\pi_c^*/dA$ is increasing in A with elasticity $1/(1-\beta)$ and increasing in B with elasticity $\alpha/(1-\beta)$.

W2: Examples of business upgrading programs

Table W1: Sample interventions

Study	Intervention	Country
Dupas and Robinson (2013)	Basic savings account	Kenya
Fafchamps et al. (2014)	In-kind grants	Ghana
Berge et al. (2015)	Business training and grants	Tanzania
Field et al. (2016)	Introducing peer support, enabling female entrepreneurs to bring a friend to training increases their aspiration	India
Bulte et al. (2016)	International Labor Organization's Gender and Enterprise Together	Viet Nam
Bardasi et al. (2017)	In class training supplemented with individualized consulting on-site visits from coaches	Tanzania
Campos et al. (2017)	Personal initiative training	Togo
Brooks et al. (2018)	Mentorship and traditional business training	Kenya
Fiala (2018)	Business skills training combined with discounted loans or grants	Uganda
Lafortune et al. (2018)	Role model visits or consultation services combined with a training program	Chile
Cai and Szeidl (2018)	Organizing business associations and opportunities to network for owner-managers of firms	China
Alibhai et al. (2019)	Mindset business training with a mission to foster self-esteem and entrepreneurial spirit	Ethiopia
Gine and Mansuri (2021)	Business training and loans	Pakistan
McKenzie and Puerto (2021)	International Labor Organization's Gender and Enterprise Together	Kenya
Anderson and Mckenzie (2022)	Providing business support through insourcing workers or outsourcing tasks to professionals	Nigeria
Bakhtiar et al. (2022)	Business training combined with mentoring	Ethiopia
Gassier et al. (2024)	Providing information on trade specific earnings	Congo

Sample interventions

Study	**Intervention**	**Country**
Iacovone et al. (2022)	Individual and group based consulting	Colombia
Ubfal et al. (2022)	Soft skills and hard skills training	Jamaica
Germann et al. (2024)	Assigning female mentors to female entrepreneurs	Uganda
Otis et al. (2024)	Artificial intelligence tools for providing advice to entrepreneurs	Kenya

W3: Indicative Findings on the Gender Program Gap

First, randomized evaluations with large but *exclusively-female* samples find that the most common business upgrading program, i.e., the ILO's Start-and-Improve-Your-Business training (De Mel, McKenzie, and Woodruff 2014), shorter training programs (Karlan and Valdivia 2011), longer business development services (Valdivia 2015), Zoom-based training (Davies et al. 2024), and MBA preparatory training (Ubfal 2024) all yield null effects on business performance. However, these studies with exclusively-female samples cannot establish a gender gap in returns to business upgrading programs. Hence, we next examine the handful of evaluations that compare impacts for male versus female entrepreneurs. Berge, Bjorvatn, and Tungodden (2015) find that a business upgrading program (training) combined with a cash grant improves the business performance of male entrepreneurs but not female entrepreneurs in Tanzania; similarly, Fiala (2018) shows that a business upgrading program (training) combined with a loan boosts the business performance of male entrepreneurs but not female entrepreneurs in Uganda; and finally Giné and Mansuri (2014) document the same pattern for a training program combined with access to a loan in Pakistan. Again, while these studies suggest a gender gap in business upgrading program returns, they do not conclusively establish it as financial capital components may drive observed performance effects.

Thus, despite these sporadic evaluations, the literature still lacks a large-scale comparison that isolates a clear "gender program gap"— that is, for the same business upgrading program, women do not obtain business performance improvements, and therefore program returns, whereas men do. We empirically establish this gap, using a mixed-gender sample with no contaminating interventions pertaining to financial access, that is persistent across diverse markets (Mexico: an upper-middle income country in Latin America, Uganda: a lower-income country in East Africa, and South Africa: an upper-middle income country in Southern Africa) and business upgrading programs (i.e., one-on-one consulting, one-on-one coaching, and classroom training).