



March 2023

## EVENING THE CREDIT SCORE: CAN PSYCHOMETRIC CREDIT-SCORING ADDRESS COLLATERAL CONSTRAINTS FOR WOMEN ENTREPRENEURS?

Authors: Salman Alibhai, Rachel Cassidy, Menaal Ebrahim, Markus Goldstein, Yemsrach Kinfe Edey, and Sreelakshmi Papineni

### KEY MESSAGES

- **Psychometric credit scoring measures traits linked to a borrower's ability and willingness to repay a loan.** Psychometric credit scoring can enable lenders to reach borrowers who lack formal credit histories, or large, fixed assets to secure loans. An experiment in Ethiopia sought to understand whether unsecured, psychometric-appraised loans could improve access to finance and unlock business growth for women entrepreneurs.
- **Psychometric-appraised, uncollateralized loans were found to alleviate credit constraints for women entrepreneurs.** Women entrepreneurs in a randomly assigned treatment group were offered an uncollateralized loan based on a psychometric credit score. After three years, these women were more than twice as likely to have accessed a loan for their business, compared to similar women entrepreneurs in a control group who were not yet offered the uncollateralized loan.
- **Access to psychometric-appraised loans increased the likelihood of firm survival through the COVID-19 pandemic and other shocks.** The firm closure rate within three years halved: from 33% of firms closing in the control group, to 17% of firms closing in the treatment group. Impacts of the psychometric-appraised loans on firm sales and profit growth were less conclusive.
- **Psychometric-appraised lending can be a viable and impactful solution for entrepreneurs who lack collateral.** The benefits of psychometric-appraised lending may naturally extend to poorer borrowers in general—and thus to broader reduction of inequality in credit markets.

### ABOUT THIS STUDY

This impact evaluation was conducted by the World Bank's Africa Region Gender Innovation Lab, under the Innovations in Financing Women Entrepreneurs (IFWE) initiative. The Africa Gender Innovation Lab conducts impact evaluations and rigorous research to figure out what works and what does not work to improve gender equality, and uses this evidence to shape policy. Funded by Global Affairs Canada, IFWE works in partnership with World Bank Group operations to pilot, scale up, and evaluate new approaches to empowering Ethiopia's female entrepreneurs. IFWE works across three components: business skills and services, access to finance, and policy evidence.

The project was a partnership with the World Bank's Finance, Competitiveness and Innovation Global Practice; the Government of Ethiopia's Women Entrepreneurship Development Project (WEDP); the Ethiopian microfinance institution Wasasa; and the Gender Innovation Policy Initiative for Ethiopia.

The full working paper from this impact evaluation can be found [here](#).

## CONTEXT

Despite gender parity in access to microfinance, and many group-based microfinance schemes favoring women, women face more difficulty than men in getting loans of larger size, longer duration, individual liability, and more flexible terms that may promote firm growth.<sup>1</sup> In Ethiopia, as in many contexts where credit information systems are in their infancy, financial institutions typically impose stringent collateral requirements for larger loans. Women are less likely than men to own large, collateralizable assets such as housing, land, or vehicles due to inheritance practices, unequal land ownership laws, and social customs. Innovative solutions to replace or reduce the reliance on fixed-asset collateral may help to expand access to capital for growth-oriented women-owned firms.

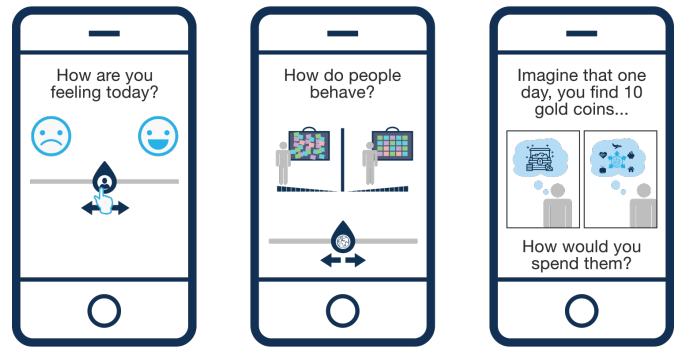
## A PROMISING INNOVATION?

Psychometric credit scoring is an innovative technology designed to predict credit risk. Psychometrics—literally “measurement of the mind”—uses questions designed to measure traits linked to a borrower’s ability to repay a loan (e.g., business aptitude) and their willingness to repay a loan (e.g., honesty). Psychometric credit scoring has been shown to enhance screening of micro, small, and medium enterprises in low- and middle-income countries, including those that do not have other forms of credit history.<sup>2</sup> However, to date there is little evidence on the impact on firms, and particularly women-owned firms, of using psychometric credit scoring as a substitute for collateral. To generate such evidence, the World Bank’s Africa Gender Innovation Lab partnered with the microfinance institution (MFI) Wasasa on an impact evaluation.<sup>3</sup> The psychometric credit scoring technology was provided by a US company.

## WHAT WE DID

The MFI used the psychometric credit scoring technology to offer large, uncollateralized loans of up to 250,000 Ethiopian birr (US\$7,500) to women entrepreneurs. The new loan product was targeted via the Government of Ethiopia’s Women Entrepreneurship Development Project (WEDP), which connects women-owned enterprises with

FIGURE 1: EXAMPLES OF PSYCHOMETRIC TEST QUESTIONS



*The psychometric credit-scoring technology takes variables from the test and its meta-data. The scoring model is calibrated against a base model from the region, trained on data from similar countries. The model is then trained over time on local borrower data as the product is rolled out, to improve its predictive power further.*

interventions including business training and access to loans through MFIs. The uncollateralized loan product was advertised to women entrepreneurs via flyers at “WEDP One Stop Shop” offices, in the cities of Adama and Asela in the Oromia region. Women entrepreneurs who wanted a loan, but lacked collateral, were invited to come to their local MFI branch to complete the psychometric assessment. The assessment was an interactive, tablet-based test consisting of games, puzzles, and questions. The psychometric test score was automatically calculated, using a model trained on the test answers and the repayment data from a large number of other borrowers from pilots in Ethiopia and in neighboring countries.<sup>4</sup> Borrowers with a high credit score were deemed potentially eligible to borrow without collateral. Between April 2018 and March 2020, a total of 357 women took a psychometric test, and 259 scored above the cut-off. To determine their final eligibility, these women then had to undertake the MFI’s standard due diligence screening that includes a documentation check and a business appraisal. Of the 259 women, 131 passed these final stages and fully qualified for the loan. Hence, the standard due diligence was still a binding step of the screening procedure.

To evaluate the impact of using psychometric credit appraisal to substitute for collateral when granting larger loans, we conducted a randomized controlled trial. The 131 applicants who fully qualified were randomized

<sup>1</sup> Agier and Szafarz (2013). “Microfinance and gender: Is there a glass ceiling on loan size?” *World Development*, 42(6):165–181

<sup>2</sup> Klinger, B., Khwaja, A. and LaMonte, J. “Improving credit risk analysis with psychometrics in Peru”. *Inter-American Development Bank. Technical Note No. IDB-TN-587* (2013). Klinger, B., Khwaja, A., and Del Carpio, C.. “Enterprising psychometrics and poverty reduction.” Vol. 860. New York, NY: Springer, 2013. Arráiz, I., Bruhn, M. and Stucchi, R. “Psychometrics as a tool to improve credit information.” *The World Bank Economic Review* 30. Supplement\_1 (2017): S67-S76.

<sup>3</sup> Alibhai, S., Cassidy, R., Goldstein, M. and Papineni, S., 2022. “Evening the Credit Score? Impact of Psychometric Loan Appraisal for Women Entrepreneurs”. *World Bank Policy Research Working Papers*, WPS 10230.

<sup>4</sup> Alibhai, S., Buehren, N., Coleman, R., Goldstein, M., and Strobbe, F. (2018). “Disruptive Finance: Using psychometrics to overcome collateral constraints in Ethiopia”. *World Bank Working Paper Series*, 30(1): S67–S76.

with 50-50 probability to receive an uncollateralized loan or not. All women were informed of their random assignment. The treatment group received their loan approximately one month later, while the control group were not offered a loan. Comparing the treatment group and the control group allows us to identify the causal impact of being offered an uncollateralized loan appraised via psychometrics, compared to women who were equally eligible but were randomly not offered an uncollateralized loan.

From September to October 2021, the research team followed up to conduct an endline survey with all 357 female entrepreneurs who had originally taken the test. Businesses were facing a challenging macroeconomic climate at the time of the endline survey, as the survey took place just after national elections and a late peak of COVID-19 in Ethiopia, as well as during ongoing conflict in the country.

## WHAT WE FOUND

### Access to psychometric-appraised loans increased access to formal finance for previously unbanked borrowers

Women entrepreneurs who were treated with the offer of an uncollateralized loan were 30 percent more likely to borrow for business purposes from any source in the last three years. Treated women were twice as likely to

borrow formally (from 42 percent to 89 percent) and 12 percent less likely to borrow informally (from family and friends). Treated women were also more likely to borrow larger amounts in total, relative to the control group.

### Access to psychometric-appraised loans halved firm closure during the COVID-19 pandemic and other aggregate shocks

Access to uncollateralized loans increased firms' three-year survival rate by 17 percent through the COVID-19 pandemic and other shocks, from 67 percent to 83 percent. We find no significant impact on women exiting entrepreneurship altogether, since many who closed their original firm reopened a new firm, typically in a different sector.

### Surviving firms were profitable (not "zombie" firms), but impact on profits were inconclusive

Treated firms earned higher average yearly profits than control firms, but this effect was not statistically significant. Almost all firms who stayed open report positive profits in the last year. Thus, there is no evidence that access to psychometric-appraised loans kept unprofitable or "zombie" firms alive during the challenging macroeconomic circumstances. However, treated firms reported significantly lower profits in the last 30 days before September-October 2021, compared to control firms.

FIGURE 2: IMPACTS ON CREDIT CONSTRAINTS

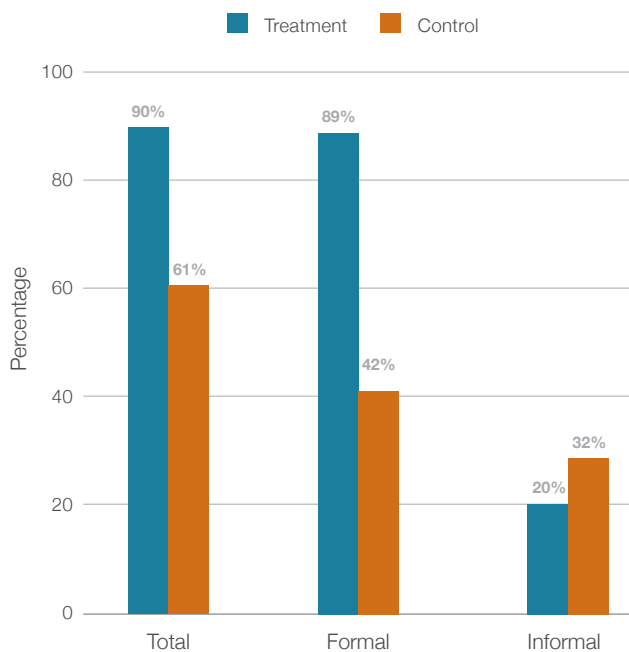
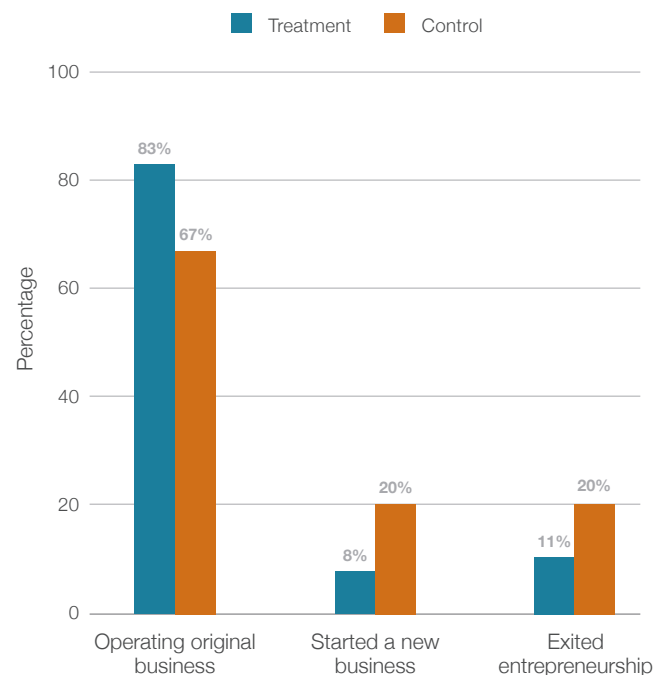


FIGURE 3: IMPACTS ON FIRM SURVIVAL







**Repayment rates of psychometric-appraised loans were comparable to (collateralized) loans prior to 2020 but were hit by the consequences of the COVID-19 pandemic.**

For uncollateralized loans disbursed prior to 2020, default rates were very low, and comparable to collateralized loan products of a similar size. For loans disbursed in 2020 just prior to the onset of the COVID-19 pandemic, default rates were higher. Despite some rescheduling to take into account the impacts of COVID-19 lockdowns, a small number of borrowers partially defaulted.

## POLICY IMPLICATIONS AND NEXT STEPS

Following this experiment, the majority of Ethiopia’s leading MFIs have requested support in integrating psychometric appraisal technology for lending to women entrepreneurs. The World Bank is now helping to scale up psychometric-based lending, both in Ethiopia and beyond. In Ethiopia, this work to scale-up innovative solutions to empower female entrepreneurs and improve their access to finance is being supported by Global Affairs Canada, through its Innovations in Financing Women Entrepreneurs (IFWE) initiative.

This study’s findings are a “proof of concept” that psychometric-appraised lending can be a viable and impactful solution for women who lack collateral, especially in contexts where lending is highly collateral-constrained. The psychometric credit scoring technology helped address the collateral constraint faced by women entrepreneurs in accessing larger, individual-liability loans. The benefits of psychometric-appraised lending also extend naturally to other populations who lack access to collateral—including other marginalized groups, and poorer borrowers in general—and thus to broader reduction of inequality in credit markets.

Psychometrics are one among many new digital technologies that might help resolve information asymmetries and overcome constraints in credit markets. With support from the World Bank’s IFWE initiative, financial institutions in Ethiopia are now also exploring other fintech and digital innovation tools to reduce or circumvent the need for traditional fixed asset collateral, such as Point-of-Sale cashflow monitoring, and revenue-based financing.

**For more information on this study, see the following paper:**

**HERE**

*Alibhai, Salman, Cassidy, Rachel, Goldstein, Markus, and Papineni, Sreelakshmi. 2022. “Evening the Credit Score? Impact of Psychometric Loan Appraisal for Women Entrepreneurs.” World Bank, Washington, DC.*

Photo credit: Impala Communication / World Bank

This work has been supported through generous contributions from Global Affairs Canada, in partnership with the Umbrella Facility for Gender Equality (UFGE), which is a multi-donor trust fund administered by the World Bank to advance gender equality and women’s empowerment through experimentation and knowledge creation to help governments and the private sector focus policy and programs on scalable solutions with sustainable outcomes. The UFGE is supported with generous contributions from Australia, Canada, Denmark, Finland, Germany, Iceland, Ireland, Latvia, the Netherlands, Norway, Spain, Sweden, Switzerland, United Kingdom, United States, the Bill and Melinda Gates Foundation, and the Wellspring Philanthropic Fund.

FOR MORE INFORMATION,  
PLEASE CONTACT

Rachel Cassidy  
rcassidy@worldbank.org

Africa Gender Innovation Lab  
afrgenderlab@worldbank.org

1818 H St NW  
Washington, DC 20433 USA  
www.worldbank.org/africa/gil