

MAY 2020

Designing a Credit Facility for Women Entrepreneurs

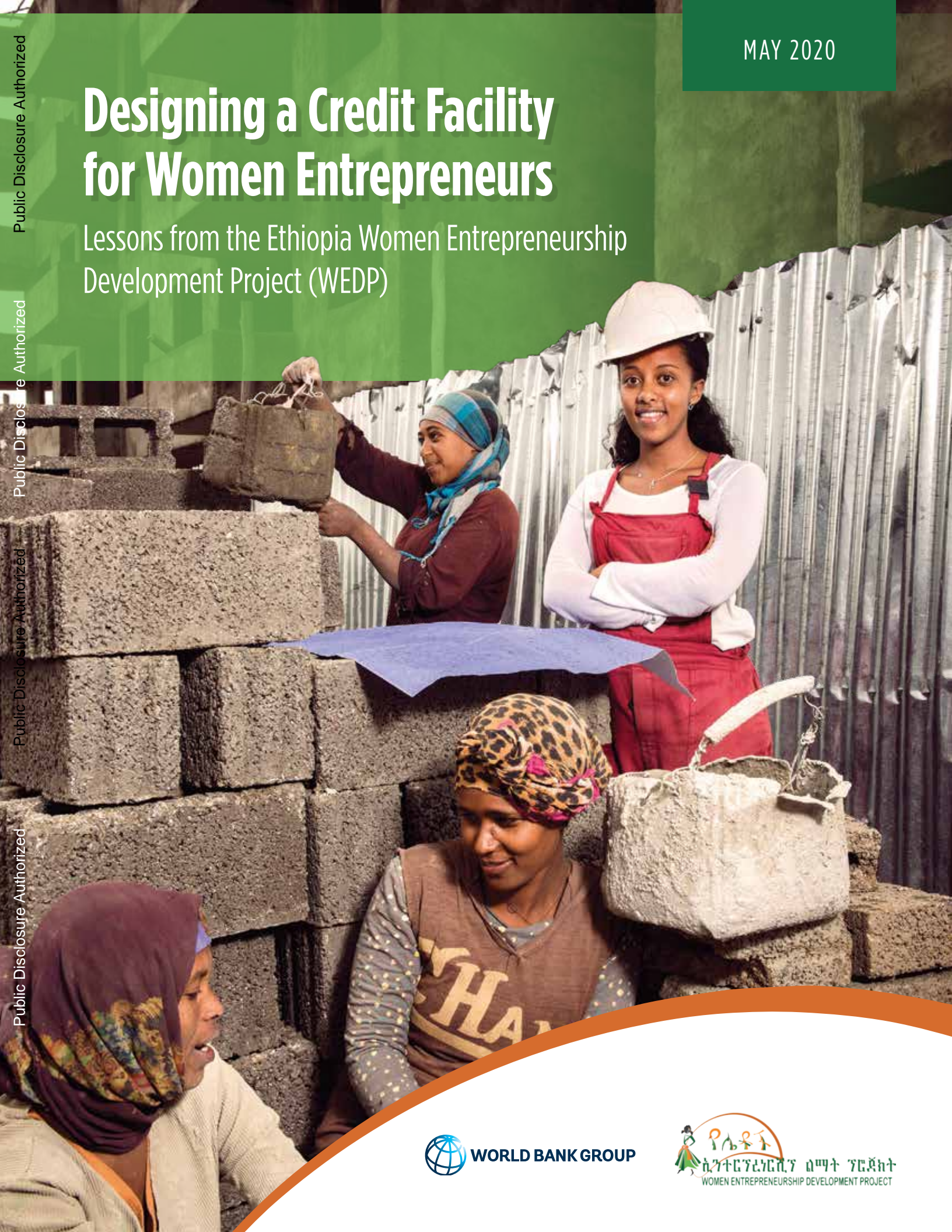
Lessons from the Ethiopia Women Entrepreneurship
Development Project (WEDP)

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This report and the studies it draws on were a collaborative effort of current and former WEDP task team leaders and task team members. The report was led by Salman Alibhai (Senior Operations Officer), Mengistu Bessir Achew (Financial Sector Specialist), Francesco Strobbe (Senior Financial Sector Economist), and Rachel Coleman (Analyst), with contributions on background pieces from Niklas Buehren (Senior Economist) and Sreelakshmi Papineni (Economist). The report was prepared under the guidance of Niraj Verma (Practice Manager) and Markus Goldstein (Lead Economist). Writing of the introductory section of the report and overall editing were provided by Laura Kim (Consultant).

Introduction

In October 2012, the Government of Ethiopia launched the Women Entrepreneurship Development Project (WEDP), with the aim of increasing the earnings and employment of growth-oriented micro and small enterprises (MSEs) owned or partly-owned by women entrepreneurs in Ethiopia. In doing so, it created the first ever women-entrepreneur focused line of credit in Africa, and one of few such operations in the world. In addition to the USD 45.9 million in financing, WEDP also offered a variety of innovative training opportunities, designed to not only enhance the business skills of its clients, but their entrepreneurial mindset and practices as well.

WEDP was established as a USD 50 million World Bank International Development Association (IDA) lending operation. An additional USD 3 million from the United Kingdom's Department for International Development (DFID) provided technical assistance toward managing the line of credit and upscaling lending to growth-oriented women entrepreneurs. Finally, Global Affairs Canada (GAC) complemented the line of credit with USD 10 million in grant funding. In addition to financing loans and business development services, GAC also supported WEDP's impact evaluation (IE) component, which allowed the project to introduce innovative training and financial products, as well as to rigorously evaluate their impacts. Canada's flexible support for innovation and evidence was fundamental to WEDP's generation of broader evidence on "what works" in supporting women-owned MSEs.

WEDP Clients

PERSONAL PROFILE



The average WEDP client is 34 years old, and has a secondary school education. She is married and has three children.

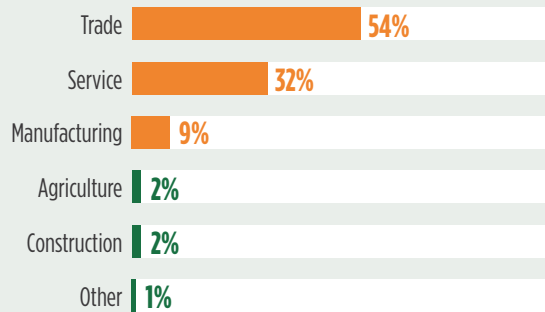
39% of WEDP clients live in a household where they are heads themselves.

96% are extensively involved in making important financial decisions in their households.

ENTERPRISE PROFILE



The majority of WEDP clients' businesses are in the trade sector, followed by non-trade services (such as cafes and restaurants) and manufacturing.



Within these sectors, the most common sub-sectors include:

50% Retail
16% Food Service

83%

of MSEs are sole proprietorships, which are both owned and managed by the WEDP client.

63%

of WEDP clients financed the start-up of their business from their own or their spouse's savings.

75%

of MSEs were launched after the Ethiopian Millennial (2007/2008).

3

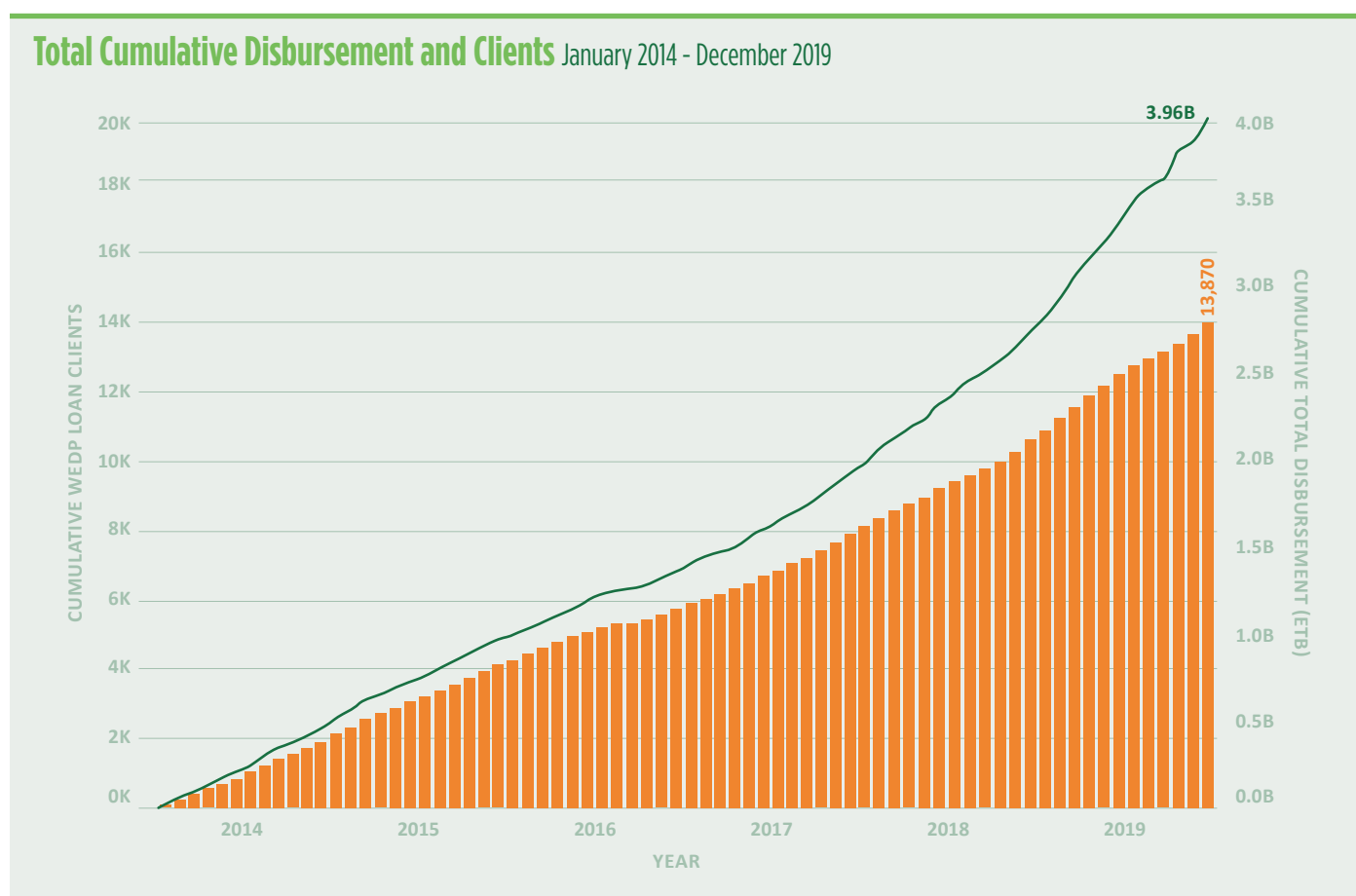
The average WEDP MSE has 3 employees.

Source: WEDP Baseline Study, 2015.

WEDP loans began disbursing in January 2014 through 12 partner microfinance institutions (MFIs) across 6 targeted cities in Ethiopia.¹ By the end of the calendar year, the project had issued ETB 456.6 million (USD 23.3 million) to 1,863 women entrepreneurs – over half the dedicated line of credit.² WEDP clients represented a broad spectrum of Ethiopia’s business community, ranging from retail stores to restaurants to beauty salons. Among those who borrowed, 66 percent were first-time borrowers, and yet repayment rates were healthy, standing at 99.1 percent. In tandem, 3,083 women had participated in entrepreneurship trainings.

By mid-2015, the high demand for credit had led to a rapid depletion of WEDP funds, prompting the project leadership to explore additional sources of financing. In light of the declining balance, partner MFIs began disbursing from their internal funds. This was an unexpected positive development, given MFIs’ liquidity challenges.³ Shortly thereafter, a WEDP revolving fund was approved to replenish the line of credit from repaid principals.

At the end of 2017, after securing external financing from Italy (USD 15.8 million) and Japan (USD 50 million), WEDP entered its second phase, expanding into 4 additional cities,⁴ adopting new technologies and innovations, and consolidating its interventions. Additional funds from the European Investment Bank (EIB, USD 34 million) allowed WEDP to further refine and scale its efforts. In total, the externally funded line of credit reached USD 145.7 million, while loans also continued to be disbursed from the revolving fund and MFIs’ internal funds.



¹ Addis Ababa, Adama, Bahir Dar, Dire Dawa, Hawassa, and Mekelle.

² 2014 average exchange rate of USD 1 = ETB 19.6175.

³ Triodos Facet (2011). Ethiopian Women Entrepreneurship Capacity Building Studies.

⁴ Assela, Axum, Dilla, and Gondar.

As of December 2019, approximately 36,000 women entrepreneurs registered for WEDP. Of these, ETB 3.96 billion (USD 158.1 million)⁵ has been disbursed to 13,870 clients, of which 59.8 percent (ETB 2.37 billion) were from donor funds, while the MFI internal funds (ETB 1.05 billion) and revolving fund (ETB 540 million) comprised the remaining 26.6 percent and 13.6 percent, respectively. Moreover, a total of 20,744 women entrepreneurs have participated in entrepreneurial trainings across 10 cities, with a 98.6 percent completion rate. Demand for loans and training shows little sign of abating, as women entrepreneurs from across various sectors, including trade, services, manufacturing, construction and agriculture, continue to register for the project.

WEDP has been widely recognized for its achievements in empowering women entrepreneurs and for raising their profile throughout Ethiopia's financial system. The project model has demonstrated how an incentives-based strategy, coupled with hands-on management and a robust monitoring and evaluation system, can converge to successfully address a persistent constraint.

In this document, we articulate some of the main conceptual and practical elements underpinning WEDP's model. Following this lessons piece, we present a collection of research and knowledge documents produced by the project thus far. We hope these lessons and experiences can inform practitioners with insights on working with the MSE sector, with a focus on applying a strong gender lens to reach a promising but underserved market segment: women entrepreneurs.

1 The response to and results of WEDP's line of credit demonstrated that growth-oriented women entrepreneurs are a high-value investment for financial institutions.

Although access to finance is crucial to any business' productivity and growth trajectory, major gaps persist in Ethiopia. According to the World Bank's 2015 Enterprise Survey, access to finance was perceived as the top business environment constraint by enterprises in Ethiopia.⁶ Like in many emerging markets, Ethiopia is characterized by the "missing middle" phenomenon, where small firms are neither being served by commercial banks nor by microfinance institutions (MFIs). Commercial banks rarely lend in amounts below USD 50,000, whereas MFIs mostly offer group loans that do not exceed USD 1,500.

The financing difficulties are especially acute for women entrepreneurs, who face greater structural and cultural barriers than their male counterparts. Women entrepreneurs tend to have less education than men, shorter histories of viable businesses, less mobility and limited business networks. Most importantly, they often lack the assets, such as a house, needed as collateral for loans. All in all, they are typically deemed "riskier" by financial institutions.

The response to WEDP's line of credit highlights an urgent need that had been previously unmet. In January 2014, the first month of disbursement, the average WEDP loan was ETB 242,364 (USD 12,354) – which was nine times the size of the average pre-WEDP MFI loan of ETB 27,000 (USD 1,376).⁷ Since then, the average WEDP loan size has been steadily increasing, with the average loan size in December 2019 amounting to ETB 417,634 (USD 14,297).⁸

To investigate the impact of WEDP loans, a baseline study was carried out in 2014 with 2,369 women entrepreneurs from six Ethiopian cities. The survey instrument included questions about household demographic characteristics, socioeconomic status, business sales, profits, costs, employees, entrepreneurial profile, business knowledge and level of financial literacy. A midline survey was conducted approximately three years later for 2,139 firms, which is 90 percent of the baseline sample. Since receiving a loan is not a random assignment, the study utilized a propensity score matching (PSM) technique to compare the impact of WEDP loans between borrowers and a statistically matched group of non-borrowers.

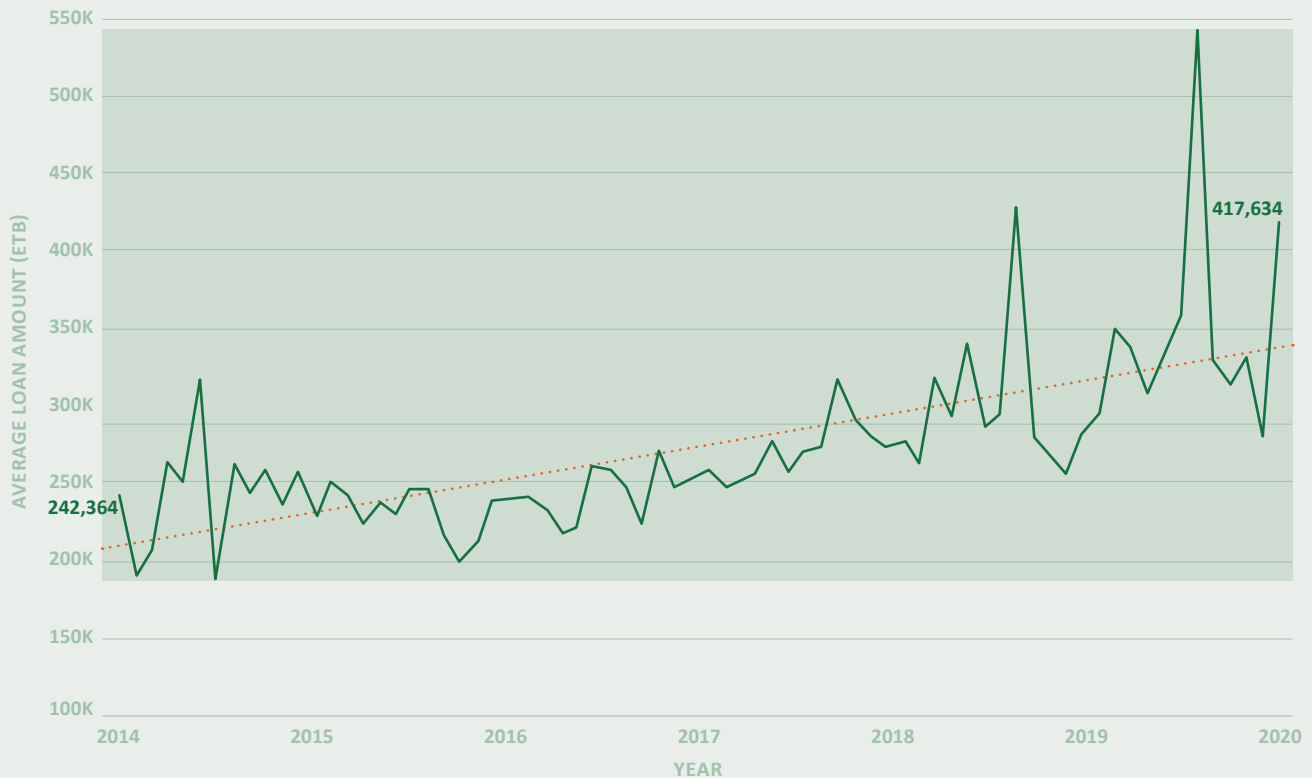
⁵ The total cumulative disbursement in USD was calculated by utilizing the average annual exchange rates for each given year's total disbursement: 2014 (USD 1 = ETB 19.6175): USD 23.28 million; 2015 (USD 1 = ETB 20.6862): USD 24.83 million; 2016 (USD 1 = ETB 21.8377): USD 17.88 million; 2017 (USD 1 = ETB 23.9673): USD 24.52 million; 2018 (USD 1 = ETB 27.6677): USD 28.76 million; 2019 (USD 1 = ETB 29.2123): USD 39.06 million.

⁶ World Bank (2016). Enterprise Survey: Ethiopia, 2015-2016. <https://www.enterprisesurveys.org/en/data/exploreeconomies/2015/ethiopia>

⁷ 2014 average exchange rate of USD 1 = ETB 19.6175.

⁸ 2019 average exchange rate of USD 1 = ETB 29.2123.

Average Monthly WEDP Loan Size Over Time January 2014 - December 2019



Midline results showed that receiving a WEDP loan had a positive impact on profitability, with firms receiving WEDP-backed loans increasing profits by 40.77 percent relative to a control group three years after taking the loan. The most robust impact was on employment generation, with the treatment firms growing their employment by 55.73 percent compared to a control group. Further results and details from the midline impact evaluation are available starting on page 18.

An endline survey of WEDP clients was completed in August 2019, which showed that treatment firms had grown incomes by 67.89 percent (compared to an end-of-project target of 50 percent) since baseline. On average, each MSE's annual earnings increased by USD 4,053.⁹ Moreover, WEDP clients increased employment in their firms by 58.60 percent (compared to an end-of-project of 30 percent) since baseline. On average, each MSE has hired 2.95 full-time and part-time employees. In total, WEDP firms are employing 89,272 workers, of which 61 percent are female.

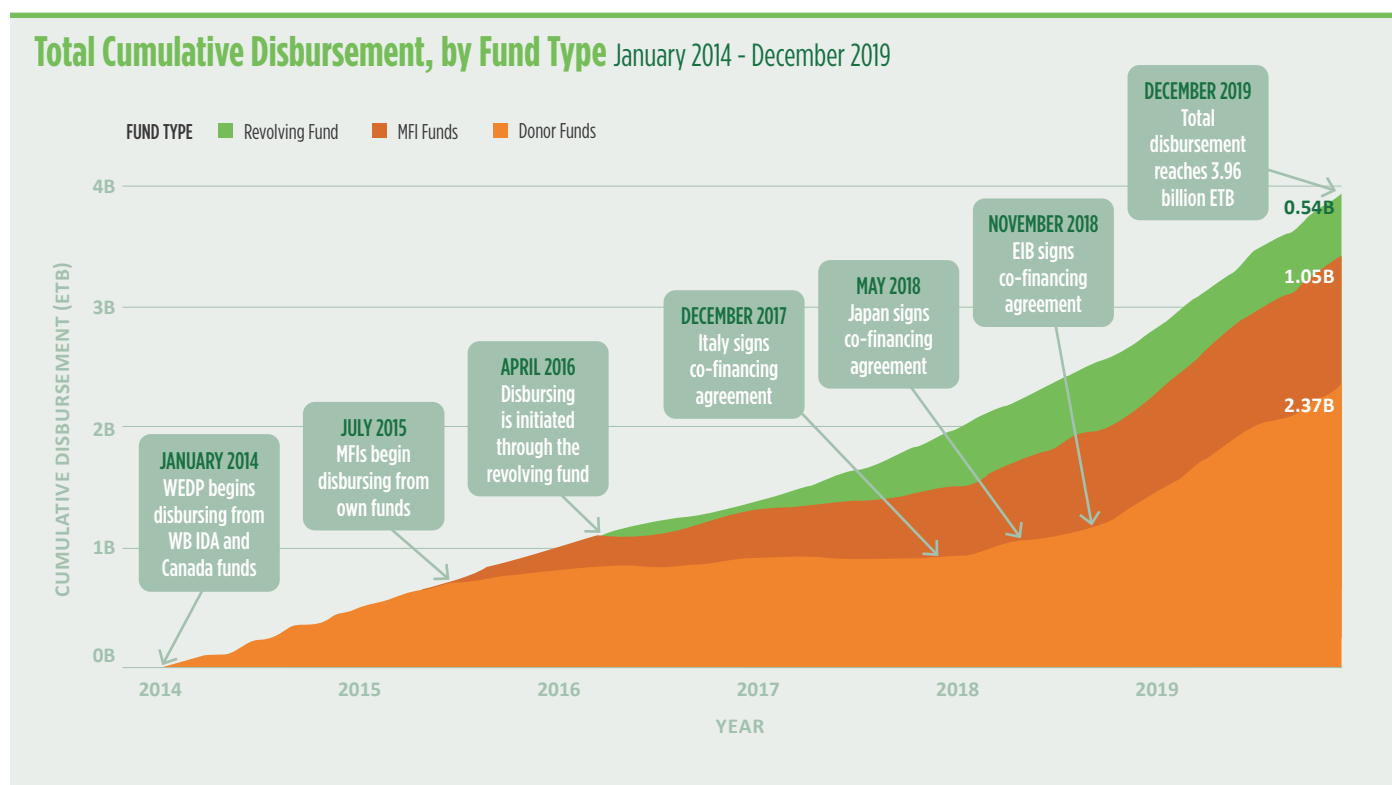
By establishing a strong business case for individual lending to women-owned enterprises, WEDP debunked initial perceptions that the project was purely a socially driven project, and therefore not commercially viable. Rather, it showcased how investments into women-owned enterprises could be amongst the highest return opportunities available for the financial sector.

⁹ 2020 average exchange rate of 1 USD = ETB 29.80.

2

WEDP’s success triggered an unforeseen challenge: a depletion of funds two years ahead of schedule. In response to the declining balance, MFIs began disbursing from their own funds, and continued to do so even when the line of credit was replenished through a revolving fund and external financiers – a strong indicator of sustainability for the project.

A year after the first WEDP loan was disbursed in January 2014, there was growing concern about the rapidly declining balance of funds. The WEDP team began exploring the option of revolving repaid WEDP funds back to the MFIs, as well as additional funding possibilities from external donors. Despite best efforts, it was becoming clear that both sources would not replenish the line of credit in time to meet growing demand.



In the summer of 2015, in response to the declining balance, four out of the 12 MFIs began disbursing from their own internal funds, totaling ETB 41.9 million (USD 2 million)¹⁰ and comprising 5.5 percent of total disbursement. Given MFIs’ general liquidity constraints, this development came as an unexpected and much welcome surprise. When WEDP’s revolving fund became active in April 2016 (ETB 54.5 million or USD 2.5 million),¹¹ 7 MFIs were disbursing from their internal funds, totaling ETB 224.6 million (USD 10.6 million).¹² By July 2017, all 12 MFIS were disbursing from their internal funds, amounting to ETB 497.4 million (USD 21.6 million),¹³ comprising 29.2 percent of total disbursement.

¹⁰ 2015 average annual exchange rate: USD 1 = ETB 20.6862.
¹¹ 2016 average annual exchange rate: USD 1 = ETB 21.8377.
¹² 2015-2016 annual average exchange rate: USD 1 = ETB 21.262.
¹³ 2015-2017 annual average exchange rate: USD 1 = ETB 22.1637.

In 2018, Italy's (AICS) and Japan's (JICA) contributions became effective, facilitating the replenishment of USD 65.8 million back into the line of credit. MFIs still continued their practice of disbursing from their internal funds – and as of December 2019, the disbursement from their internal funds has totaled 1.05 billion ETB (USD 42.7 million)¹⁴, comprising 26.6 percent of WEDP's total disbursement.

The behavioral shift among MFIs was an impressive signal that these institutions viewed the WEDP portfolio as an important part of their core business, and that they aim to sustain it into the future.

3 At its core, WEDP is a simple yet targeted response to the credit constraints and the skills gaps among an underserved market – growth-oriented women entrepreneurs – in Ethiopia. However, translating WEDP's conceptual design into practice required a well-oiled network of public and private sector stakeholders working across different sectors and geographies.

WEDP's implementing structure includes a myriad of government ministries and agencies, financial intermediaries, and a network of training providers and consultants at the federal, regional, city, and district levels. The Ministry of Finance (MOF), the recipient of the IDA funding from the World Bank, mandated the Ministry of Urban Development and Construction (MUDC) to host the project, under which the Federal Urban Job Creation and Food Security Agency (FUJCFSA) is responsible for overall project management, via a dedicated Project Management Team (PMT).

WEDP is comprised of three components. In the access to finance component, a credit facility was established in the state-owned Development Bank of Ethiopia (DBE) who acts as wholesaler of medium-term subsidiary loans to 12 eligible microfinance institutions (MFIs), with maturity ranging from 3 to 5 years. MFIs then on-lend to women-owned or partially women-owned MSEs. To carry out this component, DBE established its own Project Management Team (PMT) to ensure the credit facility's effective functioning and its adherence to all fiduciary and safeguard requirements of the World Bank. DFID provided funding for the provision of technical assistance to DBE and the MFIs – through its Enterprise Partners program.

For the skills training component, the National Technical and Vocational Education Training (TVET) Agency and its colleges, along with two additional training providers – Digital Opportunities Trust (DOT) and Entrepreneurship Development Center (EDC) – are responsible for providing different types of entrepreneurial skills trainings. An international skills development consultant, Transtec, is responsible for strengthening these providers' capacities through "training of trainers" (TOT).

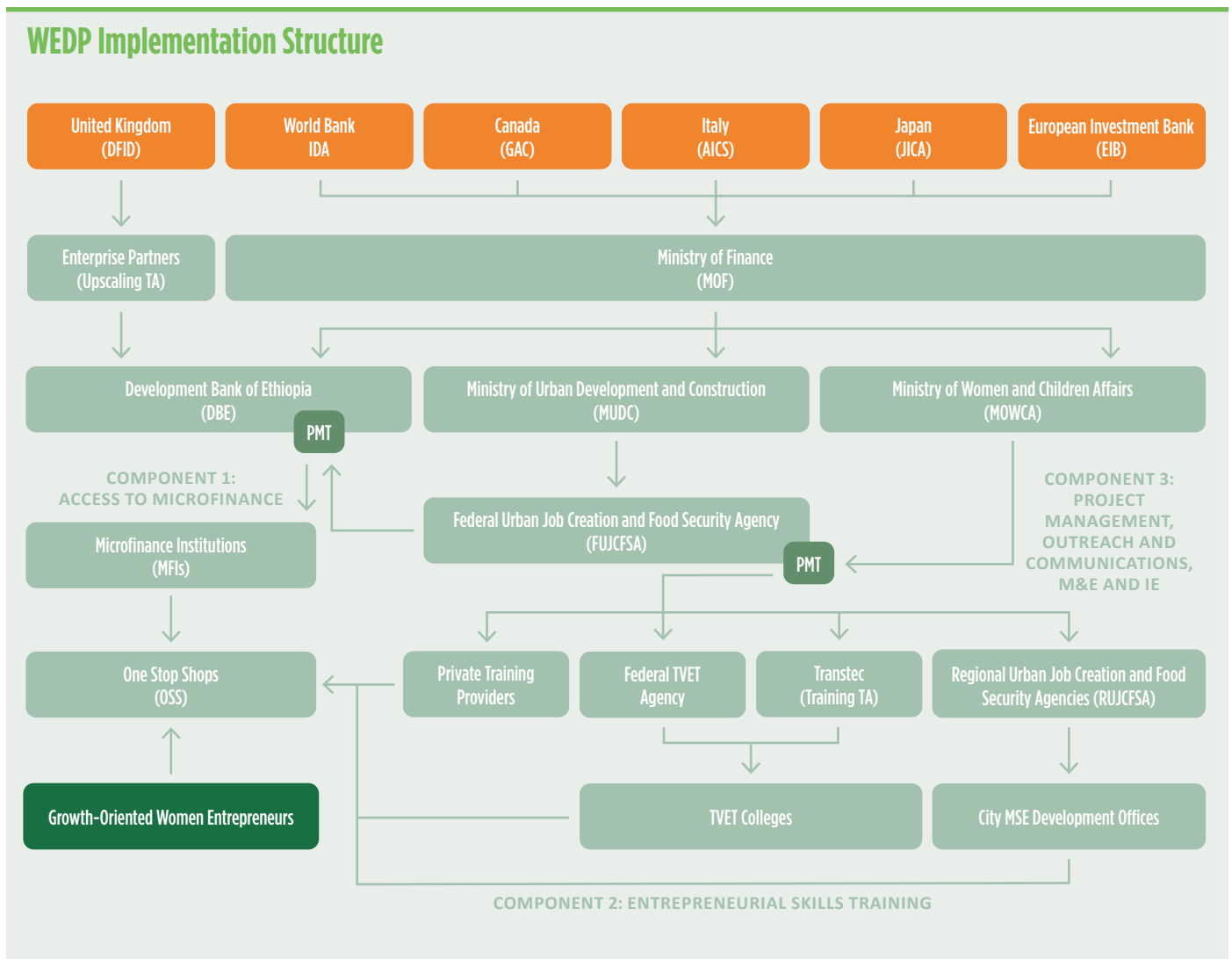
Forty-five one-stop shops (OSS), established across all 10 target cities, serve as entry points for interested women entrepreneurs. These sites also serve as a filtering mechanism – while any woman entrepreneur can learn about WEDP's offerings, only those who are eligible and highly motivated ultimately register with the project.¹⁵ Upon registering, women entrepreneurs receive a membership ID card (containing basic biographic information as well as unique 10-digit ID number), but it does not guarantee a loan or training. Rather, they receive guidance and recommendations on applying for appropriate training modules and/or for financial products.

The OSSs are overseen by coordinators from the City MSE Development Offices, who supervise the registration process and data entry. In addition, all personnel within each OSS are trained in competition, markets, and business management so that they understand demand-driven approaches and can effectively interface with potential registrants.

¹⁴ 2015-2019 annual average exchange rate: USD 1 = ETB 24.6742.

¹⁵ In order to register with the project, candidates need be full owners or partial owners of an enterprise, and their business is required to be licensed for at least six months.

WEDP Implementation Structure



In addition to its access to finance and entrepreneurial skills development components, WEDP also has a third major component, which comprises (1) advocacy, outreach and communication, (2) monitoring and evaluation (M&E), and (3) impact evaluation.

- The advocacy, outreach and communication sub-component is aimed at building awareness and understanding of WEDP among potential WEDP clients and relevant stakeholders, including male household members. It also ensures public access to information about WEDP, including its components, procedures, complaint mechanisms, and roles and responsibilities, through various broadcast, telephone and social media channels. This includes a toll-free grievance and information telephone line to further ensure quality control and mitigate any issues.
- A robust M&E sub-component is designed to capture information from multiple sources, especially since women entrepreneurs will be accessing services from different project implementers in different cities. It includes the creation of an innovative, digital management information system, which allows the project to track the progress of each individual entrepreneur, by linking the services they receive back to their ID number and uploading client data to a real-time platform for implementers.

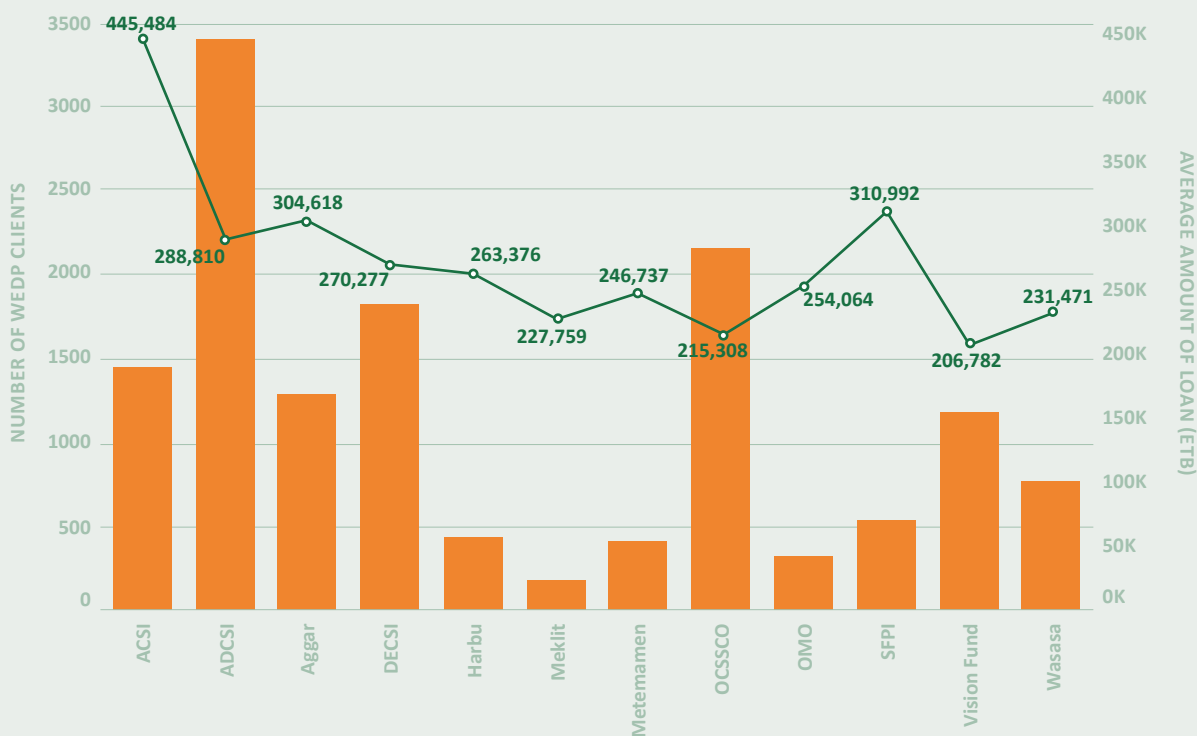
- The impact evaluation component is designed to yield rigorous studies on a number of project interventions, to test their relative effectiveness and impact on accelerating the growth of participating enterprises.

4 WEDP's liquidity provision is tied to mandatory technical assistance to ensure that MFIs were equipped to successfully lend to a client segment that is beyond their traditional client base.

WEDP's upscaling operation is conducted at two levels, and delivered through DFID's wider private enterprise program, Enterprise Partners. At the wholesale level, support to the project management teams (PMTs) at the DBE and FUJCFSA focuses on best practices in managing lines of credit through MFIs, and covers topics such as risk management and internal audit, human capital and performance assessments, loan processing, and IT and MIS.

At the retail level, WEDP assists individual MFIs in upscaling their operations to introduce and implement appropriate financial products that cater to women-owned or managed MSEs. Following an assessment¹⁶ to identify the priority technical assistance needs of MFIs, WEDP has delivered training workshops, seminars, on-site mentoring and assistance on a variety of topics and functions, including risk management, customer care, internal controls, and cash-flow based appraising of individual loans. These activities are coupled with exposure visits and group networking to maximize the depth of learning.

Total WEDP Loan Clients and Average Loan Size, by MFI January 2014 - December 2019



¹⁶ Based on and adapted from the GCAP MFI Appraisal Tool.

As a result of the upscaling process, MFIs' overall appetite for risk has increased, and they have begun recognizing new forms of collateral, including vehicles, personal guarantees and business inventory. Their improved ability to appraise loan applicants has reduced collateral requirements from an average of 200 percent of the value of the loan in 2013 to 125 percent as of 2018. Moreover, they are using cash flow lending techniques for other small business loans outside of the WEDP project.

In the future, there are plans to expand technical assistance to DBE and the MFIs, including building on innovative alternatives to fixed asset collateral, developing interest-free loan products (Islamic banking), and increasing transparency in pricing and terms across MFIs.

5 WEDP provided a stable anchor from which to innovate, including drawing on financial technology (fintech) as a means to maximize the operational efficiency and effectiveness of lenders, while relaxing collateral constraints for women entrepreneur borrowers. The success of introducing a non-traditional credit assessment methodology to a low-tech and low-literacy environment like Ethiopia stirred enthusiasm and buy-in from the financial sector.

Financial institutions' traditional lending methodologies often require data on loan applicants, including their tax records, credit history, financial statements, and legal status. MSEs in general, and women-owned MSEs in particular, often lack sufficient credit history, reliable financial statements, and collateralizable assets. This is compounded in emerging markets like Ethiopia, where there is an absence of proper financial sector infrastructure, such as a credit information system, which can help lenders identify credit worthy borrowers. Faced with such limitations, financial institutions rely on unduly large collateral requirements to minimize their exposure and risk. This results in many women-owned MSEs being excluded from the financial system, while financial institutions miss the opportunity to tap into a pool of potential borrowers.

In recent years, there has been a tide of financial technology, or "fintech", that has been sweeping across the global financial landscape, which has introduced new tools, systems and business models — allowing financial institutions to accelerate MSE lending in a profitable and cost-effective manner. In early 2014, the WEDP team began investigating different technologies that could address the collateral constraint by closing the information gap among MFIs. Among the promising technologies was one developed by the Lenddo Entrepreneurial Finance Lab (LenddoEFL), whose approach does not rely on traditional financial statements, business plans, high-value physical assets, or borrowing histories. Rather, their value proposition was a universal credit score that was calculated based on a psychometric tool that evaluates the entrepreneur's personal attributes, including "locus of control, fluid intelligence, impulsiveness, confidence, delayed gratification and conscientiousness."¹⁷ LenddoEFL's technology allows for an applicant to complete a 45-minute self-administered test on a tablet computer to determine his or her eligibility for a loan. While this technology had been used in other contexts to help banks improve and/or expand their portfolios, WEDP was among the first initiatives to harness this technology as a substitute for fixed asset collateral. Moreover, for those applicants who already had collateral, the test was designed to allow them to qualify for a larger loan size.

To pilot the psychometric testing, the Amhara Credit and Savings Institution (ACSI) was selected, as it is the largest MFI in the country, with over 1 million active borrowers, 440 branches and individual loans comprising 10 percent of its portfolio. ACSI saw the LenddoEFL technology as an opportunity to improve their ability to screen for individual loans even beyond their WEDP portfolio.

Despite EFL's great track record in Sub-Saharan Africa, Ethiopia's context presented a unique challenge. In addition to translating the test into Amharic, LenddoEFL worked to include more visuals and interactive exercises to cater to ACSI's low-tech and low-literacy clients. Moreover, while ACSI was enthusiastic about the psychometric testing, it was understandably hesitant about relying too much on the technology, given the lack of an evidence base in Ethiopia. As such, EFL focused on testing clients without using the resulting score as the basis for the credit decision — allowing ACSI to observe the accuracy of the test without taking on any credit risk.

¹⁷ Alibhai, Salman et al (2019). Disruptive Finance: Using Psychometrics to Overcome Collateral Constraints in Ethiopia. Full document available starting on page 45.

TRADITIONAL LOAN SCREENING

- Financial statements
- Business plan
- Borrowing history
- High-value assets
- Tax records



LENDDOEFL PSYCHOMETRIC LOAN SCREENING

- Locus of control
- Fluid intelligence
- Impulsiveness
- Confidence
- Delayed gratification
- Conscientiousness

In 2015, the psychometric test was pre-piloted in two ACSI branches in Bahir Dar with 420 interested clients, and then piloted across 12 branches with 2,496 clients. As loans matured, WEDP was able to track the progress of the loan repayments. The data revealed a clear trend between psychometric test scores and loan performance. Those borrowers who scored higher on the test were seven times more likely to repay their loans than lower scoring customers. Further results and details of the study are available starting on page 45.

Having succeeded with one of Ethiopia's largest financial institutions, the pilot demonstrated that a psychometrics-based loan screening system could be developed in the country, pushing the frontier of credit access for hundreds of thousands of collateral constrained borrowers. The ACSI experience demonstrated to policymakers and private sector leaders alike that fintech can make a profitable and profound difference to the Ethiopian economy.

Based on the proof-of-concept from the ACSI pilot, other MFIs began requesting for the psychometric technology. In 2018, WEDP launched the LenddoEFFL screening system with Wasasa. In 2020, ADCSI followed suit. Around this time, as an added incentive, DBE began providing additional liquidity (named "WEDP X") to support MFIs who were eager to test out alternative collateral products. Moving forward, WEDP is likely to build on this incentive mechanism to facilitate further crowding in by other microfinance institutions across Ethiopia.

6

Recognizing the limitations of traditional business trainings, WEDP began offering various innovative psychology-based trainings to improve business growth and profitability by equipping business owners with the enhanced ability to think and behave like an “entrepreneur.”

In addition to financial barriers, growth-oriented women entrepreneurs in Ethiopia also tend to lack access to high quality business and financial management skills trainings. Existing skills development opportunities primarily cater to youth, the unemployed or start-up entrepreneurs, relying on traditional textbook and classroom-based trainings provided to large groups. As a result, growth-oriented women entrepreneurs are unlikely to participate in such opportunities.

Moreover, while traditional business trainings are commonly used around the world, impact evaluations have shown limited results.¹⁸ A new approach to business training, drawing from modern cognitive psychology, has been gaining momentum. Rather than

¹⁸ McKenzie, David and Woodruff, Christopher (2013). What are we learning from business training and entrepreneurship evaluations around the developing world? https://openknowledge.worldbank.org/bitstream/handle/10986/22564/wbro_29_1_48.pdf.

focusing solely on conventional topics, such as bookkeeping, business plan development, or production management, psychology-based trainings focus on developing entrepreneurs' proactive, innovative and self-starting mindset and behavior.

A World Bank study in Togo showed that psychology-based trainings are outperforming traditional ones, with firm profits increasing by 30 percent compared to no significant impact for the latter. These trainings were even more effective for women entrepreneurs, with firm profits increasing by 40 percent for those partaking in the mindset-oriented trainings, as compared to 5 percent for those in traditional trainings.¹⁹

Encouraged by the results in Togo, WEDP began offering three different types of mindset-oriented trainings in different targeted cities in Ethiopia. While each has varying levels of psychological elements, all three trainings emphasize setting goals, developing plans to reach those goals and using innovative approaches.

- The Basic Business Skills and Entrepreneurship Development (BSED) training was designed specifically with Ethiopian women entrepreneurs in mind, and it mainly focuses on traditional business skills. However, it includes elements that seek to develop a creative mindset by drawing on experiential learning methods, role playing, and simulation games and exercises.
- StartUp! and ReachUp! Trainings are offered by the Digital Opportunities Trust (DOT), and they focus on building the life skills and mindset shift required of aspiring entrepreneurs to set and accomplish their goals. The DOT trainings combine both traditional and mindset-oriented elements in their curriculum.
- Developed by psychologists, the Personal Initiative (PI) training is an action-oriented training that encourages entrepreneurs to proactively approach their environment through self-starting, future-oriented and persistent behavior. At the end of the training, trainees work on individual projects that allow the transfer of the mindset and skills learned during the course to their own businesses.

There was a concerted effort to keep the trainings as demand-based as possible. In order to participate in any given training, a WEDP member had to have sufficient numeracy and literacy skills as determined by the provider, be committed to focusing on business as a full-time activity, and willing to pay a commitment fee for the training. Per diems were not be provided to any trainees, as the provision of per diem would distort incentives for attending the training. For any half-day trainings, refreshments were provided; for full-day trainings, lunch.

Two rigorous randomized controlled trials (RCTs) evaluated the effectiveness of these trainings. The first experiment compared a treatment group who took the PI training with a treatment group who took the BSED training, and a control group that received neither training. The second study compared a treatment group who undertook the DOT training with a control group, who comprised those entrepreneurs who had to wait before being offered the training. In addition to measuring improved business practices and profitability, it also measured psychological competencies, such as self-efficacy, personal initiative and locus of control.

Results revealed that the DOT training achieved a positive, statistically significant impact on women entrepreneurs' monthly profits, channeled through shifts in their entrepreneurial mindset, given that these trainees saw increased levels of psychological outcomes compared to the control group. The study saw no evidence of impact for the PI and BSED trainings on either psychological or business performance outcomes. To investigate the potential causes of the lack of impact, the study analyzed a range of teacher attributes, and found a statistically significant positive association between trainers' own history of entrepreneurship and trainee outcomes. Overall, the TVET trainers' own limited exposure to business experience (41 percent) indicates that the delivery mechanism is just as important as the training content. While mindset-oriented trainings hold promise, they seem to be more successful when the trainers can better relate to the trainees, and act as role models. Further results and details from this study are available starting on page 59.

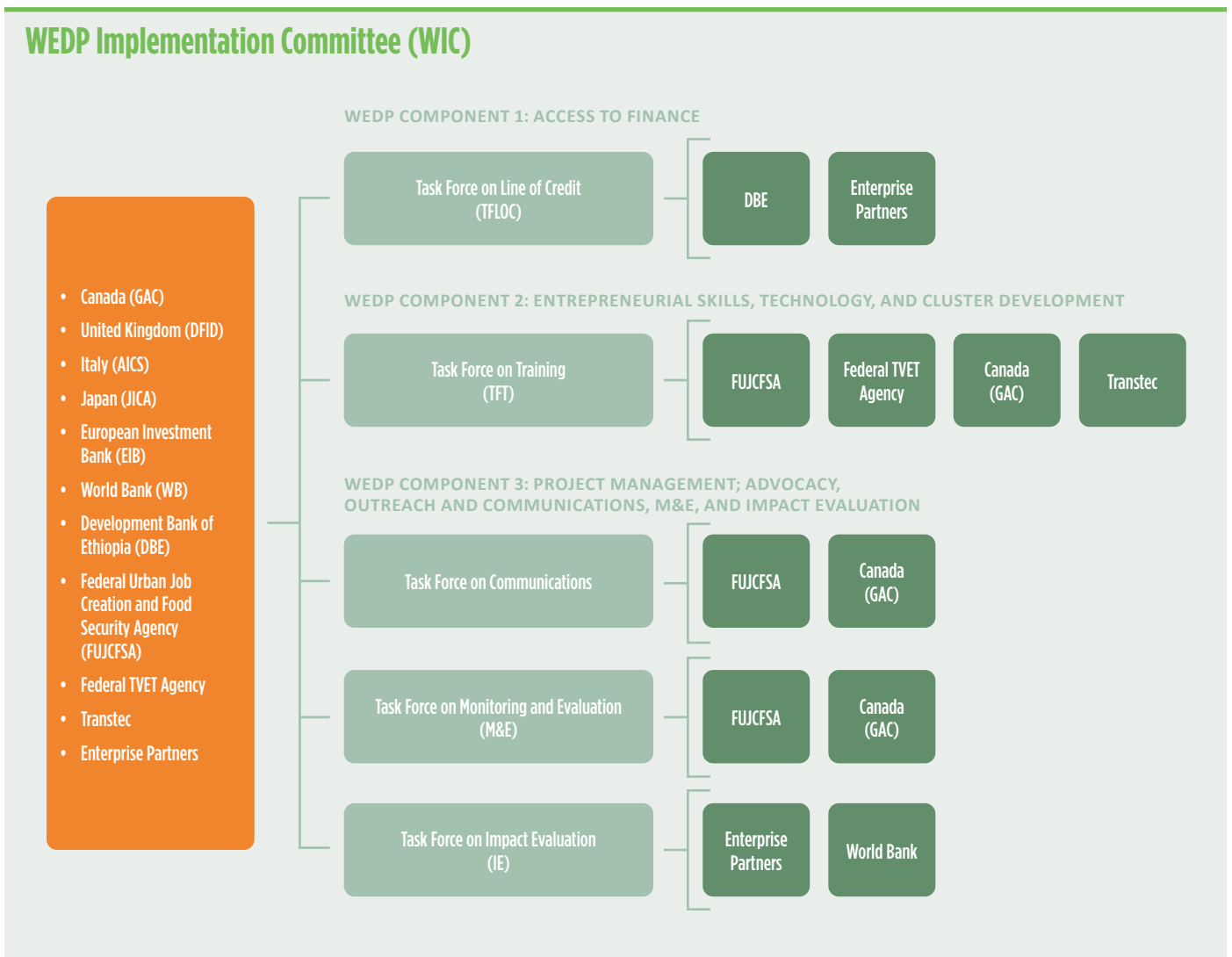
Based on the learnings from the impact evaluation, WEDP plans to refine WEDP's entrepreneurial skills training model, including maximizing training take-up by offering flexible training hours to cater to busy women entrepreneurs, introducing a suite of tailored support services on a one-on-one and small group basis, and conducting post-training follow-ups.

¹⁹ Campos, Francisco et al. (2017). Teaching personal initiative beats traditional training in boosting small business in West Africa. *Science* 357 (6357), pp. 1287-1290. <https://science.sciencemag.org/content/357/6357/1287>.

7 Establishing a coordinating body like the WEDP Implementation Committee (WIC) afforded a necessary degree of convening power and mutual accountability among all major stakeholders.

When WEDP was first launched, project management included semi-annual implementation supervision missions by the Task Team Leader (TTL) to review the project’s progress and to take decisions forward – as is standard across World Bank operations. However, given the multiple components of WEDP, it became increasingly clear that hands-on management was required to ensure effective coordination and implementation by all project stakeholders.

To this effect, WEDP established the WEDP Implementation Committee (WIC), which was composed of one representative from each of WEDP’s seven main implementers, including FUJCFSA, the Federal TVET Agency, DBE, and the World Bank. The WIC convenes on a monthly basis, and meetings are structured based on an Action Matrix, a template that allows WIC members to outline and report against key priorities that need to be accomplished by set deadlines, be they days, weeks, or months.

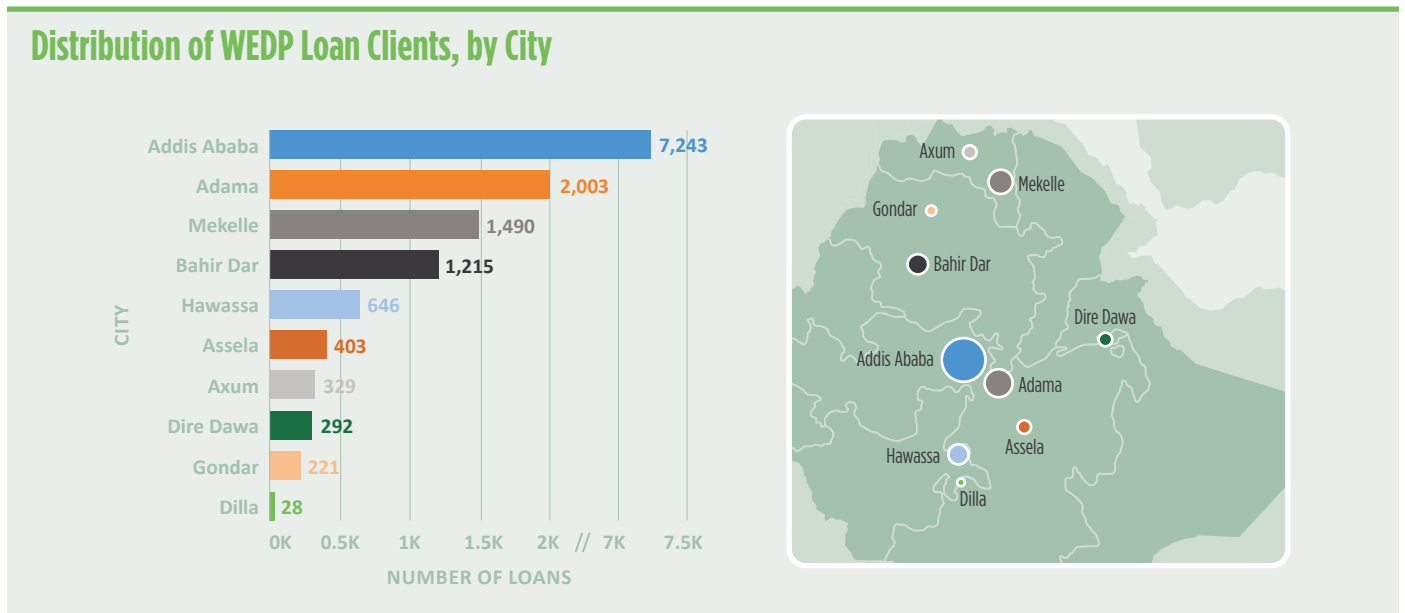


Within the WIC, there are five task forces, each aligned with the major components of WEDP. Each Task Force is comprised of relevant entities, who are responsible for implementing the agreed activities from the Action Matrix, and reporting back updates in advance of the next WIC meeting.


Such a tight and regimented feedback loop not only holds all stakeholders accountable, but it allows the project leadership to quickly address any bottlenecks, as well as to integrate the latest information into decision-making. It also elevates project performance: by creating a strong sense of teamwork and inclusivity, the WIC is a platform for collaborative strategizing and innovative thinking.

8 WEDP invested in a low-cost, user-friendly management information system (MIS) that could serve as a launchpad for other public sector programs in Ethiopia. Despite the challenging context, by harnessing government support, and configuring the functionalities to local needs and constraints, a sustainable, centralized system was successfully developed.

The operational responsibility of implementation rests with City MSE Development Offices, MFIs, TVET Colleges and private training providers, using 45 OSS sites as entry points across 10 cities in Ethiopia. The geographical dispersion and complexity of WEDP’s implementing structure necessitated a management information system (MIS) that collects, organizes and maintains information in a centralized database. An MIS would allow WEDP to uniquely identify each eligible WEDP member and track her at major points of the intervention, for example, when she registers for WEDP at an OSS, when she takes a training at a TVET College or through a private provider, and when she takes a loan from an MFI. At the aggregate level, the MIS can reveal trends in WEDP member characteristics – including their biodata and business profiles. It could also show real-time progress on registration, training take-up and retention, as well as loan disbursements and characteristics by each MFI. Insights from the MIS could enable WEDP stakeholders to see whether the project is achieving its overall aims and to facilitate better product offering where needed.



Initially, the MIS was envisaged to be WEDP-specific, but the Government of Ethiopia saw the system as having wider applicability beyond the scope of the project. Such ambitions presented new challenges, as it meant that the WEDP MIS had to be developed and managed locally, with operating costs remaining low and compatible with the GOE’s resource-constrained M&E budget. It also meant that MIS interface had to be accessible and user-friendly, to accommodate the low computer literacy levels of public sector users.



The GOE's commitment and investment were critical to the success of the MIS. Although a local IT company was contracted to develop the MIS, the GoE engaged its own local IT experts from FUJCFSA to assist the former in developing the appropriate specifications for the MIS. The process involved developing and testing an Excel-based registration form to provide insights on what a functioning MIS should look like, followed by identifying free software platforms that could accommodate the system's needs. In addition, WEDP upgraded servers, networks and server rooms so that the MIS could accommodate larger data flows than what WEDP would generate.

Building an IT culture was equally important to developing the MIS infrastructure. Given that most public sector staff are used to paper-based systems, concerted efforts were made to orient them towards a computer-based system. In addition to providing trainings, WEDP developed videos that showed the functionalities of the MIS. The MIS interface was in both English and Amharic, and features included pull-down menus and fixed choices that would simplify data entry and minimize any errors. Further quality checks were put into the system, including pop-up boxes that would explain what information needed to be entered in which fields, along with error messages that would pop up when an incorrect data format was used. More details on the functions, features and development of WEDP's MIS are available starting on page 103.

The returns to investing in an adaptable MIS are already visible. Based on the experiences and components of the WEDP MIS, FUJCFSA developed its own MIS to connect 1,600 OSSs in the country. In addition, the Federal Small and Medium Manufacturing Industry Development Agency (FeSMMIDA), which is responsible for supporting MSEs in Ethiopia, has plans to install its own MIS, with functions and features similar to that of the WEDP MIS.

Conclusion

WEDP identified a clear constraint – the unmet demand for credit by the “missing middle” in Ethiopia – and developed a holistic, systems-based approach to address this financing gap. By establishing a line of credit, WEDP presented a strong value proposition to twelve MFIs for upscaling their efforts to lend to growth-oriented women entrepreneurs. It has subsequently provided these MFIs with the necessary technical assistance to introduce, market and implement appropriate financial products. Through a combination of liquidity and technical advisory, WEDP has incentivized partner MFIs to operate out of their comfort zones, and in doing so, has created a strong demonstration effect on the benefits of lending to women-owned MSEs.

Concurrently, the project offered innovative, psychology-based business trainings to WEDP clients. Studies were showing that traditional business trainings were not increasing small-scale business profits, particularly of those owned by women. Encouraged by promising results from a novel experiment in Togo, WEDP took a calculated risk by offering non-traditional courses that focused on building entrepreneurs' proactive mindsets and creative capabilities, rather than solely on business knowledge transfer.

Operationally, WEDP's two-pronged model of credit and capacity-building required an implementation structure that spanned across multiple public sector and private sector institutions at the federal level, regional and city levels. On the ground, to reach growth-oriented women entrepreneurs, WEDP established 45 one-stop shops across 10 cities, which provided a convenient means for interested women business owners to learn about, register and apply for the project's loan and training offerings. WEDP's activities were overseen by a central coordinating body – the WEDP Implementation Committee (WIC) – not only to maximize operational efficiency and effectiveness, but to also build a culture of open communication and mutual accountability.

Finally, WEDP invested in a comprehensive monitoring and evaluation system to facilitate continuous learning – so as to improve and refine ongoing operations, inform future operations, and to contribute to the broader body of knowledge on approaches to women-owned MSE financing. To this effect, WEDP developed a centralized, web-based MIS that could track implementation progress and gather detailed performance insights in real-time. It also conducted several rigorous impact evaluations, to help draw causal conclusions about the project's impacts on women entrepreneurs' performance, earnings and employment, as well as to understand the conditions and mechanisms under which they are able to succeed.



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Better Loans or Better Borrowers?

Impact of Meso-Credit on
Female-Owned Enterprises in Ethiopia

*Salman Alibhai, Niklas Buehren and Sreelakshmi Papineni**

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Abstract

This paper explores the impact of large, individual-liability loans on the growth of women-owned microenterprises in Ethiopia. Traditionally, microfinance institutions in Ethiopia have primarily catered to female enterprises with group lending schemes that provide very small loans. The limitations of this model are two-fold: in addition to these micro-loans being too small in size to fuel meaningful business growth, many of the female enterprises that are targeted with these loans face binding constraints, such as concentration in lower-growth sectors, lack of alternative job opportunities, limitations on time and mobility, and restrictive gender norms. The paper investigates the impact of credit to female entrepreneurs in a novel context, by examining larger loans, provided to growth-oriented

women entrepreneurs. These entrepreneurs fall in the “missing middle” or “meso-finance” segment of the financial market because their credit needs are too large for microfinance, but not large enough for commercial banks. The paper uses a propensity score matching methodology to examine the impact of loans offered to women as part of the Women Entrepreneurship Development Project, a program funded by the World Bank International Development Association, that targets growth-oriented women entrepreneurs in Ethiopia. The results suggest that large, individual-liability loans can make a significant difference in accelerating growth in the business incomes and employment levels of women-owned enterprises.

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

The Policy Research Working Paper Series disseminates the findings of work in progress to encourage the exchange of ideas about development issues. An objective of the series is to get the findings out quickly, even if the presentations are less than fully polished. The papers carry the names of the authors and should be cited accordingly. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the views of the International Bank for Reconstruction and Development/World Bank and its affiliated organizations, or those of the Executive Directors of the World Bank or the governments they represent.

Produced by the Research Support Team

I. Introduction

Support for micro- and small-enterprises is a popular policy option for governments all over the world. In Ethiopia, specifically, increasing efficiency and competitiveness of micro and small-scale enterprises is a focus of the Growth and Transformation Plan II (2015-2019). A common pillar of support to microenterprises has been to facilitate access to credit, often in the form of microfinance. Over time, microfinance has increasingly been utilized as a tool to support female entrepreneurs. Recent reports show in Sub-Saharan Africa among micro- and small- firms there is no longer a gender gap in terms of access to microfinance (Demirguc-Kunt et al. 2014). Aterido et al. (2011) find no evidence that women are disadvantaged in terms of access to capital when controlling for firm and entrepreneur characteristics and argue that this is due to “female favoritism” in the microfinance industry in offering loans to micro and small firms.

While the availability of microfinance has undoubtedly expanded, the question of whether microfinance can help enterprises to grow and ultimately alleviate poverty is under intense scrutiny. A recent review of six randomized evaluations across four continents suggests that, while microcredit has some benefits, it has not led to the transformative improvements in business performance and poverty reduction widely expected (Banerjee et al 2015). Many of the microfinance randomized controlled trial (RCT) studies in the last decade have left people with a common perception that, while microfinance has helped many firms to smooth incomes and has introduced many entrepreneurs to financial services for the first time, it has not been able to propel the majority of firms onto a growth trajectory (Tarozzi et al. 2015).

The existing microfinance studies also paint a broad view that female-operated enterprises benefit from microfinance even less than men. The explanations for this differential impact between women and men focus on the gender-specific constraints that may prevent women from benefiting from the influx of capital, such as the concentration of women entrepreneurs in lower-growth sectors; time and social constraints, including pressures from self or others to spend; and the fact that many women micro-loan clients are ‘necessity’ entrepreneurs that would likely opt for wage employment if it was available (Buvinic and O’Donnell, 2016).

Traditionally, microfinance institutions (MFIs) have primarily catered to female micro-firms with group lending schemes that provide very small loans. These micro-loans, usually in the amount of a few hundred dollars, may be insufficient to fuel business investment and growth. In Ethiopia, a “missing middle” phenomenon in credit markets has been well-documented, by which growth-oriented firms are highly capital-constrained, because their credit needs are too large for microfinance, but not large enough for commercial banks. In Ethiopia, microfinance group loans rarely exceed a value USD 1,500, while commercial banks rarely lend in amounts below USD 50,000. The underserved segment of women entrepreneurs seeking loans between approximately USD 1,000 and USD 50,000 constitutes the missing middle. This paper seeks to explore the impact of credit

offered to female entrepreneurs in a novel context, by examining larger loans, provided to growth-oriented women entrepreneurs in the missing middle segment.

This paper uses a Propensity Score Matching (PSM) method to examine the impact of “missing middle” or meso-loans offered to women as part of the Women Entrepreneurship Development Project (WEDP) in Ethiopia. WEDP is a World Bank IDA-funded program that provides loans and entrepreneurship training to growth-oriented women entrepreneurs in Ethiopia. The project helps MFIs upscale to provide larger, individual loans to serve growth-oriented women entrepreneurs. The line of credit of \$45.9m is disbursed to twelve MFIs across six different Ethiopian cities: Addis Ababa, Adama, Bahir Dar, Dire Dawa, Hawassa and Mekelle. The line of credit is disbursed (wholesaled) to them via the Development Bank of Ethiopia (DBE) and the WEDP MFIs are required to have at least 10,000 borrowers, PAR90 below 5%, a specific capital adequacy ratio, and meet a number of other governance, HR, and financial benchmarks.

By nature of its focus on MFI upscaling, the WEDP operation targets a significantly different population of female entrepreneurs than the traditional group lending schemes operated by Ethiopian MFIs. The average WEDP loan size across all issued loans in 2017 was 237,000 Ethiopian Birr (USD 12,000 when exchange rate \$1 = 20 ETB) which is an increase of approximately 800% on pre-WEDP loan sizes. As a comparison, the maximum group-liability loan size available to these enterprises outside of WEDP was approximately USD 1,000-1,500. The majority of WEDP borrowers (61%) were new borrowers, who had not previously accessed loans through a formal financial institution. The loans themselves range in maturity from 24 to 36 months. The WEDP MFIs are frequently developing new loan products and recognizing new forms of collateral such as vehicles, personal guarantees, and even business inventory, to secure loans.

In this paper, we first unpack the selective take-up that was observed by analyzing characteristics of WEDP-registered female firms who were actually able to borrow versus those who were not. The females who received a WEDP loan differed from those who did not receive a loan on a number of characteristics: they are older with higher educational attainment and had larger businesses with greater household asset wealth than the rest of the sample at baseline. The entrepreneurs who get a loan also score better on measures of entrepreneurial identity and locus of control which potentially indicates that the MFIs who received WEDP funds are indeed only approving loans for the entrepreneurs who are demonstrating a higher entrepreneurial capability and therefore pose a lower risk of loan default for the lender. Better knowledge of the characteristics of female firms who borrow is important for offering direction on microfinance program targeting.

Next, we apply a Propensity Score Matching (PSM) method to test impacts of the loan by creating a statistical comparison group of firms among those who did not receive loans that is based on a model of the probability of participating conditional on a set of observable characteristics. Through this analysis, we are

able to isolate and understand the impact of these large loans on the growth of the participating enterprises.

The remainder of this paper is organized as follows. Section II describes our main data source and empirical strategy. Section III reports on the selection that was observed for the WEDP services; section IV analyzes the start-up and survival of firms in the sample and section V outlines the characteristics of firms and their owners who were able to borrow. Section VI presents the results of receiving a loan on firm performance. Section VII concludes.

II. Data and Empirical Strategy

A. Data

The data used in this paper come from the Women Entrepreneurship Development Project (WEDP) impact evaluation sample of firms. In order to build a sample for the impact evaluation the research team relied on the registration database of WEDP firms that was being collected by the Federal Micro and Small Enterprise Development Agency (FeMSEDA) from the beginning of 2014. Before a baseline survey could be carried out we had to wait until enough firms were registered for the WEDP program for an appropriate impact evaluation (IE) sample to be established. However, this waiting period meant that by the time of the baseline survey there were some firms that could have already received WEDP loans or training. Since the baseline survey began in October 2014 the research team collected information about whether any WEDP services had been taken-up at the time of baseline and we relied on asking retrospective information about some key variables during the baseline survey to be able to determine pre-program levels.

Between October and December 2014 baseline data were collected from WEDP-registered firms in six Ethiopian cities and formed a sample of 2,369 female entrepreneurs. The WEDP baseline questionnaire contained a set of questions on household demographic characteristics, socioeconomic status, business sales, profits, costs, employees, entrepreneurial profile (e.g., age, place of birth, education level), and questions designed to elicit an entrepreneur's business knowledge and level of financial literacy.

A follow-up survey was conducted between December 2016 and February 2017 for the same firms approximately 2 years after the baseline for 2,139 firms which is 90% of the baseline sample. The attrition rate of firms that were either not found, owner died or refused to be surveyed for the follow-up survey was 10%. The rate of survey attrition was similar across firms that received a loan and those that did not. The survey questionnaire elicited business performance, business practices and further entrepreneurial and psychological characteristics of the female business owners.

B. Empirical Strategy

1. PROGRESSION OF FIRMS FROM BASELINE TO FOLLOW-UP

For outcomes in which the same question was asked pre-program and post-program, the regression specification will be the following analysis of covariance (ANCOVA) estimator:

$$Y_{it} = \beta_0 + \beta_1 Loan_{2014i} + \beta_2 Loan_{2016i} + \beta_3 Y_{2012i} + \lambda Post_{2016} + X'_{2014i} \beta_4 + \varepsilon_{it} \quad (E1)$$

Where Y_{it} is the outcome variable measured in 3 time periods: pre-program (2012), in 2014 and in 2016. $Post_{2016}$ is a time dummy for the 2016 follow-up round. $Loan_{2014i}$ and $Loan_{2016i}$ are the treatment dummy variables taking the value of one if the firm reported receiving a WEDP loan in either 2014 and/or 2016. β_1 and β_2 will measure the treatment effect as compared to the control group that did not receive a loan. Y_{2012i} is the pre-program value of the outcome variable measured retrospectively for the year 2012. X'_{2014i} is a vector of baseline control variables such as age and marital status. In cases when a control variable is missing, its value is set to zero and a dummy is included for whether the variable is missing. ε_{it} is the error term.

The second specification is the difference-in-difference (DID) estimator:

$$Y_{it} = \beta_0 + \beta_1 Loan_{2014i} + \beta_2 Loan_{2016i} + \beta_3 Post_1 Loan_{2014i} + \beta_4 Post_2 Loan_{2016i} + \beta_5 Post_1 + \beta_6 Post_2 + X'_{2014i} \beta_4 + \varepsilon_{it} \quad (E2)$$

Where Y_{it} is the outcome variable measured pre-program (2012), in 2014 and in 2016. $Loan_{2014i}$ and $Loan_{2016i}$ are the treatment dummy variables taking the value of one if the firm reported receiving a WEDP loan in either 2014 and/or 2016. $Post_1$ and $Post_2$ are dummy variables taking the value of one in the two respective follow-up time periods. The interaction terms β_3 and β_4 will measure the difference-in-difference treatment effect.

The regression specifications in E1 and E2 will allow us to analyze the impact of receiving a loan on performance outcomes versus a control group in both time periods (2014 and 2016) so that we can pinpoint when the impact occurs. In all the regressions we control for whether the firm received any WEDP business training and if the 2013 retrospective estimate was used for the pre-program outcome rather than the 2012 estimate. All variables denominated in Ethiopian Birr are winsorized at the 99th percentile to deal with the possibility of sensitivity of the results to outliers.

Since receiving a loan is a choice rather than randomly assigned, the propensity score matching (PSM) method is used to adjust for any potential selection bias. PSM balances the distributions of observed covariates between a treatment group and a control group based on similarity of their predicted probabilities of receiving a loan (i.e. on their propensity scores). We use the predicted values from a

standard probit model to estimate the propensity score for each observation in the loan (treated) and the no loan (control) group samples. The conditional independence assumption that underlies the validity of the PSM methodology requires that conditional on observable characteristics, receiving a WEDP loan is independent of potential outcomes and unobservable heterogeneity is assumed to play no role in participation (Dehejia and Sadek, 2002). The conditions for our study are relatively promising for propensity score matching to be reliable, since both the loan recipients and the control group were all registered with the WEDP program and are from the same localities so are likely to have similar observable backgrounds. It is possible that the MFI lenders may have access to more information about the borrower than what is included in our survey instrument and unobservable lender information may still influence the estimation results. However, we will use a well-specified probit regression to estimate the probability of receiving a loan, grounded on empirical evidence in the financial and entrepreneurship space.

The PSM method will be used in the DID model such that the control group outcome is matched to a treated observation using characteristics of the entrepreneur (PSM Min) and entrepreneur characteristics plus a measure of firm size (PSM Max). Specifically, the propensity score specification matches on age of business owner, age squared, higher than secondary education, household size, a measure of cognition (digitspan memory recall), an entrepreneurial identity index as a proxy for motivation and passion and number of employees as a proxy for firm size at baseline (variables for gender and marital status are excluded since the sample is all female and the majority are married). The chosen variables were collected in the same baseline survey and are theorized to be important covariates of receiving a WEDP loan with measures of firm size, demographic information and entrepreneurial skill all included. Using the estimated propensity scores, matched-pairs are constructed on the basis of how close the scores are across the two samples where the matching estimator is based on a kernel-weighted average of control outcomes. Prior to matching, the estimated propensity scores for those with and without WEDP loans were respectively 0.3526 (standard error of 0.079) and 0.324 (0.078) and the region of common support was [0.144, 0.606]. Figure 3 in the Appendix displays the distribution of estimated propensity scores for the two groups and the region of common support. In addition, Figure 4 in the Appendix gives details of the probit regression to establish the propensity score and presents the balance test to verify the second identifying assumption for PSM of the presence of a common support.

2. LEVEL DIFFERENCES

An OLS regression specification will be used to compare the average differences of those firms that received a WEDP loan to those that did not across a larger variety of outcome measures that were collected in the 2016 follow-up survey round only.

$$Y_i = \beta_0 + \beta_1 Loan_i + \lambda Post_{2016} + X_i' \beta_2 + \varepsilon_i \quad (E3)$$

Where: Y_i is the outcome variable measured in 2016. $Loan_i$ is a dummy variable taking the value of one if the firm received a loan at any point as reported in either 2014 or 2016 surveys. $Post_{2016}$ is a dummy variable taking the value of zero in 2014 and one in 2016. X_i' is a vector of control variables that could change from the 2014 to 2016 (for example, age of owner, marital status and household size). β_1 will measure the average level differences of firms that receive a WEDP loan versus those that did not. Propensity score matching will again be utilized such that the control group outcome is matched to a treated observation using characteristics of the entrepreneur and firm size (as described above).

Before presenting our impact results, we first describe the observed take-up of the different WEDP programs and present characteristics of firms that were actually able to borrow.

III. Take-Up of the WEDP Services

Female firm owners register for WEDP in Ethiopia via One Stop Shops in their city and their business is required to be a registered firm for at least six months. The WEDP-registered entrepreneurs are not guaranteed a loan – both the entrepreneurs can choose which program services (loan or training) they want to take-up and the MFIs will determine creditworthiness of the borrower before lending. During the follow-up surveys, we asked the business owner to specify which WEDP program services they utilized. The self-reported WEDP loan and training status were reconciled with administrative data collected by WEDP and information in the access to finance section of the survey. Table 1 shows that at the time of the follow-up survey 34% of firms in the sample received a WEDP loan and 78% took WEDP training that was provided through Technical and Vocational Education and Training (TVET) colleges.

Table 1—Number of Firms that Received the Different WEDP Services

WEDP Program Status	Number of firms	Percentage
Loan Only	164	8%
Training Only	1,118	52%
Both loan and training	551	26%
No WEDP Services	306	14%
Total	2,139	100%

These proportions are in line with administrative data of overall WEDP-registered clients that stand at 19,431 firms in 2017. We find 35% received a WEDP loan and 54% received training in the full database of registered WEDP firms.

The MFIs started distributing WEDP loans beginning in January 2014 and at the time of the baseline survey that began in October 2014, 23% of the sample of 2,369 firms had already received a WEDP loan and 54% of the sample had received the WEDP training. Therefore, to establish pre-program levels for the impact analysis we utilize the retrospective questions asked during the baseline to be able to analyze the growth of the firms that received a WEDP loan as compared to those that did not. As a robustness check for our impact results we also compare the average difference in post-program outcome levels of those that reported having received a WEDP loan in either survey round to a matched comparison group of firms that did not receive loans in any period.

IV. Firm Start-Up and Survival

In the baseline sample of firms, 21% reported starting their business operation in the year of the survey (2014). We regard these firms as “start-up” businesses and consider the possibility that receipt of a WEDP loan may have impacted whether the firm started operations. We find that firms that received a loan in the year 2014 (as reported in the baseline survey) were 8% more likely to have started a business in the year 2014 than the rest of the sample.

Additionally, during the follow-up survey we also established if the original sample of WEDP registered clients were still running a business and found 79% with operational businesses (5% had changed business sector).

Figure 1—Firm Closure by the Follow-up Survey

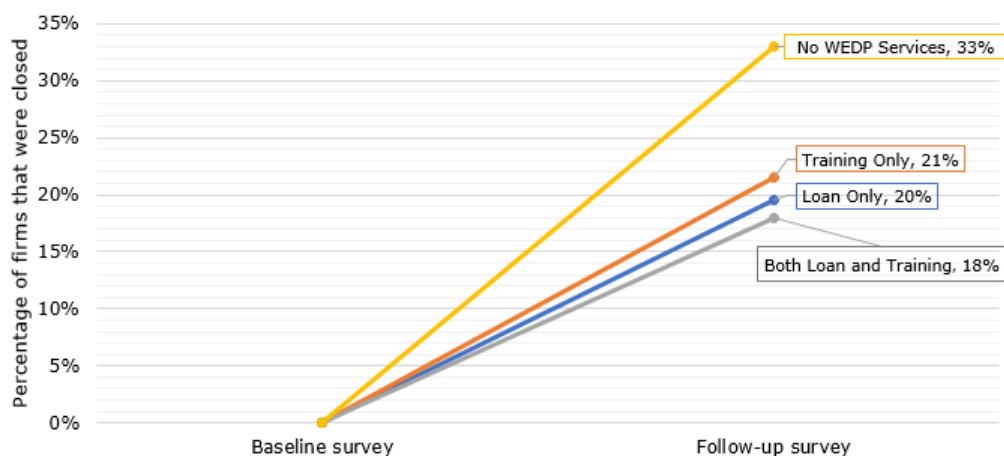


Figure 1 presents, by WEDP status, the percentage of firms that had closed by the time of the follow-up survey. The likelihood that the entrepreneur closed

their business by the follow-up survey was lower if they received any WEDP service (loan or training). We cannot be sure on the direction of causality– those firms that did not utilize WEDP services could be more likely to close or they closed and therefore had less time to take up the services offered by the program. Perhaps if you are on the cusp of bankruptcy then you may be more likely to be rejected for a loan or if you are busy shutting down a failing business you have no time to take up the WEDP services?

Of the 452 businesses that were closed by the time of the follow-up survey the most common reasons for shutting down operations was that they could not get a loan (29%) and prohibitive rent costs or insufficient infrastructure to continue with business operations. A comparison of baseline outcomes of open and closed businesses suggested that the businesses that shutdown were smaller and their owners were younger with lower measures of non-cognitive skills than those that continued operating a business.

The results in this paper will assess impact of receiving loans for existing firms at baseline and start-up firms separately. To account for the impact of receiving a loan on survival, in the analysis we will provide both unconditional estimates (which code outcomes as zero for individuals not operating the business at follow-up) and conditional estimates (which requires the firm to be in operation at follow-up to be included in the analysis). A comparison of these results will help us understand whether any effects of receiving a loan on firm performance is driven by the impact on business survival.

V. Who Borrows?

Figure 2—Sample Size of Surveys, Loan Applications and Approvals

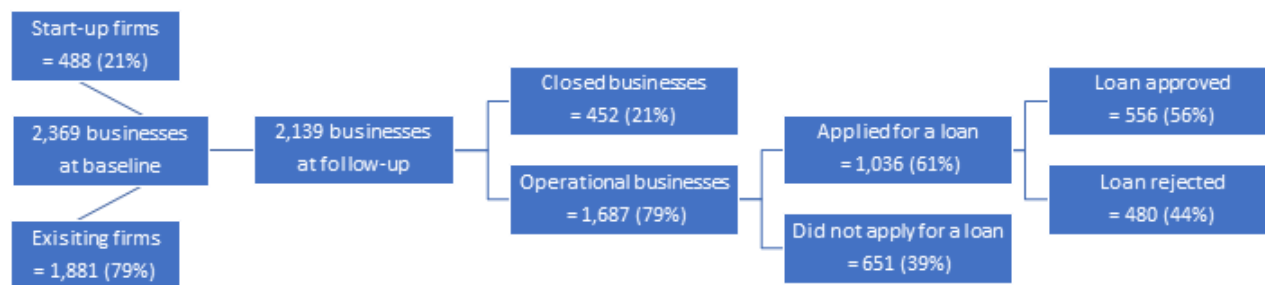



Figure 2 shows that among the sample of 1,687 operational businesses at the time of follow-up, not all firms applied for a WEDP loan – we find that 61% of firms reported applying for a WEDP loan. The main reasons for borrowing were to purchase equipment (56%) and inputs (27%). Of those firms that applied for a loan 56% reported that they were approved for an MFI loan and 44% were



rejected. The main reason given for loan rejection or not applying was that the firm owner could not provide the collateral needed for the loan. A house was the most common collateral provided for an approved WEDP loan which was solely owned by the female owner in only 35% of the cases. The average WEDP loan size among the firms that were approved a loan was approximately USD 12,000. Approximately, half of the “training only” and “no WEDP services” groups did not apply for a loan and the other half applied for a WEDP loan but were not approved.

In Tables 2 and 3 we compare the baseline outcomes for WEDP borrowers and non-borrowers for the 2,139 firms (1,700 existing firms and 429 start-ups at baseline) that were resurveyed during the 2016 follow-up survey.

Table 2 column (4) shows the existing female business owners that received a WEDP loan differed from those that did not receive a loan on a number of characteristics: they are older with higher educational attainment and had larger businesses with greater household asset wealth than the rest of the sample at baseline. The entrepreneurs that get a loan also score better on measures of entrepreneurial identity and locus of control which potentially indicates that the MFIs are only approving loans for the entrepreneurs who are exhibiting higher entrepreneurial capability and therefore could pose a lower risk of loan default for the lender. The lower sample size in column (5) for loan applicants is because the WEDP loan information was only collected for firms that were still operational during the follow-up survey. Among the 60% of firms that applied for a WEDP loan we find that they are, on average, larger firms and their owners score higher on non-cognitive skill measures than those that did not apply. The WEDP loan application process itself could potentially encourage this selection if the application process is considered cumbersome then some women could be discouraged if, say, a lot of documentation is needed. Those who present with higher non-cognitive skills may be those who have the resolve to persevere through the application. In addition, since those receiving a loan report a significantly higher household asset index at baseline perhaps these women are those that are able to come up with the collateral to meet the terms of a loan set by the MFI. Restricting the sample further, column (6) shows that the WEDP loans are being approved among older, more highly educated firm owners that exhibit higher entrepreneurial identity and locus of control skill measures.

Table 3 compares WEDP borrowers and non-borrowers among the start-up firms i.e. those that opened their business in the year 2014. In column (4) we find that the women that received a loan were older and had higher household wealth at baseline as proxied by a household asset index. The women that applied for a loan for a “start-up” business have higher education and score higher on measures on self-efficacy than those that did not. The positive significant age difference between women that were approved for a loan and were rejected could potentially indicate that lenders are more willing to lend to finance start-up firms when the entrepreneur has demonstrated sufficient prior working experience.

VI. Results

To account for the possible impact of receiving a loan on firm survival, we code firms that are closed as having zero employment and zero profits in our analysis. This enables us to examine the full unconditional impact on these outcomes in a way which is not subject to selectivity concerns present in comparing only firms in operation. We also provide comparisons of treatment and control profits and sales conditional on start-up and survival. The comparison group for the impact analysis is drawn from the firms that received no WEDP loans as measured at time of follow-up.

A. PROGRESSION OF EXISTING FIRMS FROM BASELINE TO FOLLOW-UP

In tables 4 to 7 we report results for five models: ANCOVA, ANCOVA with controls, difference-in-difference with controls (DID with controls), DID with propensity score matching using entrepreneur characteristics (DID PSM Min Kernel) and DID with propensity score matching using entrepreneur characteristics plus firm size proxied by number of employees at baseline (DID PSM Max Kernel).

Tables 4 to 7 present the impact of receiving a loan on average yearly profit, number of employees, hours worked by the owner and hours worked by employees for firms that were in operation at baseline. These are the outcomes for which we have the pre-program estimates based on retrospective recall. Columns (4) and (5) present the DID estimates using propensity score kernel matching that matches a comparison group based on a number of covariates that predict the likelihood of receiving a loan. The included outcomes used to construct the propensity score are: age of the owner, age squared, education, household size, digitspan score (memory recall), entrepreneurial identity index and number of employees at baseline.

Table 4 reports the results for the average treatment effect of receiving a loan on average yearly profits by comparing WEDP borrowers to non-borrowers. Impacts in the 2014 and 2016 survey rounds are presented in the table. Receiving a WEDP loan has a positive significant impact on the profitability of firms when measured 3 years after the WEDP program started issuing loans (see positive significant coefficient on *Loan_2016* in the ANCOVA regressions in columns (1) and (2)). The magnitude of treatment effects is similar across the DID regression models; however, the PSM model using kernel matching produces a more conservative estimate that is no longer statistically significant (positive coefficient on *Loan_2016*Post2* shows the treatment impact in 2016). The similar effects for the unconditional and conditional samples suggests that the impact of loans on profitability is not occurring through the extensive margin of allowing firms to survive and earn profits.

Table 5 reports the average treatment effect of receiving a loan on employment. Receiving a loan has a positive impact on the number of employees when measured 3 years after the WEDP program started issuing loans (positive significant

coefficient on Loan_2016 in the ANCOVA regressions in columns (1) and (2)). The magnitude of treatment effects in the DID models is slightly larger than the ANCOVA and remain statistically significant even when applying PSM methods. Again, the similar effects for the unconditional and conditional samples suggests that the impact of loans on employment is not being driven by the impact on business survival.

Table 6 and Table 7 report the impact of receiving a WEDP loan on the number of hours worked by the owner and by employees. The loans had a small and insignificant impact on the number of hours worked by the owner but a strongly significant positive impact on the number of hours worked by employees per week when measured 3 years after the program started. The magnitude of effects on the number of hours worked by employees is similar across all the regression models.

Overall, the results show that female-owned enterprises who are able to borrow through the WEDP program are able to exhibit a higher growth potential after 3 years than the non-borrowers. The most robust impacts of the loans are on employment generation; however, the impact on profitability is less reliable with the positive impact only significant for the models where matching methods were not utilized. A comparison of the unconditional and conditional results suggests that the impact of receiving a WEDP loan is not occurring through the extensive margin of allowing firms to continue to operate that otherwise would have had to close down.

B. LEVEL DIFFERENCES FOR EXISTING AND START-UP FIRMS

Next, we report the level differences for firms that received a loan and did not across a wider array of outcomes measured in the 2016 follow-up survey. Tables 8 and 9 report the level differences for those that received a loan to those that did not (the treatment dummy is whether they reported receiving a loan in either the 2014 or 2016 surveys). We report results across three models: ordinary least squares (OLS), OLS with controls and a PSM kernel estimator where the ATT is computed averaging over the unit-level treatment effects of the treated where the control unit outcome matched to a treated observation is obtained as kernel-weighted average of control unit outcomes. PSM Min computes the propensity score based on characteristics of the entrepreneur and PSM Max on characteristics of the entrepreneur plus a measure of firm size.


Table 8 reports the results comparing WEDP borrowers to those without any WEDP loans for firms that were already existing at baseline. In panel A, we report positive significant differences across a range of business performance outcomes (profits, sales, capital machinery and employees are all significantly higher for firms that received a WEDP loan). The PSM kernel matching models in columns (3) and (4) produces similar effects to the OLS regressions and the impacts remain statistically significant. The number of hours worked by the owner is slightly lower for firms that received a loan which is consistent with them passing some of the workload onto their employees since the owner, on average, already works long

weekly hours. In panel B, we compare a range of business practices outcomes and find those firms that borrow are more likely to report maintaining written records and have a formalized plan for their business. We can not rule out that the improvements in record keeping and financial planning may simply reflect the documentation requirements that are needed to apply for a loan through the MFIs or potentially the receipt of a loan may require the firm to be more organized with written records in order to keep track of interest repayments. We find limited evidence of improvements in marketing practices among existing firms that received a loan.

Table 9 reports the results comparing WEDP borrowers to those without any WEDP loans for firms that started their business in 2014 that we are classifying as a “start-up firm”. We find a positive statistically significant difference in average monthly profits for the firms that received a WEDP loan. However, for all other measures of profits, sales and number of employees we do not find statistically significant differences. The PSM kernel matching model in columns (3) and (4) produces effects that are similar in magnitude to the OLS regressions and are still not significant. The lack of evidence of differences in business performance among the start-up firms that borrowed and did not borrow could reflect that these start-up firms have not had enough time to reap the returns of their loan investment and grow their business beyond the non-borrowers. The significantly higher level of capital machinery reported by those that received a loan suggests the WEDP loan was invested directly into the start-up capital for the firm while the non-borrowers possibly used their own savings to start their business in less capital-intensive sectors. Among business practices, the start-up firms that receive a loan similarly improve their record-keeping practices as compared to non-borrowers. In addition, those that received a loan were more likely to self-report that they generated a higher number of business ideas among the newly started firms. Perhaps the receipt of the loan inspired them to be more creative and come up with new ideas since they now have the means to realize their ideas.

VII. Conclusion

The recent microfinance impact studies that assert only modest effects on business growth for women-owned businesses typically focus on the customary practice of offering small loans to females microentrepreneurs through group lending schemes. These studies tend to leave the reader with the view that women are unable to effectively invest entrepreneurial finance. However, this narrow focus shrouds that loan products as well as borrowers can come in all shapes and sizes. As Cull and Morduch (2017) write “getting the right product to the right population can yield substantial impacts”. The evidence in this paper shows that larger, individual-liability loans offered to growth-oriented women entrepreneurs in Ethiopia had a significant impact on accelerating their business growth and boosting employment levels. The impact on the average number of employees is particularly pertinent when thinking how these business impacts may be filtered



down to the poorer segments of the market. The WEDP project in Ethiopia was selective in lending to entrepreneurs that were able to demonstrate more entrepreneurial capability and therefore potentially exhibited a lower risk of default for the lender, suggesting due diligence and vetting processes were effective. Perhaps policy and research efforts should be directed to re-thinking loan products to target underserved market segments, with larger and better-fit credit.

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Table 2—Baseline Differences for Existing Firms

Existing Firms: Differences between WEDP borrowers and non-borrowers

	All Existing firms at baseline	Loan received	No Loan received	Diff Loan received - No Loan received	Diff Loan Applied - Not Applied	Diff Loan Approved - Not Approved
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Differences						
Age of business owner (Number)	34.47 (8.32)	35.72 (8.45)	34.14 (8.22)	1.58*** (0.43)	-0.57 (0.45)	1.86*** (0.56)
Married (1=Yes, 0=No)	0.62 (0.48)	0.66 (0.47)	0.62 (0.49)	0.04 (0.02)	0.02 (0.03)	0.03 (0.03)
Average Yearly Profits pre-program (ETB)	45743.60 (74585.66)	50559.15 (73779.72)	41899.14 (71607.66)	8660.01** (3858.33)	8292.63** (4032.48)	3229.44 (5331.25)
Log of yearly profits pre-program	9.17 (3.04)	9.30 (3.16)	9.06 (3.02)	0.24 (0.16)	-0.02 (0.17)	0.10 (0.23)
Number of workers (Number)	1.74 (3.34)	2.16 (3.41)	1.52 (3.24)	0.64*** (0.17)	0.57*** (0.18)	0.54** (0.25)
Number of hours worked by the owner per week	66.40 (24.41)	65.24 (25.89)	67.29 (24.04)	-2.05 (1.28)	1.79 (1.34)	-6.15*** (1.75)
Number of hours worked by employees	103.22 (206.86)	125.59 (208.49)	91.67 (199.78)	33.91*** (10.49)	34.65*** (11.26)	30.44* (15.52)
Capital at business start (ETB)	43532.59 (90031.50)	53130.49 (99668.33)	38442.00 (84090.01)	14688.49*** (5070.11)	11612.80** (4934.57)	10139.35 (6603.22)
Less than primary education (1=Yes, 0=No)	0.05 (0.21)	0.06 (0.23)	0.04 (0.21)	0.01 (0.01)	-0.00 (0.01)	-0.01 (0.01)
Primary school is max education (1=Yes, 0=No)	0.17 (0.37)	0.17 (0.38)	0.17 (0.37)	0.01 (0.02)	-0.01 (0.02)	-0.00 (0.03)
Secondary school is max education (1=Yes, 0=No)	0.42 (0.49)	0.36 (0.48)	0.44 (0.50)	-0.07*** (0.03)	-0.02 (0.03)	-0.06* (0.03)
Completed more than secondary (1=Yes, 0=No)	0.37 (0.48)	0.40 (0.49)	0.35 (0.48)	0.06** (0.02)	0.04 (0.03)	0.06* (0.03)
Household Asset Index (0-8)	6.02 (1.29)	6.36 (1.21)	5.83 (1.28)	0.52*** (0.06)	0.30*** (0.07)	0.53*** (0.08)
Preference for business (1=Yes, 0=No)	0.36 (0.48)	0.37 (0.48)	0.35 (0.48)	0.02 (0.02)	-0.01 (0.03)	0.02 (0.03)
Digitspan forward recall (0-7)	2.21 (1.10)	2.31 (1.16)	2.15 (1.06)	0.16*** (0.06)	0.21*** (0.06)	0.11 (0.08)
Personal Initiative (0-1)	0.83 (0.14)	0.84 (0.14)	0.82 (0.14)	0.02*** (0.01)	0.03*** (0.01)	0.01 (0.01)
Entrepreneurial Identity (0-1)	0.78 (0.21)	0.80 (0.20)	0.77 (0.21)	0.03*** (0.01)	0.02* (0.01)	0.04*** (0.01)
Entrepreneurial Locus of Control (0-1)	0.75 (0.17)	0.77 (0.18)	0.75 (0.17)	0.02*** (0.01)	0.00 (0.01)	0.04*** (0.01)
Self Efficacy (0-1)	0.79 (0.14)	0.81 (0.14)	0.78 (0.14)	0.03*** (0.01)	0.03*** (0.01)	0.01 (0.01)
Number of Observations	1,700	561	1139	1,700	1,396	838

* significant at 10% level ** significant at 5% level *** significant at 1% level

(1) Columns (1), (2) and (3) report means with standard deviations in parentheses.

(2) Column (4) reports the test of differences of means across columns (2) and (3). Columns (5) and (6) report the differences for loan applied/not applied and loan approved/rejected groups respectively.

(3) The majority of outcomes in Table 2 are captured during the baseline survey. The exception to this are the entrepreneurial characteristics (personal initiative, entrepreneurial identity, locus of control and self efficacy) and capital stock at business start that were asked at follow-up. Capital stock at business start was asked retrospectively to firms who were still operational during the follow-up survey.

Table 3–Baseline Differences for Start-Up Firms

Start-Up Firms: Differences between WEDP borrowers and non-borrowers

	All Start-up firms at baseline	Loan received	No Loan received	Diff Loan received - No Loan received	Diff Loan Applied - Not Applied	Diff Loan Approved - Not Approved
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Differences						
Age of business owner (Number)	31.51 (7.52)	33.18 (7.88)	30.91 (7.18)	2.28*** (0.74)	-0.43 (0.93)	3.48*** (1.04)
Married (1=Yes, 0=No)	0.62 (0.49)	0.68 (0.47)	0.60 (0.49)	0.08 (0.05)	0.05 (0.06)	0.09 (0.07)
Capital at business start (ETB)	68143.14 (123642.41)	95365.74 (150109.03)	51989.07 (101902.93)	43376.68*** (14825.57)	20197.62 (15537.25)	23080.86 (17909.54)
Less than primary education (1=Yes, 0=No)	0.02 (0.14)	0.03 (0.18)	0.02 (0.13)	0.01 (0.01)	-0.03* (0.02)	0.02 (0.01)
Primary school is max education (1=Yes, 0=No)	0.15 (0.36)	0.10 (0.31)	0.19 (0.39)	-0.08** (0.04)	-0.07 (0.05)	-0.04 (0.05)
Secondary school is max education (1=Yes, 0=No)	0.38 (0.49)	0.37 (0.48)	0.36 (0.48)	0.01 (0.05)	-0.00 (0.06)	-0.01 (0.07)
Completed more than secondary (1=Yes, 0=No)	0.45 (0.50)	0.49 (0.50)	0.43 (0.50)	0.06 (0.05)	0.11* (0.06)	0.03 (0.07)
Household Asset Index (0-8)	5.83 (1.35)	6.23 (1.28)	5.63 (1.31)	0.60*** (0.13)	0.31* (0.16)	0.65*** (0.18)
Preference for business (1=Yes, 0=No)	0.30 (0.46)	0.27 (0.45)	0.31 (0.46)	-0.04 (0.05)	-0.05 (0.06)	-0.08 (0.07)
Digitspan forward recall (0-7)	2.34 (1.16)	2.40 (1.19)	2.31 (1.14)	0.09 (0.12)	0.06 (0.15)	0.14 (0.17)
Personal Initiative (0-1)	0.84 (0.13)	0.84 (0.13)	0.84 (0.14)	0.00 (0.01)	0.03 (0.02)	-0.01 (0.02)
Entrepreneurial Identity (0-1)	0.80 (0.20)	0.82 (0.18)	0.78 (0.21)	0.04* (0.02)	0.04 (0.03)	0.06** (0.03)
Entrepreneurial Locus of Control (0-1)	0.75 (0.19)	0.76 (0.18)	0.75 (0.19)	0.01 (0.02)	0.05** (0.02)	0.00 (0.03)
Self Efficacy (0-1)	0.81 (0.14)	0.82 (0.14)	0.80 (0.14)	0.02 (0.01)	0.05*** (0.02)	-0.02 (0.02)
Number of Observations	439	154	285	439	291	198

* significant at 10% level ** significant at 5% level *** significant at 1% level

(1) Columns (1), (2) and (3) report means with standard deviations in parentheses.

(2) Column (4) reports the test of differences of means across columns (2) and (3). Columns (5) and (6) report the differences for loan applied/not applied and loan approved/rejected groups respectively.

(3) The majority of outcomes in Table 3 are captured during the baseline. The exception to this are the entrepreneurial characteristics (personal initiative, entrepreneurial identity, locus of control and self efficacy) and capital stock at business start that were asked at follow-up. Capital stock at business start was asked retrospectively to firms who were still operational during the follow-up survey.

Table 4–Average Treatment Effect on Average Yearly Profits

Impact of WEDP Loans on Average Yearly Profits

	Average Yearly Profits (Ethiopian Birr)				
	ANCOVA	ANCOVA with Controls	DID with controls	DID PSM Min Kernel	DID PSM Max Kernel
	(1)	(2)	(3)	(4)	(5)
<i>Panel A (unconditional)</i>					
Loan_2014	572.0 (2,930)	-860.4 (2,918)	-11,726*** (4,390)	-10,585** (4,164)	-10,903*** (4,166)
Loan_2016	10,871*** (2,499)	9,571*** (2,488)	14,292*** (3,706)	19,439*** (3,686)	19,035*** (3,687)
Loan_2014*Post1			806.1 (6,746)	-914.5 (6,473)	-1,494 (6,475)
Loan_2016*Post2			9,756* (5,874)	8,021 (5,944)	8,514 (5,946)
<i>Panel B (conditional on business in operation)</i>					
Loan_2014	644.8 (2,920)	-706.0 (2,911)	-11,998*** (4,626)	-10,416** (4,385)	-10,725** (4,389)
Loan_2016	10,638*** (2,487)	9,540*** (2,478)	14,237*** (3,782)	19,426*** (3,762)	19,018*** (3,764)
Loan_2014*Post1			686.7 (6,920)	-1,422 (6,646)	-2,022 (6,650)
Loan_2016*Post2			9,281 (6,348)	7,548 (6,442)	7,805 (6,450)
Observations unconditional	4,640	4,634	4,634	4,631	4,630
Observations conditional	4,347	4,341	4,341	4,346	4,342
Control Mean pre-program existing firms (no loans)	41,917 (2,219)	41,917 (2,219)	41,917 (2,219)	41,917 (2,219)	41,917 (2,219)

Notes:

* significant at 10% level ** significant at 5% level *** significant at 1% level

- (1) The outcome variable is Average Yearly Profits in Ethiopian Birr winsorized at the 99th percentile.
- (2) All regressions control for whether the firm received any WEDP business training and if the 2013 estimate was used for the pre-program outcome rather than 2012 estimate. The controls used in column (2) and (3) include age of the owner, education, marital status, household size, digitspan score (memory recall) and number of employees at baseline.
- (3) Regressions in Panel A include the unconditional outcome where businesses that were closed at follow-up were set to zero and regressions in Panel B is conditional on the business being operational. In cases when a control variable is missing, its value is set to zero and a dummy is included for whether the variable is missing.

Table 5—Average Treatment Effect on Number of Employees

Impact of WEDP Loans on Number of Employees

	Number of Employees			
	ANCOVA (1)	ANCOVA with Controls (2)	DID with controls (3)	DID PSM Min Kernel (4)
<i>Panel A (unconditional)</i>				
Loan_2014	0.158 (0.226)	0.146 (0.188)	0.123 (0.182)	0.0809 (0.174)
Loan_2016	0.531*** (0.0865)	0.483*** (0.0878)	0.545*** (0.157)	0.709*** (0.157)
Loan_2014*Post1			0.240 (0.282)	0.238 (0.272)
Loan_2016*Post2			0.711*** (0.242)	0.694*** (0.246)
<i>Panel B (conditional on business in operation)</i>				
Loan_2014	0.178 (0.233)	0.164 (0.191)	0.161 (0.192)	0.136 (0.182)
Loan_2016	0.510*** (0.0809)	0.463*** (0.0796)	0.526*** (0.160)	0.694*** (0.160)
Loan_2014*Post1			0.196 (0.288)	0.180 (0.278)
Loan_2016*Post2			0.783*** (0.259)	0.753*** (0.265)
Observations unconditional	5,079	5,079	5,079	5,079
Observations conditional	4,776	4,776	4,776	4,776
Control Mean pre-program existing firms (no loans)	1.46 (0.0952)	1.46 (0.0952)	1.46 (0.0952)	1.46 (0.0952)

Notes:

* significant at 10% level ** significant at 5% level *** significant at 1% level

(1) The outcome variable is Number of employees winsorized at the 99th percentile.

(2) All regressions control for whether the firm received any WEDP business training and if the 2013 estimate was used for the pre-program outcome rather than 2012 estimate. The controls used in column (2) and (3) include age of the owner, education, marital status, household size and digitspan score (memory recall).

(3) Regressions in Panel A include the unconditional outcome where businesses that were closed at follow-up were set to zero and regressions in Panel B is conditional on the business being operational. In cases when a control variable is missing, its value is set to zero and a dummy is included for whether the variable is missing.

Table 6—Average Treatment Effect on Hours by the Owner

Impact of WEDP Loans on Hours Worked by the Business Owner

	Hours worked by the business owner per week				
	ANCOVA	ANCOVA with Controls	DID with controls	DID PSM Min Kernel	DID PSM Max Kernel
	(1)	(2)	(3)	(4)	(5)
<i>Panel A (unconditional)</i>					
Loan_2014	-1.718 (0.890)	-1.563 (0.836)	-3.066** (1.378)	-3.730*** (1.222)	-3.827*** (1.223)
Loan_2016	0.832 (0.821)	1.085 (0.866)	0.973 (1.188)	0.844 (1.104)	0.923 (1.104)
Loan_2014*Post1			1.084 (2.130)	1.551 (1.913)	1.712 (1.913)
Loan_2016*Post2			1.052 (1.832)	0.383 (1.734)	0.436 (1.735)
<i>Panel B (conditional on business in operation)</i>					
Loan_2014	-1.744 (0.994)	-1.442 (0.864)	-2.791** (1.362)	-3.545*** (1.233)	-3.612*** (1.235)
Loan_2016	-0.251 (0.552)	0.153 (0.596)	1.085 (1.129)	0.743 (1.073)	0.803 (1.074)
Loan_2014*Post1			0.784 (2.007)	1.262 (1.844)	1.406 (1.845)
Loan_2016*Post2			-2.699 (1.802)	-2.640 (1.745)	-2.455 (1.747)
Observations unconditional	5,042	5,039	5,039	5,037	5,036
Observations conditional	4,414	4,411	4,411	4,413	4,412
Control Mean pre-program existing firms (no loans)	67.37 (0.738)	67.37 (0.738)	67.37 (0.738)	67.37 (0.738)	67.37 (0.738)

Notes:

* significant at 10% level ** significant at 5% level *** significant at 1% level

- (1) The outcome variable is number of hours worked by the owner in a typical week in Ethiopian Birr winsorized at the 99th percentile.
- (2) All regressions control for whether the firm received any WEDP business training and if the 2013 estimate was used for the pre-program level of the outcome rather than 2012 estimate. The controls used in column (2) and (3) include age of the owner, education, marital status, household size, digitspan score (memory recall) and number of employees at baseline.
- (3) Regressions in Panel A include the unconditional outcome where businesses that were closed at follow-up were set to zero and regressions in Panel B is conditional on the business being operational. In cases when a control variable is missing, its value is set to zero and a dummy is included for whether the variable is missing.

Table 7—Average Treatment Effect on Hours Worked by Employees

Impact of WEDP Loans on Hours Worked by Employees

	Hours worked by employees per week				
	ANCOVA	ANCOVA with Controls	DID with controls	DID PSM Min Kernel	DID PSM Max Kernel
	(1)	(2)	(3)	(4)	(5)
<i>Panel A (unconditional)</i>					
Loan_2014	8.241 (14.79)	8.944 (11.22)	6.537 (7.967)	9.797 (10.14)	10.26 (10.08)
Loan_2016	29.78*** (6.545)	25.34*** (6.074)	10.14 (6.853)	34.80*** (9.153)	33.46*** (9.103)
Loan_2014*Post1			16.49 (12.30)	15.67 (15.85)	15.50 (15.77)
Loan_2016*Post2			39.21*** (10.58)	38.94*** (14.38)	38.38*** (14.30)
<i>Panel B (conditional on business in operation)</i>					
Loan_2014	10.04 (16.85)	10.40 (12.66)	8.805 (8.792)	14.14 (11.37)	14.56 (11.29)
Loan_2016	29.51*** (7.027)	25.39*** (6.047)	10.20 (7.272)	33.60*** (9.885)	32.69*** (9.819)
Loan_2014*Post1			12.83 (12.94)	11.56 (16.98)	11.34 (16.87)
Loan_2016*Post2			42.85*** (11.62)	41.74*** (16.10)	40.65** (15.99)
Observations unconditional	5,072	5,072	5,072	5,072	5,072
Observations conditional	4,434	4,434	4,434	4,434	4,434
Control Mean pre-program existing firms (no loans)	93.28 (6.833)	93.28 (6.833)	93.28 (6.833)	93.28 (6.833)	93.28 (6.833)

Notes:

* significant at 10% level ** significant at 5% level *** significant at 1% level

(1) The outcome variable is number of hours worked by employees in a typical week in Ethiopian Birr winsorized at the 99th percentile.

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Table 8—Existing Firms: WEDP Borrowers Versus Non-Borrowers

Level Differences for borrowers and non-borrowers in 2016
follow-up for existing firms

Existing firms (1,700 firms)	Average treatment effect of the loans on the treated: WEDP borrowers versus no loans			
	OLS (1)	OLS with controls (2)	PSM Min Kernel matching (3)	PSM Max Kernel matching (4)
<i>Panel A (Business performance outcomes)</i>				
Average monthly profits (ETB)	2,419*** (426.2)	1,626*** (431.6)	1,852*** (471.1)	1,809*** (523.5)
Average yearly profits (ETB)	17,367*** (3,811)	9,820** (3,832)	10,427** (4,569)	9,995** (4,229)
Average monthly revenues (ETB)	23,555*** (3,406)	17,184*** (3,419)	18,854*** (4,192)	18,732*** (4,168)
Average monthly business costs (ETB)	27,718*** (3,411)	18,778*** (3,430)	21,899*** (4,123)	21,767*** (3,874)
Number of workers (Number)	1.323*** (0.150)	0.970*** (0.153)	1.194*** (0.176)	1.166*** (0.179)
Hours worked by employees (Hrs per week)	77.84*** (10.45)	61.24*** (10.41)	68.96*** (10.71)	67.34*** (12.17)
Hours worked by owner (Hrs per week)	-1.705 (1.304)	-1.257 (1.318)	-2.142* (1.273)	-2.078* (1.218)
Capital Stock (machinery) (ETB)	67,066** (30,171)	26,615 (30,146)	64,037* (35,829)	63,181* (33,658)
<i>Panel B (Business practices)</i>				
Has a written business plan (Yes=1; No=0)	0.107*** (0.0163)	0.0765*** (0.0164)	0.0744*** (0.0179)	0.0733*** (0.0177)
Has a written annual budget (Yes=1; No=0)	0.0514*** (0.0156)	0.0288* (0.0159)	0.0400** (0.0171)	0.0392** (0.0186)
Keeps financial records (Yes=1; No=0)	0.106*** (0.0192)	0.0744*** (0.0191)	0.0938*** (0.0189)	0.0936*** (0.0182)
New products introduced yr (Yes=1; No=0)	0.0324* (0.0168)	0.0327* (0.0169)	0.0262* (0.0157)	0.0255 (0.0179)
Number of new customers daily	3.073** (1.439)	2.916* (1.523)	3.320* (1.725)	3.317* (1.717)
Number of business ideas in past 6m (Num)	0.333 (0.245)	0.369 (0.248)	0.286 (0.284)	0.292 (0.225)
Marketing expenses in past 6months (ETB)	300.2 (1,215)	254.6 (1,288)	-217.5 (1,323)	-216.5 (1,379)

Notes:

* significant at 10% level ** significant at 5% level *** significant at 1% level

- (1) Outcomes presented in the table are reported in the follow-up survey conducted in 2016.
- (2) Results for nearest neighbor matching are not materially different from the kernel matching results presented.
- (3) Regressions in column (2) include controls for age of the owner, education, marital status, household size and digitspan score (memory recall) which could be different in the two survey rounds. In cases when a control variable is missing, its value is set to zero and a dummy is included for whether the variable is missing.
- (4) PSM Min (column 3) calculates the propensity score using entrepreneurial characteristics alone and PSM Max (column 4) calculates the propensity score using entrepreneurial characteristics plus firm size.

Table 9—Start-Up Firms: WEDP Borrowers Versus Non-Borrowers

Level Differences for borrowers and non-borrowers in 2016
follow-up for start-up firms

Start-up firms (439 firms)	Average treatment effect of the loans on the treated: WEDP borrowers versus no loans			
	OLS	OLS with controls	PSM Min Kernel matching	PSM Max Kernel matching
	(1)	(2)	(3)	(4)
<i>Panel A (Business performance outcomes)</i>				
Average monthly profits (ETB)	1,773*** (584.9)	1,344** (604.4)	1,410** (644.0)	1,413** (649.9)
Average yearly profits (ETB)	1,135 (5,771)	-3,218 (5,872)	-2,943 (5,854)	-2,922 (5,777)
Average monthly revenues (ETB)	3,568 (4,916)	1,511 (5,182)	1,934 (4,979)	1,949 (4,976)
Average monthly business costs (ETB)	6,800 (4,402)	3,013 (4,644)	4,471 (4,513)	4,519 (4,123)
Number of workers (Number)	0.202 (0.236)	-0.148 (0.246)	0.00922 (0.249)	0.0149 (0.249)
Hours worked by employees (Hrs per week)	23.75 (17.31)	4.728 (17.36)	16.51 (18.02)	16.93 (19.38)
Hours worked by owner (Hrs per week)	-3.850 (2.587)	-2.191 (2.618)	-2.305 (2.817)	-2.347 (2.716)
Capital Stock (machinery) (ETB)	396,823*** (71,717)	360,178*** (73,596)	400,727*** (89,164)	401,513*** (97,709)
<i>Panel B (Business practices)</i>				
Has a written business plan (Yes=1; No=0)	0.0170 (0.0312)	-0.0234 (0.0325)	-0.0178 (0.0296)	-0.0170 (0.0365)
Has a written annual budget (Yes=1; No=0)	0.0583** (0.0274)	0.0476 (0.0293)	0.0470 (0.0344)	0.0471* (0.0277)
Keeps financial records (Yes=1; No=0)	0.0993*** (0.0362)	0.0627* (0.0373)	0.0818** (0.0351)	0.0825** (0.0378)
New products introduced yr (Yes=1; No=0)	0.00796 (0.0337)	0.0178 (0.0349)	0.0128 (0.0346)	0.0124 (0.0300)
Number of new customers daily	2.513* (1.507)	2.244 (1.635)	2.574 (1.817)	2.597 (2.131)
Number of business ideas in past 6m (Num)	0.826 (0.506)	0.788 (0.522)	0.901** (0.455)	0.898* (0.545)
Marketing expenses in past 6months (ETB)	506.2 (431.1)	340.5 (474.3)	558.1 (662.3)	558.2 (646.8)

Notes:

* significant at 10% level ** significant at 5% level *** significant at 1% level

(1) Outcomes presented in the table are reported in the follow-up survey conducted in 2016.

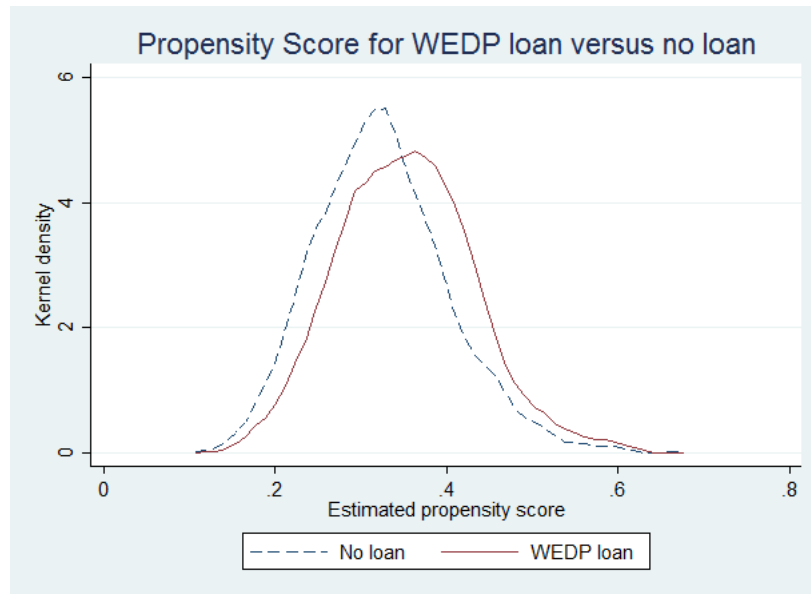
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(4) PSM Min (column 3) calculates the propensity score using entrepreneurial characteristics alone and PSM Max calculates the propensity score using entrepreneurial characteristics plus firm size.

Propensity Score of WEDP Loan Versus No Loan

Figure 3. Probability of Receiving a Loan Based on Observable Characteristics



Probit Regression of Propensity Score

Figure 4. Probit Regression of Propensity Score and Test of Balancing Property

<pre> Estimation of the propensity score Iteration 0: log likelihood = -9079.9116 Iteration 1: log likelihood = -3982.7828 Iteration 2: log likelihood = -3982.4993 Iteration 3: log likelihood = -3982.4993 Probit regression log likelihood = -3982.4993 Number of obs = 6396 LR chi2(7) = 182.32 Prob > chi2 = 0.0000 Pseudo R2 = 0.0226 </pre> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>loan</th> <th>Coeff.</th> <th>Std. Err.</th> <th>z</th> <th>P> z </th> <th>[95% Conf. Interval]</th> </tr> </thead> <tbody> <tr> <td>sex_mf=bf</td> <td>.0447523</td> <td>.0125823</td> <td>3.51</td> <td>0.001</td> <td>.0192512 .0702537</td> </tr> <tr> <td>sex_mf=bf</td> <td>-.0000750</td> <td>.0001923</td> <td>-3.88</td> <td>0.001</td> <td>-.0004595 -.0000905</td> </tr> <tr> <td>educ_#</td> <td>-.1848746</td> <td>.0361001</td> <td>-5.12</td> <td>0.000</td> <td>-.2560323 -.1137171</td> </tr> <tr> <td>hh_size</td> <td>-.0228990</td> <td>.0079829</td> <td>-2.85</td> <td>0.005</td> <td>-.0378890 -.0079090</td> </tr> <tr> <td>hh_size</td> <td>.0228990</td> <td>.0079829</td> <td>2.85</td> <td>0.005</td> <td>.0079090 .0378890</td> </tr> <tr> <td>wealthscore_v</td> <td>-.0019340</td> <td>.0003931</td> <td>-4.92</td> <td>0.000</td> <td>-.0027146 -.0011534</td> </tr> <tr> <td>wealthscore_v</td> <td>.0019340</td> <td>.0003931</td> <td>4.92</td> <td>0.000</td> <td>.0011534 .0027146</td> </tr> <tr> <td>_cons</td> <td>-2.125130</td> <td>.2527369</td> <td>-8.41</td> <td>0.000</td> <td>-2.626430 -1.623782</td> </tr> </tbody> </table>	loan	Coeff.	Std. Err.	z	P> z	[95% Conf. Interval]	sex_mf=bf	.0447523	.0125823	3.51	0.001	.0192512 .0702537	sex_mf=bf	-.0000750	.0001923	-3.88	0.001	-.0004595 -.0000905	educ_#	-.1848746	.0361001	-5.12	0.000	-.2560323 -.1137171	hh_size	-.0228990	.0079829	-2.85	0.005	-.0378890 -.0079090	hh_size	.0228990	.0079829	2.85	0.005	.0079090 .0378890	wealthscore_v	-.0019340	.0003931	-4.92	0.000	-.0027146 -.0011534	wealthscore_v	.0019340	.0003931	4.92	0.000	.0011534 .0027146	_cons	-2.125130	.2527369	-8.41	0.000	-2.626430 -1.623782	<pre> Balancing property satisfied Iteration 0: log likelihood = -4079.9116 Iteration 1: log likelihood = -3982.6413 Iteration 2: log likelihood = -3982.6107 Iteration 3: log likelihood = -3982.6107 Probit regression, reporting marginal effects log likelihood = -3982.6107 Number of obs = 6396 LR chi2(8) = 189.05 Prob > chi2 = 0.0000 Pseudo R2 = 0.0228 </pre> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>loan</th> <th>dF/dx</th> <th>Std. Err.</th> <th>z</th> <th>P> z </th> <th>W-test</th> <th>[95% C.I.]</th> </tr> </thead> <tbody> <tr> <td>pscore</td> <td>-.0900003</td> <td>0.298938</td> <td>-0.30</td> <td>0.891</td> <td>-.399877</td> <td>-.049949 1.449649</td> </tr> <tr> <td>age_#=2</td> <td>.0298826</td> <td>.0204108</td> <td>1.46</td> <td>0.144</td> <td>94.0741</td> <td>-.010142 .069967</td> </tr> <tr> <td>age_#=2</td> <td>-.0202464</td> <td>.0204129</td> <td>-1.00</td> <td>0.314</td> <td>1229.17</td> <td>-.060685 .0202464</td> </tr> <tr> <td>educ_#</td> <td>.1279149</td> <td>.098918</td> <td>1.28</td> <td>0.200</td> <td>3998.77</td> <td>-.049788 .305417</td> </tr> <tr> <td>hh_size</td> <td>.0228990</td> <td>.0108993</td> <td>2.10</td> <td>0.034</td> <td>9.17871</td> <td>-.009048 .054846</td> </tr> <tr> <td>hh_size</td> <td>-.0228990</td> <td>.0108993</td> <td>-2.10</td> <td>0.034</td> <td>2.92668</td> <td>-.054846 .009048</td> </tr> <tr> <td>wealthscore_v</td> <td>.0019340</td> <td>.0003931</td> <td>4.92</td> <td>0.000</td> <td>1.7854</td> <td>-.0027146 .0011534</td> </tr> <tr> <td>wealthscore_v</td> <td>-.0019340</td> <td>.0003931</td> <td>-4.92</td> <td>0.000</td> <td>1.7854</td> <td>-.0011534 .0027146</td> </tr> <tr> <td>_cons</td> <td>.3399567</td> <td>.0300033</td> <td>11.33</td> <td>0.000</td> <td>1.37883</td> <td>-.009976 .3300033</td> </tr> </tbody> </table> <p style="font-size: small;">(*) dF/dx is for discrete change of dummy variable from 0 to 1 z and P> z correspond to the test of the underlying coefficient being 0</p>	loan	dF/dx	Std. Err.	z	P> z	W-test	[95% C.I.]	pscore	-.0900003	0.298938	-0.30	0.891	-.399877	-.049949 1.449649	age_#=2	.0298826	.0204108	1.46	0.144	94.0741	-.010142 .069967	age_#=2	-.0202464	.0204129	-1.00	0.314	1229.17	-.060685 .0202464	educ_#	.1279149	.098918	1.28	0.200	3998.77	-.049788 .305417	hh_size	.0228990	.0108993	2.10	0.034	9.17871	-.009048 .054846	hh_size	-.0228990	.0108993	-2.10	0.034	2.92668	-.054846 .009048	wealthscore_v	.0019340	.0003931	4.92	0.000	1.7854	-.0027146 .0011534	wealthscore_v	-.0019340	.0003931	-4.92	0.000	1.7854	-.0011534 .0027146	_cons	.3399567	.0300033	11.33	0.000	1.37883	-.009976 .3300033
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Disruptive Finance

Using Psychometrics to Overcome Collateral Constraints in Ethiopia

*Salman Alibhai, Niklas Buehren, Rachel Coleman,
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Disruptive Finance: Using Psychometrics to Overcome Collateral Constraints in Ethiopia

Innovation has been and will be pivotal for reaching sustained, scalable solutions to the world's most complex problems.¹

Amhara Credit and Savings Institute's (ACSI) product has a high potential for serving more women but its reach is limited by a lack of appropriate appraisal tools, limited skills and that the women borrowers are constrained by the traditional collateral, such as houses, which ACSI requires.²

All around the world, women-owned businesses have less access to credit than their male counterparts. This unequal access is largely driven by inequalities in ownership of fixed assets such as houses and land, which can serve as collateral to secure loans. Without needed credit, women-owned enterprises are starved of opportunities to grow.

In Ethiopia, and in emerging markets around the world, this collateral constraint is amplified by the absence of financial sector infrastructure such as credit information systems that can help lenders identify creditworthy borrowers. Faced with a dearth of information, financial institutions impose unduly large collateral requirements in order to minimize their exposure and risk. Five years ago, it wasn't uncommon for Ethiopian banks to require collateral worth three times the value of a loan, limiting credit access to only the wealthiest borrowers.

Limitations to the reach of financial services are not endemic to Ethiopia, or to emerging markets. The tide of financial technology, or 'fintech', is sweeping across the largest banks around the globe, leading them to adapt business models, adopt new tools, demonstrate agility, and ultimately enhance their customer offerings. But beyond making banks more efficient and profitable, fintech also holds the potential to open new horizons for financial inclusion, enabling lenders to appraise and reach borrowers traditionally excluded or underserved by the banking system.

In 2014, a World Bank team set out to explore how developments in the fintech industry could be harnessed to unlock the collateral challenge facing Ethiopia's women entrepreneurs. They looked to a technology at the frontiers of financial inclusion: psychometric credit scoring. A tech start-up in Cambridge, Massachusetts had developed a short interactive assessment

¹ "A Call for Innovation in International Development", pubdocs.worldbank.org/en/851851446842304852/Call-for-Innovation-in-International-Development.pdf.

² "Ethiopia Women Development Project Microfinance Institutions Assessment Report", Business & Finance Consulting (BFC), 2011

Canada This work has been funded in part by the government of Canada.

that could be taken by potential borrowers on a tablet computer and could predict the likelihood that the borrower would repay a loan by drawing on the latest advances in big data and machine learning. If psychometric credit scoring worked, the team surmised, perhaps it could be an antidote to the information asymmetry faced by Ethiopian financial institutions, and could ease collateral requirements for creditworthy women entrepreneurs.

The following case study tells the story of the evolution of psychometric credit scoring as an innovative solution in a World Bank operation, from its humble beginnings as a small pilot in Ethiopia, to the current movement to replicate its use for similar challenges in countries across the continent – in Tanzania, Zimbabwe, Madagascar, and beyond. The story is one of both achievements and setbacks, just as the future of fintech holds both promise and limitations. It is shared with a view to better understand how psychometrics and fintech more broadly can be utilized to solve critical development challenges, and help get finance to those who need it most around the world.

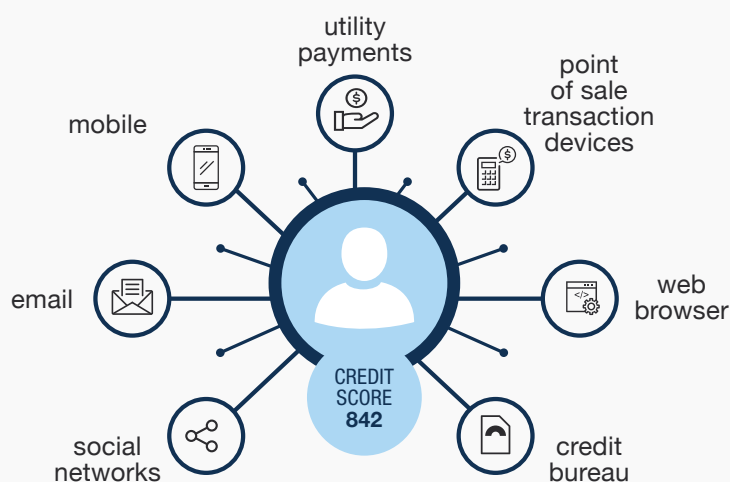
■ A Changing Industry – the Rise of Fintech

Fintech is commonly defined as an industry composed of companies that use technology to make financial systems more efficient.³ Fintech industry players have taken the financial sector by storm in recent years. They cover a wide range of sub-industries such as peer-to-peer lending, credit scoring, payments, crowdfunding and digital currencies. Investment in financial technology has grown exponentially in the past decade - rising from \$1.8 billion in 2010 to \$19 billion in 2015.⁴ Despite different innovative business models, these companies share a common objective: to create and implement technology that improves the efficiency of financial markets.⁵

Fintech companies are increasingly supporting the growth of financial inclusion by reimagining traditional banking products and procedures. They are doing this by bringing new and innovative approaches to better serve clients with reliable, relevant and affordable financial solutions that work for underserved communities.⁶ In this way, financial technology is allowing customers to overcome traditional barriers to accessing finance.

EXHIBIT 1

Get a Full Picture and Better Serve Clients by Leveraging Big Data



3 Williams, Christophe. "What Is Fintech?", Wharton Fintech, 16 Feb. 2016, www.whartonfintech.org/blog-archive/2016/2/16/what-is-fintech.

4 "Digital Disruption - How FinTech Is Forcing Banking to a Tipping Point", CITI GPS: Global Perspectives and Solutions, 2016, www.nist.gov/sites/default/files/documents/2016/09/15/citi_ri_response.pdf.

5 Williams, Christophe. "What Is Fintech?"

6 Chaia, Alberto, et al. "Counting the World's Unbanked", McKinsey Quarterly, Mar. 2010, www.mckinsey.com/industries/financial-services/our-insights/counting-the-worlds-unbanked.

Credit assessment is an area where fintech is poised to make particularly large gains for financial inclusion. Using fintech, financial institutions can access previously untapped data that reveals insights into customers and markets.⁷ This alternative data is derived from sources such as mobile phones, social media, web browsers, utility payments, and point-of-sale transaction devices (See Exhibit 1). Using this data, fintechs can better understand a borrower's cashflows, character traits, and networks. Lenders can use this information to better calculate risk for current clients and to expand their reach to new and previously unbanked borrowers.

Integrating technology into financial institutions heralds the opportunity to dramatically advance financial inclusion. Two billion people around the world remain unbanked,⁸ and fintech promises the potential of more convenient, less expensive, and higher quality financial services. But technology in itself is not a panacea for financial inclusion, and implementing technological change in a financial institution, as we will see from the following case, can be a complex and oftentimes non-linear process.

■ The Idea

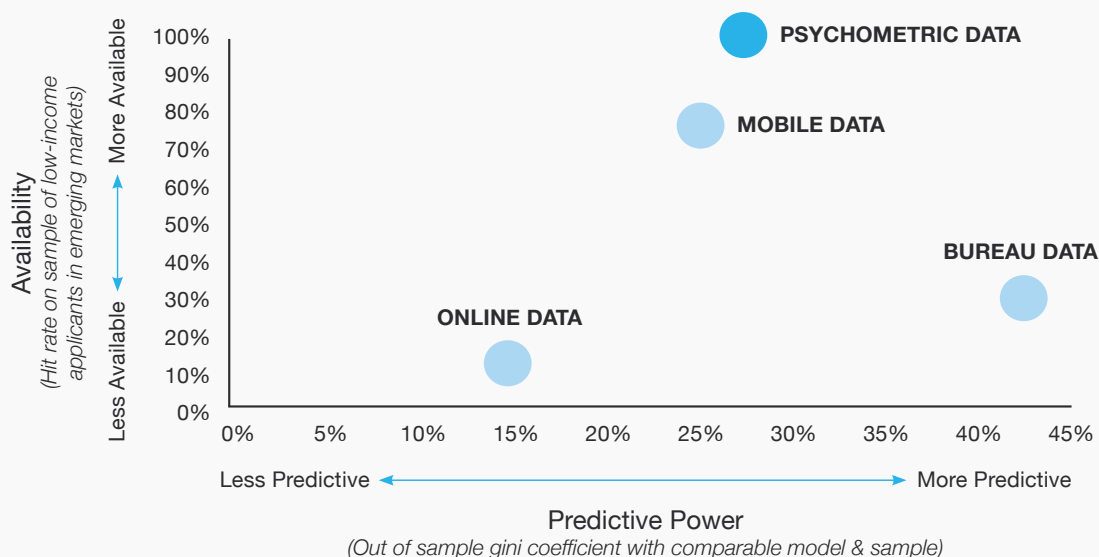
In early 2014, a multidisciplinary World Bank team working on banking, entrepreneurship, and gender in Ethiopia began its first forays into the world of fintech. The team's objective was to identify a technology that could address the collateral constraint facing women entrepreneurs in Ethiopia. The team understood that information scarcity was the key issue preventing banks from lending to women, and that addressing this scarcity would be critical to finding a sustainable solution.

At the time, a myriad of new technologies were emerging to help banks address information asymmetries and scarcities. Harnessing alternative data, for example, could enable lenders to make reliable predictions about the creditworthiness of potential borrowers. Despite their potential, however, many of these technologies were better suited to developed markets

EXHIBIT 2

Predictive Power and Availability Vary By Data Source

Psychometric is the only data source with 100% availability - everyone has a personality



Source: <https://www.eflglobal.com/alternative-credit-scoring-emerging-markets/>; <https://data.worldbank.org/indicator/IC.CRD.PRVT.ZA>; EFL Analysis

7 "Innovations in Payments: The Future Is Fintech", BNY Mellon, 2015, www.bnymellon.com/_global-assets/pdf/our-thinking/innovation-in-payments-the-future-is-fintech.pdf.

8 Demirguc-Kunt, Asli, et al. "The Global Findex Database 2014 - Measuring Financial Inclusion around the World", World Bank Policy Research Working Paper 7255, documents.worldbank.org/curated/en/187761468179367706/pdf/WPS7255.pdf#page=3

in which the majority of citizens had a digital footprint. These technologies were less viable in a market like Ethiopia, where only 16% of the population uses the internet and 51 out of 100 people have mobile phone subscriptions.⁹ For this reason, psychometrics – literally ‘measurement of the mind’ – emerged as a promising option for creating a better picture of Ethiopian borrowers. Unlike other fintech data solutions, psychometrics could actually create new data on borrowers, where it didn’t exist before.

Psychometric data held great potential (See Exhibit 2). While it is widely known that a borrower’s character relates to their likelihood to repay a loan, financial institutions had found it challenging to quantify these traits. Years of research and development have proven that someone’s personality could be broken down into measurable traits such as locus of control, fluid intelligence, impulsiveness, confidence, delayed gratification and conscientiousness, and that these traits could be used to predict credit risk.¹⁰

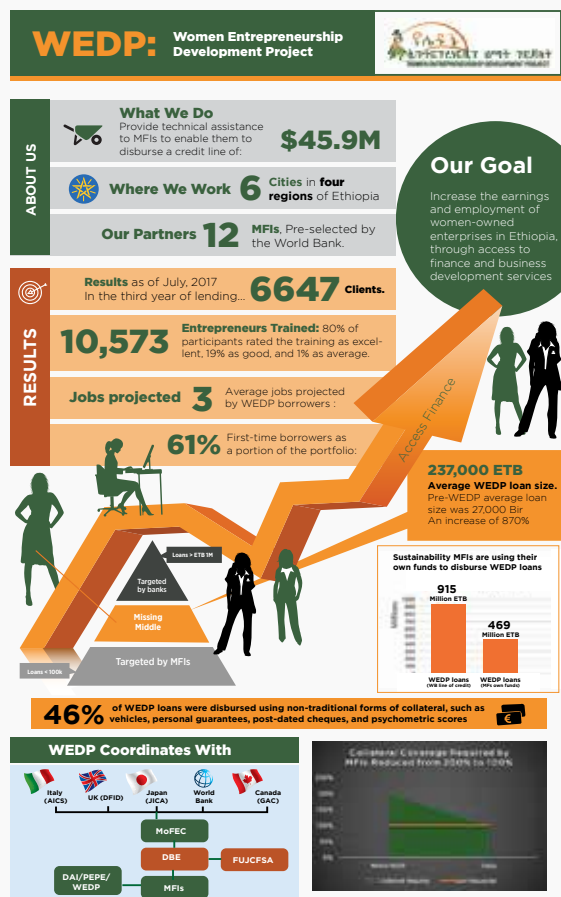
Through a connection with a researcher at Harvard Business School, the World Bank team was introduced to the Entrepreneurial Finance Lab (EFL)¹¹ in early 2014 (now Lenddo after a corporate merger in October 2017)¹². EFL had worked with over 50 financial institutions in 20 countries as a provider of alternative credit scores. Their value proposition was a universal credit score that was calculated using psychometric and behavioral data. They had built predictive psychometric credit models around the world including in Peru, Mexico, Guatemala, Ecuador, India, Indonesia, Kenya, and Ghana and across different population segments.

From their first conversations with EFL, the World Bank team was impressed. EFL’s track record was strong and their work in African countries was unique, as many fintech companies were only just starting to dip their toes in African markets. They had designed a psychometric credit assessment which could be taken on a tablet or a mobile phone: a powerful solution that made sense in a data scarce environment where the level of digitalization of loan files, mobile phone usage and internet penetration is low. Generating new data on an entrepreneur’s character that could predict their creditworthiness could be a breakthrough for Ethiopian lending.

While the team saw promise in EFL’s tool, the challenge ahead was a bold one. The objective was not simply to introduce psychometric screening, but to use it as a tool that could replace traditional asset collateral for high-potential women entrepreneurs. And the low-tech context in Ethiopia was one unlike any other that EFL had worked in before. If this worked and a locally calibrated statistical model could be developed for predicting loan repayment, the Ethiopian financial sector would be equipped with a powerful tool for expanding access to credit for hundreds of thousands of collateral constrained borrowers.

Though the challenges of introducing a new technology into a low-tech environment were real, it soon became clear the opportunities of piloting the psychometric credit assessment to address the collateral constraint far outweighed the risks. In late 2014, a pilot project was launched.

EXHIBIT 3



⁹ International Telecommunication Union, World Telecommunication/ICT Development Report database, data as of 2016

¹⁰ These characteristics have been statistically correlated to loan performance in a global database of over 75,000 applications to create a robust credit risk evaluation.

¹¹ EFL (or “The psychometric credit scoring company used”) provides credit scores for SMEs in emerging markets based on psychometric questions. Their core business has produced compelling results – see *Enterprising Psychometrics and Poverty Reduction* by Bailey Klinger, Asim Ijaz Khwaja, Carlos del Carpio – and this project was an R&D attempt organized by the World Bank to apply the same techniques in the micro-credit space, where there are considerable differences in income, literacy, and bank processes among other potentially contributing factors.

¹² EFL merged with Lenddo in October 2017. Learn more about the merger and the combined company at Include1Billion.com

■ The Situation in Ethiopia

Over the past decade, Ethiopia has achieved high economic growth, establishing the country among the fastest growing economies both in Africa and the developing world. However, Ethiopia is falling behind its peers in the area of provision of credit to the private sector. According to the World Bank's Enterprise Surveys access to finance is perceived as the main business environment constraint by micro (41%), small (36%) and medium (29%) enterprises in Ethiopia, compared to a Sub-Saharan average of 24%, 20% and 16% respectively.¹³

Access to finance is a challenge for men and women alike but difficulties are amplified for women, who are less likely to own assets, and opportunities for women entrepreneurs in Ethiopia lag far behind those of men. In the Economist's Women's Economic Opportunity index, Ethiopia occupies the 123rd rank out of 128 countries.¹⁴ Most growth-oriented women entrepreneurs fall into a 'missing middle' trap, in which they are served neither by commercial banks nor by microfinance institutions. High minimum loan sizes and excessive collateral constraints restrict women's access to loans from commercial banks. Microfinance institutions (MFIs) often lend without asset collateral, but they primarily cater to micro-firms with group lending schemes that provide very small loans, which are not sufficient in size to support business growth.

In 2012, a \$50 million World Bank investment lending operation was designed to address this missing middle challenge. The Women Entrepreneurship Development Project (WEDP) aimed to increase the earnings and employment of female-owned micro and small enterprises in Ethiopia, by improving the capacity of existing microfinance institutions to serve female entrepreneurs. To do this, MFIs were provided with tools, technical assistance, and liquidity to allow them to 'upscale' and provider larger, individual loans to growth-oriented women entrepreneurs who needed them. In addition to introducing MFIs to existing best practices in individual lending, the World Bank team also sought to introduce innovations that could enable MFIs to reach a greater number of women entrepreneurs with individual loans (See *Exhibit 3*).

■ The Lender and the Fintech

After deciding on EFL's psychometric credit assessment tool, the next step was to decide which microfinance institution in Ethiopia would be the best partner for a pilot. At the time, the WEDP project involved 7 of the country's leading MFIs. After introducing the technology to each of them and conducting a careful assessment, one MFI - the Amhara Credit and Savings Institute (ACSI) - came out as the leading candidate.

Located in the Amhara region of Ethiopia, ACSI was the largest MFI in the country, with over 1 million active borrowers and 440 branches (See *Exhibit 4*). ACSI had a well-established business in the group lending market but individual lending was still a new product line. Individual loans made up just over 10% of ACSI's lending portfolio and screening for individual loans was still based on a traditional appraisal mechanism that relied heavily on the existence of fixed asset collateral, such as houses or buildings.

ACSI saw the pilot project as an opportunity to improve their ability to lend on an individual basis. They were optimistic that the psychometric score could be used to help graduate group borrowers who lacked collateral and therefore did not qualify for individual loans under the current credit assessment processes. This would allow former group borrowers to access

EXHIBIT 4 Association of Ethiopian Microfinance Institutions (AEMFI) Data on ACSI MFI

1st Quarter - March 31, 2016
ETB = .046 USD

Name	ACSI
No. of Active Borrowers	1,056,390
No. of Women Borrowers	621,245
Loans Outstanding	8,568,663,201
Voluntary Saving	7,431,441,029
Compulsory Saving	787,699,181
Total Saving	8,219,140,210
Total Asset	13,898,277,412
Total Liabilities	10,668,396,923
Total Capital	3,229,880,489

13 "SME Finance in Ethiopia: Addressing the Missing Middle Challenge", World Bank Group, 2015, documents.worldbank.org/curated/en/805371468247458154/pdf/943650WP0Box380nt0Feb01002015040Web.pdf.

14 "Women's Economic Opportunity Index 2012", The Economist, www.eiu.com/Handlers/WhitepaperHandler.ashx?fi=WEO_full_report_final.pdf&mode=wp&campaignid=weoindex2012.

larger value loans and create an individual credit history. They were eager to learn if psychometric screening could be used to predict credit risk for borrowers in their portfolio.

A tripartite pilot agreement was formed and in January 2015, the World Bank, EFL and ACSI set out to pilot psychometric testing as an alternative to collateral for ACSI borrowers. A common objective was established: to measure both the feasibility of the screening tool in predicting credit risk, and the impact of the loans on female borrowers. The agreement was that the World Bank would fund the start-up phase of this partnership, enabling ACSI to pilot EFL's technology before deciding whether to make a longer-term investment. The agreement also stipulated that the technology would be provided at affordable rates to other financial institutions in Ethiopia if the pilot proved successful.

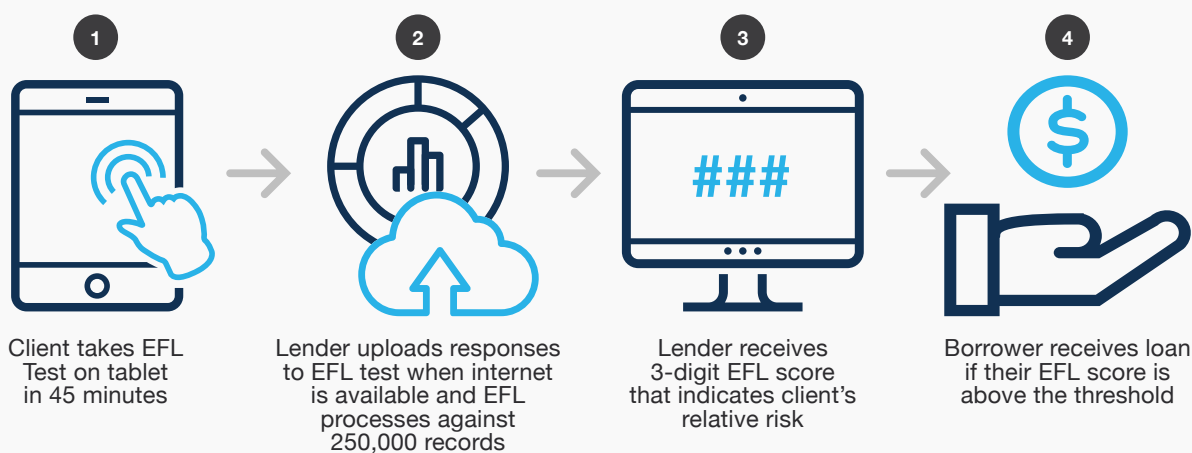
■ First Years and Early Success

PREPARATION

EFL's technology, an interactive test on a tablet computer, was the epicenter of the pilot and the key to predicting the likelihood the entrepreneur would repay their loan. The rules of the game: if a client scored above a certain score cut-off on the test they could use their test score as a form of collateral and receive a loan without providing a fixed asset as collateral (See Exhibit 5). Clients who already had collateral could also take the test to qualify for a larger loan size.

EXHIBIT 5

EFL Questionnaire Administration and Scoring

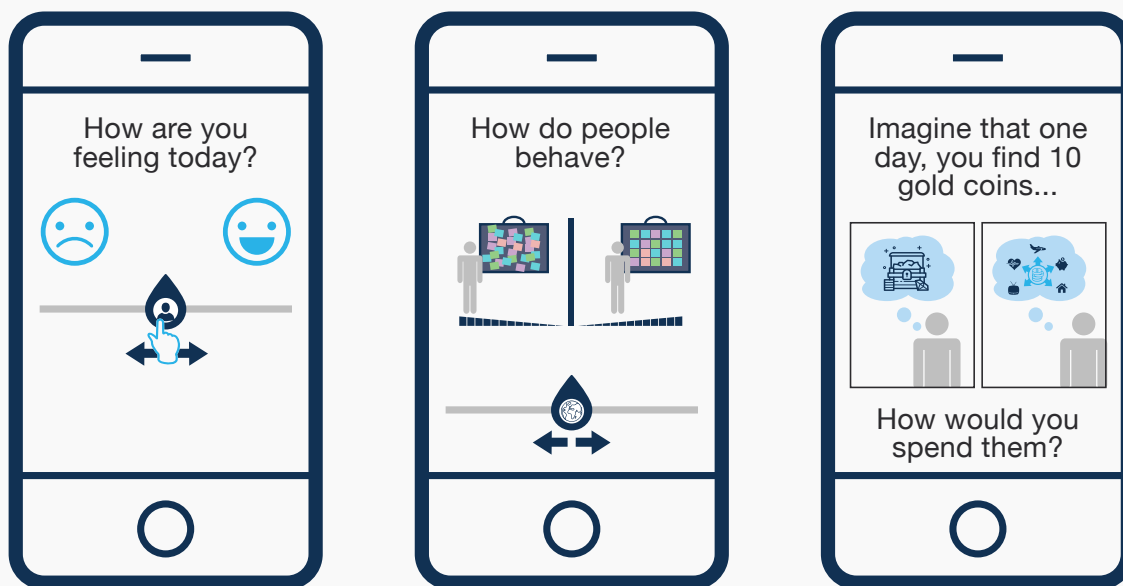


Although the psychometric test had been used in many other contexts, Ethiopia's context was unique and required significant adaptation. In addition to translating the test into Amharic, EFL worked to include more visuals and interactive exercises, since the ACSI microfinance client population had low literacy levels. Other adaptations were also needed to ensure that the test was as concise and easy-to-follow as possible, since the population had limited familiarity with digital technology (See Exhibit 6).

Adjustments were guided by the over-arching principle that the test should be quick, data-rich and text-light. The test needed to have a maximum time associated with each exercise and each exercise had to capture multiple traits in order to obtain as much information in as little time as possible.¹⁵ These adaptations involved some significant shifts in the content of EFL's test, but ultimately helped EFL to engage in other low-tech, low-literacy contexts globally over the following years.

15 Meade, Kyle. "From SME to Micro: Developing New Content for the BOP", EFL Global, 2 Mar. 2015, www.eflglobal.com/efl-microfinance/.

EXHIBIT 6 EFL Psychometric Test Question Examples



PRE-PILOT

The pre-pilot phase began in March 2015 in two ACSI branches in the town of Bahir Dar, close to ACSI's headquarters. The purpose of this phase was to help the team understand the challenges staff and clients could face in implementing the tool and how to appropriately set the loan terms before scaling up to additional branches.

During the pre-pilot phase, 420 tests were administered and 133 clients received loans. To administer the test, EFL purchased tablets, pre-paid SIM cards and airtime for each of the credit officers. An agreement was made at this time that only clients serviced in urban branches would be eligible to take the test. The pre-pilot stage enabled ACSI to iron out early implementation issues and determine how the product should be marketed, how to integrate it into existing credit screening processes, and how to ensure ownership of the credit scoring tool by branch-level staff. It was an important phase in enabling ACSI to get familiar and comfortable with the new technology.

VOTE OF CONFIDENCE – THE PILOT STAGE

After a year, the pre-pilot stage expanded to a full pilot phase in a total of 12 branches. ACSI chose to expand to branches that were networked in the core banking software (not all branches were at the time of the pilot) to ease the credit score delivery process. During this stage, 2,496 borrowers took the psychometric credit assessment and 1,132 loans were disbursed using ACSI's standard loan decision-making criteria (See Exhibit 7).

Initially, ACSI was hesitant about relying too much on the psychometric test scores. ACSI's senior management was excited about the potential of the psychometric testing, but wanted more evidence that it could actually predict credit risk in their population. During the pilot phase, therefore, the focus was on testing clients without using the score as the basis for the credit decision. In this way, ACSI could observe how accurate the test was, without taking on any undue credit risk. EFL sponsored a trip for three ACSI deputy managers to visit Janalakshmi Financial Services (JFS), a bank in India that had successfully implemented psychometrics to graduate group borrowers, and develop an individual loan portfolio. This learning experience positively impacted the commitment of the managers to the pilot.

The results of the pilot took time to emerge, partially due to the unique context at ACSI. Across its broader portfolio, ACSI's PAR30 rate (customers with payments due for more than 30 days) was below 2%, with very few borrowers in arrears and almost no defaults. ACSI's strong book was coupled with long loan tenures. In the early months of the pilot, hundreds of loans were disbursed, usually with a 24-month tenor, and almost none of the borrowers went into arrears. However, ACSI knew that customers were more likely to miss payments as the loan term progressed, with more defaults emerging after six months, and the peak number of defaults emerging after 18 months.

As months passed and loans matured, data began to come in on the clients that had taken the psychometric test. Customers who scored higher on the test were seven times more likely to repay their loans compared to lower performing customers (See Exhibit 8). Across customer segments, higher test scores meant better repayment. There was a clear trend between psychometric profiles and loan performance, and the test had proven its value as a tool for predicting credit risk amongst ACSI's borrowers.

Through the pilot phase, ACSI was able to develop a proof of concept, showing that psychometrics could accurately predict which of their borrowers were likely to go into arrears or default. The next step would be to move towards using the psychometrics as a substitute to traditional collateral, and to shift to a model where they psychometric score became the basis of the loan decision.

EXHIBIT 7 ACSI Clients Writing the Psychometric Test with Loan Officers



■ Is Newer Shinier? Some Reflections on Alternative and Traditional Data

One shortcoming in looking at correlations of psychometric scores and loan performance is the potential of an attribution bias, where the scores themselves are masking the effect of other factors which are influencing loan performance. This could lead to overly optimistic conclusions about the value of the psychometric scores in predicting credit risk.

A wide body of evidence shows that, across countries and contexts, age and business experience have been powerful predictors of both business performance and loan repayment. We analyzed the age and years of business experience of the borrowers who took psychometric loans in Ethiopia, in order to compare the predictive value of these variables against the psychometric score of the given sample of borrowers.

When we examine the correlation of the psychometric score with age and business years, we find weak relationships, suggesting that an attribution bias is not at play. However, we still want to understand the value of the psychometric score in relation to other potential predictors of loan performance. In Table 1, we run correlations of our three variables (Age, Business Years, Score) and default. Higher numbers in either direction indicate better predictive power of our variables. We use a 'default at 7 days' variable, as it is the most severe definition at which we have more than 50 defaults.¹⁶

TABLE 1 Correlations of Variables with Default

Default Variables	Age	Business Years	Score	Bad Count
At 1 day	-4.2%	14.4%	-9.6%	116
At 7 days	-7.3%	15.3%	-13.2%	63
At 14 days	-7.8%	12.2%	-12.6%	49
At 30 days	-6.9%	13.2%	-4.6%	21

¹⁶ LenddoEFL typically relies on a minimum of 50 default outcomes to assess a model's predictive power

The most interesting finding is that business years have a positive correlation with default. This means that the older the business, the riskier it is. This is an unexpected result, that could suggest that older businesses take out loans if they are in some sort of trouble, which leads to higher rates of default. While psychometric scores, age, and business experience all correlate with default, the latter two seem less useful from a policy-standpoint, since it would likely be both inequitable and impractical for financial institutions to exclude or differentiate borrowers on the basis of demographic characteristics such as age or years of experience.

While age and business experience do not seem to hold as useful determinants of lending policy on their own, the remaining question is whether the psychometric score adds any value beyond the predictive power of these variables. Table 2 shows statistical regressions on loan performance with and without EFL scores. The regressions use both the EFL score as well as a cutoff of $EFL > 350$ to construct a dummy variable, and test that as a potential predictor of default. These regressions provide a basis to believe that EFL scores are a significant predictor of default probability in addition to individual age and business years.

Overall, our findings suggest that when controlling for age and years of experience, the psychometric score still has value in predicting default. The psychometric score, then, does provide insights into predicted loan performance beyond basic demographic characteristics. However, it's important to recognize that psychometric credit scoring is not a silver bullet that can replace other forms of loan appraisal or substitute tried-and-tested sources of data traditionally relied on by financial institutions. Alternative data shouldn't replace traditional data, but tools such as psychometrics can complement and enhance the ability to predict credit risk in information-scarce environments.

TABLE 2 Regressions on Probability of Default at 7 Days

	(1) Default	(2) Default	(3) Default
Age	-0.0478*** (0.0157)	-0.0312* (0.0161)	-0.0421*** (0.0158)
Business Years	0.107*** (0.0227)	0.116*** (0.0234)	0.113*** (0.0231)
EFL Score		-0.0149*** (0.00426)	
EFL Score Above 350			-0.996*** (0.341)
Constant	-1.095* (0.587)	3.953** (1.541)	-0.511 (0.607)
Observations	818	818	818
Pseudo R-squared	0.058	0.086	0.075

Standard errors in parentheses

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Scaling Up and Its Complications

The move from pilot to scale was laden with complexities, and holds valuable lessons for organizations interested in scaling fintech initiatives. In theory, the tripartite agreement stipulated that ACSI would use the psychometric tool to offer large, unsecured loans to a subset of women entrepreneurs. In practice, although the technology had proven to be predictive, there were several key challenges and trade-offs that ACSI faced in using the psychometric screening tool in this way.

ACSI's evolution into the largest MFI in the country, and one of the largest on the continent, had been premised on a low-cost distribution model, homogeneous product offering, and a high-performing portfolio, with almost no default. While ACSI's leadership was very progressive and had a strong interest in financial inclusion, the organization was also committed to maintaining high repayment rates and absorbing minimal risk. While ACSI slowly began to gain trust in the psychometric screening process, they remained reticent to offer large, unsecured loans against the scores.

A TUMULTUOUS POLITICAL LANDSCAPE

The challenges around the risk of scaling the new psychometric technology were amplified in mid-2016, when civil and political conflict broke out in the Amhara region, where ACSI operates. The conflict broke out just as the pilot phase began to get underway. As a result of the prolonged conflict, late repayments temporarily spiked, as mass closures of businesses, violence, and protests brought the local economy to a grinding halt. As ACSI contended with significant portfolio risk stemming from the conflict, it became more reluctant to roll out the unsecured psychometric loans. Ultimately, the dramatic shift from secured to unsecured lending envisioned by the World Bank team seemed to be a larger leap than ACSI was willing to make in the midst of a portfolio-wide shock.

LEGACY SYSTEMS

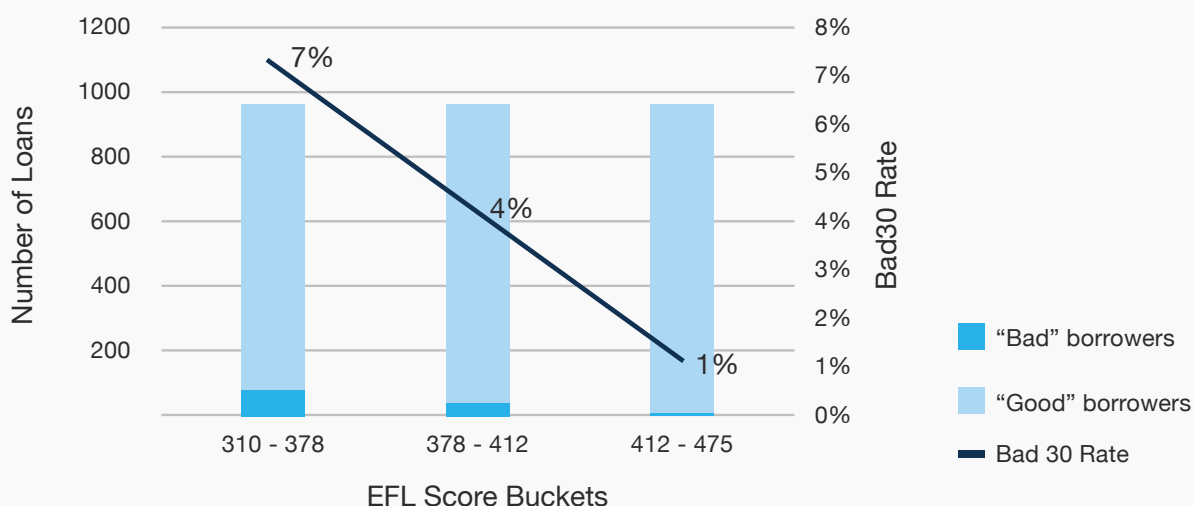
Beyond the concerns about risk, one major operational challenge for ACSI in taking the new technology to scale related to the ability to integrate a new, digital product into an aging and rudimentary IT infrastructure. ACSI had few dedicated IT staff, a dated core banking system, and little connectivity between branches and headquarters. Simple processes, such as reloading sim cards and charging tablets overnight, seemed unusually challenging. More complex processes such as matching loan performance data from ACSI's core banking system with the psychometric score of a given client, required months of effort and extensive trial-and-error. Ultimately, the transition from analog to digital was a slow, belabored process, and is in many ways still a work in progress.

This challenge is not one unique to ACSI. Fintechs and banks around the world are struggling with the integration of technology and the limitations of legacy systems. A survey by Accenture of senior financial services industry executives revealed that 72% feel their bank has only a fragmented or opportunistic strategy to dealing within digital innovation. All of the respondents felt that legacy technology presented an issue to their organization, but only just over half said their bank had a strategic approach to decommissioning this old technology. The overwhelming majority felt that the big challenge for leading banks is their organizational ability to adopt a collaborative approach with new innovators and start-ups.¹⁷ Simply put, for ACSI and for banks around the world, the promise of new technology alone isn't sufficient: organizations need to be committed and connected to technological change.

EXHIBIT 8

Model Performance at ACSI

Bad30 ever at 17 months on book



¹⁷ Skan, Julian. "The Future of Fintech and Banking: Digitally Disrupted or Reimagined?", Accenture, 2015, bankingblog.accenture.com/wp-content/uploads/2015/04/accenture-future-fintech-banking.pdf.

ANALOG OPERATIONS AND HUMAN CENTRIC LENDING

ACSI had traditionally relied heavily on human-centric processes. Loan officers visit clients at their homes and businesses, managers oversee branch processes through daily visits, and communication of priorities is done via written letters and faxes. The introduction of the psychometric technology required a number of organization-wide changes to the credit process to enable unsecured lending.

Organization-wide communications around policy were a key challenge. Since there are no staff email accounts at ACSI, new processes or procedures are communicated through written circulars hand-delivered or faxed to each of ACSI's 440 branches. Messages pass through several layers of the institution before reaching credit officers and clients, and the process is very dependent on word-of-mouth communication. As a result, memorandums about the new psychometric technology were understood in very different ways by different branches and staff. While some of the larger, more visited branches (referred to by ACSI as 'micro-banks') seemed to integrate the technology according to policy, the smaller and more distant branches often had challenges around compliance with the testing process and use of the new scores.

Compliance challenges due to human-centric communications were compounded by a highly hierarchical management structure, typical of large Ethiopian para-statal. The branches which were not complying with the psychometric testing policy often would not alter their practice until receiving multiple, official memorandums. The organizational culture, in which risk of reprimand significantly outweighed rewards for innovation led branch-level staff to be cautious and risk-averse in adopting policy changes. In this way, new processes became complex and time-consuming to realize.

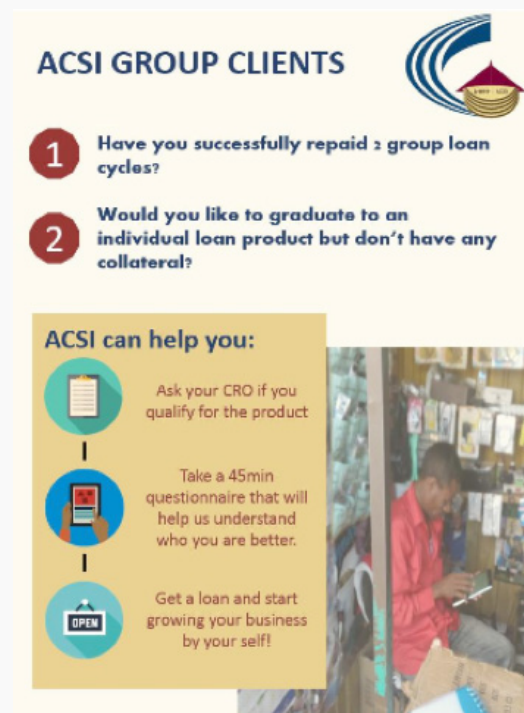
INCENTIVES AND DETERRENTS

The commitment of ACSI's senior leadership to the use of psychometric testing as an alternative to traditional collateral was strong from the outset. ACSI's General Manager and its Board were enthusiastic about being a first-mover in piloting and introducing this new technology, which they felt could address a critical challenge they faced around graduating borrowers from group to individual loans. However, it soon became clear that ACSI's rank-and-file - from branch managers to loan officers themselves - didn't always share this excitement.

For loan officers in particular, the new technology involved an additional workload, as it required them to administer the 45 minute psychometric test and put together extra paperwork for eligible clients. The new psychometric product also posed a direct risk to these loan officers, whose performance was judged on the health of the loans they approved.

Getting branch staff on board required oversight by the World Bank and EFL, extensive training, and careful attention to the needs of loan officers. For example, loan officers were initially having difficulty explaining the value of the test and administering it in their already busy work program, so a package of marketing materials was developed for them to communicate more easily with clients about the graduating and lower collateralized products offered (See Exhibit 9).

EXHIBIT 9 ACSI Group Clients Marketing Poster



The poster is titled "ACSI GROUP CLIENTS" and features the ACSI logo, which consists of three blue curved lines above a red roof icon with a yellow sun. Below the title, there are two numbered questions in red circles:

- 1 Have you successfully repaid 2 group loan cycles?
- 2 Would you like to graduate to an individual loan product but don't have any collateral?

Below the questions, a yellow box titled "ACSI can help you:" contains three steps:

- 1 Ask your CRO if you qualify for the product (with a document icon)
- 2 Take a 45min questionnaire that will help us understand who you are better. (with a smartphone icon)
- 3 Get a loan and start growing your business by your self! (with an "OPEN" sign icon)

To the right of the text is a photograph of a man in a red shirt sitting at a desk in a cluttered office, looking at a laptop.

■ Vision and Reality

As issues were addressed and time passed, ACSI became more comfortable and confident with the psychometric technology. They were willing to incrementally adjust how they were using the technology to make loans. These changes included adjusting the score cutoff rate to allow more clients to pass the test and increasing the loan size available with a passing EFL score. While at the start of the pilot many branch level staff were skeptical of the technology, over time they began to trust the tool and see the benefits it offered for their clients. One branch level staff stated, “This product helps and is appropriate to help customers graduate from group to individual loans and bridge the collateral gap.”

With ongoing commitment from ACSI, EFL, and the World Bank team, the technology began to take root. But the utilization of the technology was not as the World Bank team had initially envisioned. Instead of using the psychometric technology as a full replacement for asset collateral, ACSI began to see it as an additional data point on potential borrowers in the credit decision.

Today, though the support from EFL and the World Bank has subsided, ACSI’s branches are continuing to use the tool as a valuable addition to their credit assessment process. In some branches, collateral requirements are being relaxed or reduced for high-scoring borrowers, or loan sizes were increased. In other branches, the test is used to screen trusted group borrowers for the potential to graduate to individual loans (See *Exhibit 10*).

The test became a way for ACSI to improve its appraisal process and provide better products to more borrowers, even if it fell short of becoming a tool to transform ACSI’s underwriting process.

■ Reactions on the Markets

Financial institutions in Ethiopia had initially responded to the idea of psychometric testing with tepid optimism. Most banks and MFIs were curious about psychometrics, but wanted to observe the results at ACSI before committing to the technology themselves. Three years later the spirit has shifted decidedly. Psychometrics have demonstrated the ability to predict credit risk in the Ethiopian market, and have succeeded with one of the country’s largest financial institutions. The technology created a buzz, with multiple MFIs and banks requesting their own pilots.

To respond to the demand, the World Bank team has launched a second psychometric intervention with one of the country’s leading private MFIs, Wasasa. With knowledge built from the ACSI experience the tool is being operationalized better this time around. The MFI underwent a readiness assessment to understand their current capacity to adopt financial technology. This exercise created a detailed roadmap for the financial institution to follow that captures what they need to act on from the start to allow for increased efficiency in their operations and greater insight into credit risk from financial technology.

At the same time, the pilot has sparked a broader interest in the fintech credit screening space in Ethiopia, with global fintechs also beginning to look to the Ethiopian market for the first time. A New York-based fintech firm, First Access, recently designed and launched a first-ever data driven credit screening tool for the Ethiopian market, which will enable MFIs to tap into alternative data from digitized loan files.

EXHIBIT 10 ACSI Client Profile

Abeba produces and wholesales Ethiopian bread (injera). She operates 3 stoves in her compound and sells up to 150 injera each day. After more than 10 years as a group loan borrower at ACSI, she was finally able to take her first individual loan after passing the psychometric test. As an individual borrower, she is no longer constrained by the group loan size limit of approximately \$1000 USD, and can borrow higher value loans. The larger loans are fueling business growth. With the first individual loan she was able to build another room in her compound that she rents out to diversify her income. Despite the transition to individual lending, the social cohesion from the group endures. Many of the former group members are now individual borrowers also, but they work together and take turns to go to the MFI to make monthly repayments on each other’s behalf.

The reaction from Washington has ranged from a spectrum of exuberance to aversion. The team has received dozens of requests from country teams across the World Bank Group to learn more about psychometrics. World Bank operations in Tanzania, Madagascar, and Zimbabwe have explored integrating psychometrics into the design of credit lines and financial sector operations. Others have expressed resistance to psychometric technology and other fintech credit screening tools, due to the infancy of the technology and the portfolio risk it could introduce.

The team's response has been to moderate expectations. The psychometric credit assessment won't work for every financial institution, and can't be implemented overnight. Roll-out of the technology is invariably slow to take root when it must be implemented through loan officers, and is dependent on a number of conditions being in place in a financial institution. Changing the way a bank makes loans takes time, and most lenders are cautious when reforming these fundamentals.

Still, as this case study demonstrates, psychometrics can differentiate risk for borrowers with no information and for many financial institutions it could be a valuable tool for reaching more customers with better-fit services. The technology seems to hold particular value in contexts where the coverage of credit bureaus is low, and where other forms of data are unavailable.

■ Conclusions and Options for the Future

The small pilot of psychometrics in Ethiopia points to broader questions about how the World Bank Group should engage with and support disruptive technologies.

The team hasn't gotten as far as originally imagined, and lending in Ethiopia still remains largely asset-based. The pilot, however, has made notable impacts. Financial institutions in Ethiopia have gained exposure to technologies that improve the appraisal process and expand access to credit. Psychometric assessment has been proven as a viable way to predict and manage credit risk in female Ethiopian small business borrowers. The fintech industry is starting to see markets like Ethiopia as viable destinations, despite the dearth of digital and financial sector infrastructure. And the World Bank team itself has learned a great deal about how to ensure success in the implementation of fintech innovations.

Fintech can be disruptive, and can push the frontiers of inclusion. But like all technology and all change, its introduction must be premised on strong commitment and readiness of the implementing institution, and on a clear vision of how the technology will be used to expand access. The lesson for the World Bank Group is clear: by introducing the right fintech to the right partners, and providing flexible, responsive, long-term technical assistance, we can help transform the credit landscape and further improve access to finance for credit worthy entrepreneurs.



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Full Esteem Ahead?

Mindset-Oriented Business Training in Ethiopia

*Salman Alibhai^a, Niklas Buehren^b, Michael Frese^c,
Markus Goldstein^d, Sreelakshmi Papineni³ and Kathrin Wolf^{a1}*

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a, b, d and e: World Bank Africa Gender Innovation Lab (AFRGIL), 1818 H Street, NW, Washington, DC, 20433. USA.

c: Head of Department of Management & Organization, National University of Singapore (NUS) Business School and Professor at Leuphana University of Lueneburg, Germany.

f: PhD Psychology Leuphana University of Lueneburg, Germany.

Abstract

Is there a mindset gap holding women back in business? Can entrepreneurship training instill a set of attitudes, behaviors, and strategies that are thought to underpin success in business such as motivation, perseverance, and self-confidence? This study conducted two randomized controlled trials to evaluate the effect of mindset-oriented business trainings on the performance of women-owned micro and small enterprises in Ethiopia. The trainings were underpinned by psychology with a mission to foster self-esteem and entrepreneurial spirit. Despite a similar approach, however, the quality of delivery seemed to matter as impacts of the trainings on business performance were mixed. A key channel for an impact on profits is if the training can

actually effectuate the mindset change, with only one training transferring higher levels of entrepreneurial self-efficacy, personal initiative, and entrepreneurial locus of control to the women, relative to a control group. The study finds suggestive evidence that psychological skills and mindset are better inspired by a trainer who previously owned a business themselves and therefore may have a better understanding of the entrepreneurs' specific challenges. The study concludes that psychological skills are important for women's business success, and these skills can indeed be transferred using training, assuming a shared identity match between trainer and student. Service delivery appears to be critical for inculcating these important skills.

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

The Policy Research Working Paper Series disseminates the findings of work in progress to encourage the exchange of ideas about development issues. An objective of the series is to get the findings out quickly, even if the presentations are less than fully polished. The papers carry the names of the authors and should be cited accordingly. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the views of the International Bank for Reconstruction and Development/World Bank and its affiliated organizations, or those of the Executive Directors of the World Bank or the governments they represent.

Produced by the Research Support Team


1 Introduction

Our mindset is related to our beliefs about our ability, which create a whole mental world for us to live in and our entire perception of attainable opportunities. Simply put, if we do not believe we can do something, we are less likely to try it, and to do it well, regardless of our capabilities. In the context of entrepreneurship, women are found to underestimate their capabilities and possess a greater fear of failure than men (Kelley et al., 2017). While men are not exempt from doubting themselves, women frequently are responding to messages they received from the world around them about who is and is not supposed to lead and take risks. The natural result of lower self-confidence is inaction and as women navigate the business environment with fewer role models to imitate they may set internal limits on what they can achieve.

Mindset-oriented entrepreneurship trainings are gaining momentum that aim to change the mindset of entrepreneurs as a precondition to effect entrepreneurial behaviors and to achieve better economic results e.g. by becoming more innovative and differentiating their firms from competitors (Frese & Gielnik, 2014). A recent study in Togo showed that Personal Initiative (PI) training—a mindset-oriented training program that develops key behaviors associated with a proactive entrepreneurial mindset—delivered large and lasting improvements for both male and female business owners (Campos et al., 2017).

This paper offers a rigorous evaluation of three mindset-oriented entrepreneurship training curricula offered to women entrepreneurs in Ethiopia.² In the first experiment, the PI training, delivered through Technical and Vocational Education Training (TVET) colleges in Addis Ababa, Ethiopia is compared to a more traditional business training, called Basic Business Skills and Entrepreneurship Development (BSED), that focuses on teaching managerial skills with some psychological competencies. In a second experiment, we

² The sample of women entrepreneurs are part of the World Bank's Women Entrepreneurship Development Project (WEDP). The WEDP seeks to support growth-oriented women entrepreneurs owning micro- and small- businesses in Ethiopia by facilitating access to finance and entrepreneurial training and advocacy (World Bank, 2017).



evaluate an entrepreneurship training offered by the Digital Opportunity Trust (DOT), a social enterprise, to women entrepreneurs in Mekelle, Ethiopia.

Entrepreneurship trainings constitute a popular approach to support women entrepreneurs to increase their business success and catch up with male business owners (Coduras Martínez, Levie, Kelley, Saemundsson, & Schott, 2010; McKenzie & Woodruff, 2014). Traditionally, entrepreneurship trainings have focused on business knowledge transfer, often with a particular emphasis on the improvement of financial practices (Drexler, Fischer, & Schoar, 2014; Frese, Gielnik, & Mensmann, 2016). However, existing trainings are highly heterogeneous and evidence on whether entrepreneurship training positively affects women entrepreneurs' performance is limited (McKenzie & Woodruff, 2014). In addition, little is known about the conditions under which entrepreneurship training is effective and the specific mechanisms of different types of entrepreneurship training (Anderson-Macdonald, Chandy, & Zia, 2016).


Most likely, different types of entrepreneurship training lead to different kinds or degrees of training outcomes (McKenzie & Woodruff, 2014). Evidence shows that traditional business trainings increase business knowledge and practices (Cho & Honorati, 2014; McKenzie & Woodruff, 2014), whereas psychological training interventions promote entrepreneurial self-efficacy, goal intentions, action planning and knowledge, opportunity identification (Gielnik et al., 2015), and personal initiative (Glaub, Frese, Fischer, & Hoppe, 2014). Whereas business knowledge and practices rarely translate into higher profits and sales (Cho & Honorati, 2014; McKenzie & Woodruff, 2014), there is initial evidence that personal initiative, referring to self-starting, future-oriented and persistent behavior, increases entrepreneurs' economic performance (Campos et al., 2017; Glaub et al., 2014).

The PI training is an action-based entrepreneurship training that focuses on helping entrepreneurs develop their personal initiative by training them to actively approach their environment, to think about longer-term horizons, and to overcome barriers and deal with failure (Mensmann & Frese, 2017). Developed by psychologists, the action-oriented approach to entrepreneurship training relies on knowledge about the psychology of entrepreneurship, and ultimately aims to encourage entrepreneurs to show proactive

behavior. It starts with the development of an active mindset through action principles (Glaub et al., 2014), which is then refined and routinized with active practice and feedback during the training (Mensmann & Frese, 2017). The BSED training focuses on more traditional business skills but also seeks to develop a creative mindset. The entrepreneurship training programs offered by DOT are called StartUp! and ReachUp! and take an innovative approach to entrepreneurship development, with a mission to “help entrepreneurs learn basic technology and business skills, and to foster the self-esteem and entrepreneurial spirit needed to build sustainable livelihoods”. The DOT training focuses on building the life skills and mindset shift required of aspiring entrepreneurs to set and reach their goals.

The results from two randomized controlled trials (RCTs) that evaluate the effectiveness of these mindset-oriented trainings are mixed. The impact results reveal that only the DOT training in Mekelle achieved a positive statistically significant impact on monthly profits, measured one and two years after the training. For the PI and BSED trainings in Addis Ababa we find no evidence of an impact on profits or other measures of business performance, one and a half years after the training. The key channel of influence on profits in the DOT study seems to be through a mindset shift since we find evidence of higher average levels of entrepreneurial self-efficacy, personal initiative and entrepreneurial locus of control among the women who were trained one year post the training, relative to a control group. Entrepreneurial self-efficacy refers to one’s own belief in their entrepreneurial competences; and entrepreneurial locus of control refers to a sense of control over one’s business and the business environment in which they operate. We find no evidence of an impact on business practices such as improved book-keeping or marketing; or knowledge outcomes. In the PI and BSED trainings this mindset channel link is missing since we find no evidence of an average impact on the psychological outcomes included in the survey.

The lack of impact of the PI and BSED trainings in Ethiopia on psychology we hypothesize to be related to the implementation of the program. In Ethiopia existing skills development opportunities for entrepreneurs are offered mainly through government TVET colleges which provide classroom-based training on fixed schedules to large groups. The TVET system in Ethiopia is designed as a low-cost/high-



scale model. On closer inspection of the implementation features of the PI/BSED trainings in Ethiopia, we find suggestive evidence that the role of the trainer appears to be key.

Much of the education literature within economics on teacher characteristics focuses on the relationship between specific teacher attributes (such as experience or education) and student achievement and has few consistent findings (Hanushek 2006). From a synthesis of more than 800 meta-analyses, Hattie (2008) suggests that the individual competence of the teacher, in bringing the material to the students, is most important. For example: being able to explain well, encouraging the students to try things out, encouraging meta-cognition in the students, providing quick feedback, and other facets. All structural characteristics (like class size) or how well the subject knowledge of the teacher was (or how well-studied) were not as important. In this paper we use detailed trainer characteristics and data from the participants of the PI/BSED study to analyze a range of teacher attributes that may have mattered for the women entrepreneurs who took the training.³ We find a statistically significant positive association between student psychological constructs of empowerment, such as locus of control, self-efficacy, and personal initiative and the trainer having a history of entrepreneurship him- or herself. Since only 41% of the TVET trainers reported they ever owned a business we believe this mismatch between the trainers and entrepreneurs was critical for the lack of overall impact.

The TVET trainers' limited exposure to the world of entrepreneurship may be one of the major barriers to successfully train women entrepreneurs on these psychology-focused skills. Perhaps those trainers with their own exposure to entrepreneurship have a better understanding of the target group and are more likely to provide relevant practical examples. These trainers may also be perceived as those who have already circumvented some of the issues that these women entrepreneurs are facing and are therefore perceived as more inspiring and influential role models to them.⁴ Qualitative analyses of trainers' teaching behavior

³ The results section includes a discussion and tests to address possible concerns on the non-random allocation of students to trainers.

⁴ Since we did not collect data on the trainer characteristics of the DOT trainers we were not able to replicate this analysis for the DOT study. The DOT model operates as a social enterprise for youth and uses “interns” to deliver the trainings. The DOT trainers

provide some initial support for this line of reasoning. When it comes to imparting mindset changes and psychological skills to entrepreneurs, instructors with some personal exposure to entrepreneurship seem to be better equipped than others.

In addition, while the TVET college system boasts infrastructure to provide entrepreneurial trainings at scale and may be helpful for youth, unemployed and start-up entrepreneurs; growth-oriented women entrepreneurs, such as those targeted by the Women Entrepreneurship Development Project (WEDP)⁵ are less likely to be attracted to participate. The take-up of training for the PI/BSED trainings in Addis Ababa was 41% and for the DOT training in Mekelle it was 52%. Although, this is a fairly typical take-up rate found for other entrepreneurship trainings in comparable contexts (McKenzie & Woodruff, 2014), all three training programs in Ethiopia attracted the smallest and lowest performing businesses among those to whom the training was offered. While these classroom-based trainings present an opportunity for women to self-reflect on their own patterns of behavior, meet other business-owners to discuss challenges, and offer advice and encouragement to one another on how best to overcome problems, they may be missing out on the women entrepreneurs who have the higher growth prospects.

The paper is organized as follows. Section 2 outlines details of the trainings and section 3 describes our main data source and empirical strategies. Section 4 presents the results, including: characteristics of women who take up the trainings; a discussion of the relationship between psychology and economic success; impact of both the PI/BSED and DOT studies; and an analysis of the relationship between the characteristics of the trainer and student psychological outcomes. Section 5 concludes.

are graduated youth, not more than 25 years old, with any BA degree education background. The selection process of trainers is competitive and passed through intensive assessment; document review, interview, practical assessment and ICT skill. DOT may be accessing some of the best and brightest young teachers and therefore may prove good role models to encourage active behavior.

⁵ Launched in 2012, WEDP is a World Bank project that aims to increase the earnings and employment of micro and small enterprises fully or partly owned by female entrepreneurs in six selected cities. Women interested in participating in WEDP and fulfilling the criteria for project beneficiaries (not full time in school and being growth oriented) receive a WEDP membership card that entitles them to access WEDP services. The WEDP targets a specific group: growth-oriented female entrepreneurs, defined as female entrepreneurs with the ambition and potential to expand their micro-enterprises, innovate, and generate paid employment.

2 Psychological Training Types

In this paper, we compare the impact of three entrepreneurship trainings that incorporate psychological training elements to different degrees. Despite these training programs being offered in different cities and having varying curricula; there are significant overlaps. They all emphasize setting goals, developing plans to reach those goals and using innovative approaches; along with a strong focus on developing one's own approach as a firm owner rather than just emulating others.

Personal initiative (PI) training is an entrepreneurship training that focuses on changing the psychological mindset of the entrepreneur. It is based on action regulation theory (Frese & Zapf, 1994) and aims to promote personal initiative throughout the entrepreneurial process. Personal initiative refers to self-starting, future-oriented and persistent behavior (Frese & Fay, 2001) and has been shown to be an important predictor of entrepreneurial success (e.g. Campos et al., 2017; Glaub et al., 2014). The training starts with the development of a proactive mindset through evidence-based action principles which is then refined and routinized with active practice and feedback during the training (Mensmann & Frese, 2017). At the end of the training, participants develop a personal project that facilitates the transfer of the mindset and skills developed during the training to their own business (Frese et al., 2016).

Business Skills and Entrepreneurship Development (BSED) training was developed based on a training needs assessment with women entrepreneurs in Ethiopia. It is a holistic training that predominantly teaches traditional business skills but also uses psychological elements. Traditional business skills promoted by BSED training include financial literacy, marketing, production and workplace management, purchasing and bookkeeping, business plan development, and legal rights and regulations. On the psychological side, the training seeks to develop a creative mindset that helps to identify and develop innovative business opportunities. The training draws on experiential learning methods, role plays, and simulation games and exercises to transmit the training content. In addition, BSED training addresses gender-related challenges faced by women entrepreneurs and teaches corresponding coping mechanisms. To deliver the training, BSED trainers were provided with an extensive training manual but were free to choose the contents for

each group of participants. That implies that BSED training might have considerably differed from trainer to trainer and training to training.

The StartUp! and ReachUp! trainings, developed by the social enterprise Digital Opportunity Trust (DOT), seek to foster entrepreneurs' self-esteem and entrepreneurial spirit. They aim to encourage a lifelong learning process by facilitating an entrepreneurial learning cycle, starting with one's experience in the classroom, followed by its reflection, generalization, and application. DOT Ethiopia delivered both the StartUp! and ReachUp! entrepreneurship trainings to WEDP women entrepreneurs. Using a youth-led delivery model, DOT equips young university graduates – DOT interns - to serve as facilitators and coaches of DOT's entrepreneurship training. Upon recruitment, DOT interns are enrolled in a three-week Intern Learning Experience (ILE) training program to gain skills in ICT, entrepreneurship, facilitation, coaching, leadership and gender equality. Following the ILE, DOT interns are deployed to deliver DOT's empowerment and entrepreneurial training to youth and women in their communities. The interns guide participants through concept formulation, business planning, market assessment and testing. There is also an emphasis on the use of technology to operate and expand a business.

3 Data and Empirical Strategy

3.1 DATA

In this paper, the sample of women-owned enterprises were drawn from the registration database of the Women Entrepreneurship Development Project (WEDP). WEDP is the World Bank's International Development Association (IDA) funded program that provides loans and entrepreneurship training to growth-oriented female entrepreneurs in Ethiopia. The WEDP clients register their business at their nearest One Stop Shop, a local government branch created to support small businesses. The study entrepreneurs are a relatively homogeneous group of urban, growth-oriented women entrepreneurs. The average age of women business owners in our sample was mid-30s with 60% married and 70% having completed secondary school education or higher in Mekelle and 85% in Addis Ababa. The average age of the business was 6 years and retail was the main sector of business operation with approximately 50% of the sample in retail, 20% in café and restaurants and 7% in beauty salons.

3.1.1 DOT study

For the DOT training experiment, the impact evaluation team drew upon the WEDP registration database of clients in Mekelle only and randomly assigned 800 women entrepreneurs to either a treatment group (399) who were offered the DOT training immediately or a control group (400) who had to wait before being offered the training.⁶

The baseline data collection was conducted in October and November 2014 and the questionnaire contained a set of questions on household demographic characteristics, socioeconomic status, business sales, profits, costs, employees, entrepreneurial profile (e.g., age, place of birth, education level), and questions designed to elicit an entrepreneur's business knowledge and level of financial literacy. The DOT training was offered

⁶ The final sample size in the DOT study was 799 rather than 800 since one firm was incorrectly duplicated in the sampled list of firms.

from January 2015 in half-day sessions over a period of 15 to 20 days, so that entrepreneurs could complete the training while continuing to attend to their businesses.


From January to March 2016, approximately one year after the treatment group were offered the training, the research team resurveyed the 799 entrepreneurs. Follow-up I survey was conducted with 729 female entrepreneurs who were tracked out of the entrepreneurs already interviewed at baseline. An additional follow-up II survey for 726 entrepreneurs was administered in February-March 2017, approximately two years after the training. The panel of firms with data collected across the three survey rounds is 680 firms. The follow-up survey questionnaires elicited business performance, business practices plus additional entrepreneurial and psychological characteristics of the female business owners. The main results in this paper are an intention-to-treat (ITT) estimation, i.e. the impact of being offered training.

3.1.2 *PI/BSED study*

For the PI/BSED training experiment, the impact evaluation team drew upon the WEDP registration database of clients in Addis Ababa only and randomly assigned 2,001 women entrepreneurs to the different treatment arms. The research team randomly assigned WEDP clients into a treatment group who were offered the PI training (747), a treatment group who received BSED training (757) and a control group (497) who were not offered training for at least one year.⁷

From the registered WEDP clients in Addis Ababa the research team excluded all those who were already part of the overall WEDP program impact evaluation and those who had reported that they already received some form of business training in the registration database. The research team randomly selected the original 2,000 names from the WEDP registration database in Addis Ababa using Stata in November 2015 when the random sampling for the experiment was initiated.

⁷ Since the survey firm faced issues with locating all the women in the original WEDP registration list, the survey firm was provided with replacement names and instructed to survey until they reached a 750 PI, 750 BSED and 500 Control sample size.



The baseline data collection for the impact evaluation of the PI/BSED training experiment began in November 2015 and ended in April 2016 as interviews were done on a rolling basis before the entrepreneurs attended a training batch. As a first step, enumerators phoned each female entrepreneur in the list to establish the existence and location of the business since WEDP registration data were somewhat outdated. Baseline data were collected over a 6-month period to tie-in with the implementation of all the training rounds. For each training round approximately 50 women assigned to both the PI and BSED treatment groups were interviewed for the baseline survey and then once the interview was complete the enumerator told the respondent that they were to be offered a training based on the randomization result. Enumerators from the survey company pitched the benefits of the training to the WEDP clients who were invited to attend a training using fliers, a lottery, and successful case studies as examples to motivate take-up among the invited group of entrepreneurs. A baseline survey was administered to the control group concurrently with the treatment groups but when the interview was complete no training was offered.

The follow-up survey was conducted between May and September 2017, approximately one and a half years after the training was received. The timing of the interviews attempted to mimic the timing of the baseline surveys by visiting localities of respondents who were surveyed first during the baseline survey and then moving to localities in sequence. All rounds of data collection included questions on household demographic characteristics, socioeconomic status, business performance measures, business practices and extensive questions on a range of entrepreneurial and psychological characteristics.

3.1.3 *Trainer Surveys*

The trainer surveys targeted teachers of six TVET colleges and the TVET agency in Addis Ababa who had been trained as trainers for both PI and BSED training. The interviews were conducted by two trained enumerators between August and October 2015 before implementation began. The original trainer sample was 29 trainers but only 21 trainers (5 PI, 16 BSED) who remained throughout the rounds are included in

this study. Since BSED training was occasionally delivered by two trainers, in order to match one trainer per female entrepreneur, we decided to only include the characteristics of the trainer named first in the corresponding training lists. We consider this as a conservative approach, even if we were to think the weaker trainer was named first then this implies that any suggestive training effects would be underestimated in our analysis. Conversely, if we think the stronger trainer was named first in the list then we assume that the presence of one strong trainer in the classroom was sufficient even if the training was jointly delivered with a weaker trainer. Thus, the final sample includes 17 trainers (5 PI, 12 BSED).

Figure 1–Timeline of the Surveys and Interventions



3.2 EMPIRICAL STRATEGY

The following section presents the strategy we will use to estimate treatment effects for each RCT study. For those outcomes in which the same question was asked in both the baseline survey and follow-up surveys, our main specification will be an ANCOVA specification (following McKenzie, 2012).

3.2.1 DOT study

Our primary specification is an intention-to-treat (ITT) analysis using the two follow-up rounds. For outcome Y we then estimate the following OLS equation for firm i at time t:

$$y_{it} = \alpha + \beta_1 DOT_{1i} + \beta_2 DOT_{2i} + \beta_3 y_{0i} + \gamma \text{time} + X'_{0i} \beta_4 + \varepsilon_{it} \quad (E1)$$

Where y_{it} is the outcome variable measured at both follow-up survey I and follow-up survey II. DOT_1 and DOT_2 are dummy variables taking the value of one if the firm was assigned to the DOT treatment group, at

follow-up I and follow-up II respectively. The coefficients β_1 and β_2 will measure the intent-to-treat effect of being assigned to the DOT treatment compared to the control group. y_{0i} is the baseline value of the outcome variable. X'_{0i} is a vector of baseline control variables. $time$ is a dummy variable taking the value of zero for the follow-up I period and one for the follow-up II period. In cases when a control variable is missing, its value is set to zero and a dummy variable is included for whether the variable is missing. ε_{it} is the error term.

3.2.2 PI/BSED study

The regression specification for the PI/BSED study is also an intention-to-treat (ITT) analysis using the one follow-up round of data and includes the lag of the dependent variable. For outcome Y we then estimate the following equation for firm i at time t :

$$y_{it} = \alpha + \beta_1 PI_i + \beta_2 BSED_i + \beta_3 y_{0i} + X'_{0i} \beta_4 + \varepsilon_{it} \quad (E2)$$

Where y_{it} is the outcome variable measured at follow-up I. PI_i and $BSED_i$ are dummy variables taking the value of one if the entrepreneur was assigned to the PI training or the BSED training treatment groups, respectively. The coefficients β_1 and β_2 will measure the intent-to-treat effect of being assigned to the PI or BSED training groups respectively, compared to the control group who did not receive training. y_{0i} is the baseline value of the outcome variable. X'_{0i} is a vector of control variables. In cases when a control variable is missing, its value is set to zero and a dummy variable is included for whether the variable is missing. ε_{it} is the error term.

E1 and E2 will provide the intent-to-treat (ITT) effect which is the effect of being offered to participate in the training among the experimental sample.⁸ For the outcomes for which we have follow-up data only we

⁸ In addition to intention-to-treat (ITT) analyses we ran a two-stage least squares (2SLS) estimation to estimate the local average treatment effect (LATE) where we instrument the actual participation in the training program with the random assignment to the treatment group. This measure of the treatment-on-the-treated (TOT) gives an estimate that controls for non-compliance with treatment assignment (i.e. for the lower than 100% take-up). LATE estimates are not presented in the regression tables since they did not offer any new information than that provided by the ITT estimates.

will use an ordinary least squares regression model (OLS) and otherwise ANCOVA where we have the outcome variable measured at baseline. All variables denominated in Ethiopian Birr are winsorized at the 99th percentile to deal with the possibility of sensitivity of the results to outliers.

3.2.3 Role of the trainer

The regression specifications for the analysis of trainer characteristics in the PI/BSED study take the form:

$$StudentPsych_{1i} = \alpha + \beta_1 TrainerChar_{0tr} + \beta_2 StudentPsych_{0i} + \varepsilon_{it} \quad (E3)$$

Where $StudentPsych_{1i}$ are psychological outcomes (e.g. personal initiative, self-efficacy, error competence, entrepreneurial identity and locus of control) of student i measured at follow-up I, 1.5 years after the training. $TrainerChar_{0tr}$ are a set of characteristics for trainer tr such as: age, gender, tenure, experience, cognitive and noncognitive skills and job satisfaction. The coefficients β_1 measure the correlation of the trainer characteristics with student psychology among those who participated in the PI or BSED trainings. $StudentPsych_{0i}$ is the baseline value of the student's psychology outcome variable. Standard errors are clustered at the classroom and training round level (the six TVET colleges where the trainings took place had multiple training rounds where the student could have attended a training). ε_{it} it is the error term.

Tables 1 and 2 provide a summary of the training interventions and details of the study.

Table 1–Details of the Training Interventions

Trainings:	DOT (1)	PI (2)	BSED (3)
Training development	Focus is on building the life skills and mindset shift required of aspiring entrepreneurs to set and reach their goals.	Theory-based (action-regulation theory)	Training needs analysis with women entrepreneurs in Ethiopia
Level of psychological mindset training	Medium	High	Low
Degree to which training targets mindset changes	Main focus on the development of self-confidence and an entrepreneurial mindset	Main focus on the development of a proactive mindset	Business skills training that seeks to create a creative mindset
Methods to initiate mindset changes	Entrepreneurial learning cycle (Experience à Reflect à Generalize à Apply)	Exercises and cases guided by Action Principles, emphasis on positive and negative feedback and learning from errors	Experiential learning
Training content	<p>Content:</p> <ol style="list-style-type: none"> 1) Identifying your strengths, skills and passions. 2) Envisioning your future, setting goals, planning a sustainable livelihood. 3) Improved ICT, business, and employability skills – problem solving, critical analysis, and self-confidence. 4) Connections to peers, local support networks, employers, and digital and financial services. 5) Group coaching to address common challenges and support the development of peer networks. 6) Developing a fundamental attitude shift that develops an individual's inner strengths and passions – resulting in increased self-esteem, self-reliance, and the self-confidence to look ahead positively. 	<p>Content (all modules obligatory):</p> <ol style="list-style-type: none"> 1) Being self-starting 2) Opportunity identification and innovation 3) Goal setting 4) Financial and action planning 5) Feedback 6) Overcoming barriers 	<p>Content selected by the trainer from the following modules:</p> <ol style="list-style-type: none"> 1) Getting Started: Appetizer and Energizers 2) Expectation and Commitment Building 3) Financial Literacy and Financial Transaction in Business: Cost and capital 4) Behavioural Skills in Entrepreneurship 5) Business Skills development 6) Challenges in Business – Performance improvement and Growth of the Business 7) Creativity and Product Development for Competitiveness 8) Sales and Marketing 9) Production and Workplace management 10) Purchasing 11) Book Keeping 12) Registration and Taxation in Business and Cooperatives 13) Gender Management in Business and Women Empowerment: Coping mechanisms and strategies 14) Action Plan
Trainees	Women owning or partly owning a business, having a business license, and being registered at WEDP	Women owning or partly owning a business, having a business license, and being registered at WEDP	Women owning or partly owning a business, having a business license, and being registered at WEDP
Training duration	Approx. 30-hour course offered in half-day sessions over a period of 15 to 20 days. ReachUp! Course is 120hours.	Approx. 40 h (10 half days)	Approx. 40 h (10 half days)
Training location	Mekelle, Ethiopia in Business Development Service (BDS) Centres	Addis Ababa, Ethiopia in six TVET colleges (Akaki, Entoto, G. Wingate, Misrak, Nefas Silk and Teqbareid)	Addis Ababa, Ethiopia in six TVET colleges (Akaki, Entoto, G. Wingate, Misrak, Nefas Silk and Teqbareid)
Trainers	Graduates employed as "interns" at DOT	Teachers of TVET Colleges in Addis Ababa	Teachers of TVET Colleges in Addis Ababa
Training cost	Free	Transport stipend only	Transport stipend only

Table 2—Study Details

Trainings:	DOT	PI	BSED
	(1)	(2)	(3)
Baseline survey date	October - November 2014	November 2015 - April 2016 (rolling)	November 2015 - April 2016 (rolling)
Intervention start date	January 2015	December 2015 - June 2016 (rolling)	December 2015 - June 2016 (rolling)
Panel data	Yes	Yes	Yes
Intervention end date	March 2015	June 2016 (final batch)	June 2016 (final batch)
Unit of randomization	800 female-owned firms	2,001 female-owned firms	2,001 female-owned firms
Follow-up I survey dates	January - March 2016	May - September 2017	May - September 2017
Follow-up I survey sample size	729	1,777	1,777
Follow-up II survey dates	February - March 2017	n/a	n/a
Follow-up II survey sample size	726	n/a	n/a
Panel response rate	85%	89%	89%
Time between training and follow-up I	12 months	18 months	18 months
Time between training and follow-up II	24 months	n/a	n/a
Training take-up in treatment	52%	41%	39%
Randomization process	Across firms	Across firms	Across firms
Treatment sample size	400 DOT training; 400 control	747 PI training; 757 BSED training; 497 Control	747 PI training; 757 BSED training; 497 Control
Business closure rate, follow-up I	13%	16%	16%
Business closure rate, follow-up II	22%	n/a	n/a

4 Results

Before presenting the impact results of the training, we first analyze characteristics of the women that took up training and examine the relationship between psychology and economic success.

4.1 WHO TAKES UP TRAINING?

The initial self-reported interest in business training was high (over 90% said they were interested in attending entrepreneurship training during the baseline surveys) but actual take-up was lower: 52% for DOT training in Mekelle and 41% for PI/BSED trainings in Addis Ababa. The take-up rates correspond to rates found for other entrepreneurship trainings in comparable contexts (cf. McKenzie & Woodruff, 2014). The most common reason given for why a business owner did not take-up training was because they were “not able to find the time”.

We find that women who take-up training are systematically and significantly different from those who were offered training but did not participate. Table 3 presents the t-test statistics for the differences in means among these groups for both studies (see columns (4) and (8)). The take-up rate for the DOT training among the treatment group was 52%. Table 3 Column (4) shows that those who select into entrepreneurship training in Mekelle seem to be the women entrepreneurs who have smaller and less profitable businesses (we find statistically significant lower monthly profits and capital stock at business start). The women who attended the DOT training also differed on a number of characteristics: they are slightly older with lower educational attainment and digit-span scores (proxy for memory recall) than those who do not attend. These women also had lower household asset wealth and were less likely to save in a bank at baseline.

Similarly, the average take-up rate for the PI/BSED study in Addis Ababa was 41%. Table 3 Column (8) presents a similar pattern to the DOT sample where those who attend the training seem to have smaller and less profitable businesses at baseline (we find statistically significant lower profits, sales, employees and starting capital stock). From Table 3 we can also see that the sample of WEDP businesses in Addis Ababa,

the capital of Ethiopia, are, on average, approximately double the size of the WEDP businesses studied in Mekelle.

The selection into the training suggests that women entrepreneurs who choose to take-up business training in Ethiopia are either those who believe they need more help with their business operations and/or those who have a lower opportunity cost of attending a 10/20-day classroom training program, since their businesses are smaller and less profitable.

Table 3–Characteristics of the Trainees

Test of differences of training participants and non-participants	DOT study				Diff. in Means (2)-(3)	PI/BSED study		
	Mean for the DOT study sample	Participated in the training	Offered but did not participate	Mean for PI/BSED sample		Participated in the training	Offered but did not participate	Diff. in Means (6)-(7)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age of Owner (years)	33.22 (8.06)	34.81 (8.29)	32.62 (7.89)	2.18*** (0.64)	35.84 (8.92)	36.53 (8.39)	35.28 (9.53)	1.24*** (0.48)
Digitspan score (0-7)	2.27 (1.19)	2.11 (1.14)	2.34 (1.20)	-0.23** (0.10)	2.82 (1.28)	2.84 (1.28)	2.77 (1.24)	0.07 (0.07)
Education Secondary or Tertiary	0.69 (0.46)	0.59 (0.49)	0.73 (0.45)	-0.13*** (0.04)	0.86 (0.35)	0.88 (0.32)	0.85 (0.35)	0.03 (0.02)
Number of hours worked per week	74.70 (22.61)	73.49 (22.07)	75.16 (22.81)	-1.66 (1.80)	49.37 (25.95)	50.08 (26.08)	49.17 (25.91)	0.91 (1.36)
Log monthly profits	7.13 (2.48)	6.72 (2.54)	7.29 (2.45)	-0.57*** (0.20)	7.82 (2.90)	7.70 (2.72)	7.95 (2.93)	-0.25 (0.15)
Average monthly profits (Birr)	4828.31 (8066.32)	3536.41 (6850.48)	5317.07 (8435.10)	-1780.66*** (646.13)	11712.35 (18983.62)	8892.91 (14064.04)	13546.24 (21681.07)	-4653.33*** (1006.88)
Average monthly revenues (Birr)	40479.77 (111616.49)	31055.05 (101716.00)	44053.52 (115031.66)	-12998.47 (8933.27)	63460.81 (139363.11)	47876.61 (105969.80)	72259.66 (151643.19)	-24383.04*** (7178.31)
Revenues in a typical month (Birr)	45457.03 (120781.41)	41710.24 (124061.49)	46876.86 (119595.08)	-5166.62 (9654.83)	239071.81 (647762.50)	188272.56 (554187.00)	272355.81 (722679.19)	-84083.26** (35536.40)
Average monthly business costs (Birr)	36685.54 (95958.52)	29435.45 (91919.84)	39388.74 (97360.30)	-9953.29 (7629.12)	66297.74 (139552.83)	54334.82 (118415.95)	75856.45 (153679.20)	-21521.62*** (7344.93)
Number of employees	1.40 (2.47)	1.17 (2.19)	1.49 (2.57)	-0.32 (0.20)	4.40 (7.47)	3.88 (6.02)	4.99 (8.73)	-1.12*** (0.41)
Capital stock at business start (Birr)	44907.83 (153288.52)	22363.58 (53616.98)	54296.85 (178360.81)	-31933.27** (13662.18)	296180.59 (988730.38)	271736.13 (1011316.44)	342888.44 (1068306.00)	-71152.31 (54731.53)
Save in a bank	0.62 (0.49)	0.54 (0.50)	0.64 (0.48)	-0.10** (0.04)	0.63 (0.48)	0.61 (0.49)	0.62 (0.49)	-0.01 (0.03)
Household Asset Index (0-8)	5.67 (1.35)	5.47 (1.34)	5.74 (1.35)	-0.27** (0.11)	6.58 (1.20)	6.46 (1.23)	6.64 (1.20)	-0.17*** (0.06)
Joint test				0.01				0.01
Number of Observations	799	208	191		2,001	619	888	

4.2 ARE PSYCHOLOGICAL CONSTRUCTS RELATED TO ECONOMIC SUCCESS?

The main claim underpinning the use of mindset-oriented business trainings is that the psychological skills and mindset taught by the training are important for economic success. Table 4 validates this claim by

assessing the relationship between the psychology measures included in the baseline survey for business owners in the PI/BSED study with their business profits at baseline. We focus on the relationship between psychological variables and a business success indicator of above and below median profits at baseline.

The OLS regression specification for this relationship takes the form:

$$Psychology_{0i} = \alpha + \beta_1 BusinessProfit_{0i} + X'_{0i}\beta_2 + \varepsilon_{it} \quad (E4)$$

Where $Psychology_{0i}$ is a psychology outcome (e.g. personal initiative, self-efficacy, error competence, entrepreneurial identity, locus of control and attitude to risk) of entrepreneur i measured at baseline. The coefficient β_1 measures the correlation of the psychology outcome with the business success indicator variable $BusinessProfit_{0i}$ that takes the value 1 for profits above the median level at baseline and zero below the median at baseline. X'_{0i} is a vector of control variables where we include controls for other measures of success ascribed at the individual and household level by including an indicator for educational attainment above secondary school level and an index of household asset wealth in the regression in addition to other demographic variables e.g. age, marital status and loan status at baseline. ε_{it} is the error term.

Table 4 shows that those women who exhibit higher levels of profitability (above the median) do score more highly across the range of psychology variables at baseline. We believe that the directional link in a business context is that the psychology is driving the economic success as opposed to the economic success is positively impacting psychology (Campos et al., 2017). It may well be possible that a profit windfall might generate a temporary boost in psychological outcomes, but we believe the shift in psychology a priori is what is necessary to change behavior that leads to an improvement in profits and economic success.

Since the PI and BSED trainings mainly attracted the business owners who were towards the lower end of the profit distribution in Ethiopia, perhaps those women could potentially benefit more from a business training since they have a deficit in these skills. They perhaps have pent up demand for these socioemotional skills by having more hardship or difficulty in their life or lacked opportunities to obtain the skills (e.g. less exposure to tertiary education or social networks) and therefore could possess a lower stock of these skills.

Table 4–Correlation Between Psychological Constructs and Economic Success

	Personal Initiative (1-5)	Error management (1-5)	Self Efficacy (1-5)	Entrepreneurial locus of control (1-5)	Entrepreneurial Identity (1-5)	Attitude to Risk (1-8 where a higher score is less risk averse)	Entrepreneurial Activity Planning (1-3)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Success: Business Profits above median at baseline (Yes=1; No=0)	0.0993*** (0.0263)	0.137*** (0.0267)	0.202*** (0.0278)	0.303*** (0.0354)	0.155*** (0.0386)	0.0496 (0.103)	0.135*** (0.0198)
Mean for low profit businesses at baseline PI/BSED study	4.342 (0.0708)	4.210 (0.0719)	4.049 (0.0750)	3.556 (0.0954)	4.236 (0.104)	4.196 (0.278)	2.076 (0.0535)
Observations	2001	2001	2001	2001	2001	2001	2001

Notes:

* significant at 10% level ** significant at 5% level *** significant at 1% level

(1) Controls include: household asset wealth, secondary school educational attainment, received WEDP loan at baseline, age of owner, and marital status at baseline.

(2) OLS regression analysis includes all entrepreneurs who are part of the PI/BSED study sample and outcomes are measured at baseline.

4.3 IMPACT RESULTS

The following section presents the intention-to-treat estimates of the trainings on a number of business performance, psychological and business practices outcomes.

4.3.1 Impact on firm closure and business performance

Table 5 presents the impact of the DOT (panel A) and PI/BSED (panel B) trainings on business performance. In the DOT sample, 25% of the sample had closed their business operations two years after the training and we find no impact of DOT training on survival rates of firms. The closure rate was commensurate with reports of increased taxation law enforcement in 2017 that saw a number of businesses shutting down. We find a positive impact of the DOT training on profits with average monthly profits 30% higher for the treatment group versus the control group. Data are from the two follow-up survey rounds and Table 5 includes the average impact for the one- and two-years post-training. As can be seen in the table, we cannot reject the hypothesis that the impact of the DOT training on monthly profits is equal in the two follow-up rounds, one year and two years post the training, but the profit impacts do seem to attenuate over

time (which is why we present the two coefficients separately rather than pool them). The treatment effect on profits two years after the training is still positive but no longer statistically significant. Regressions include a time dummy (not shown) to indicate the survey wave and standard errors are in parentheses, clustered at the firm level.

In panel B we present the results for the PI and BSED trainings, where we find no evidence of any impact on business performance outcomes with no statistically significant differences between treatment and control groups.

Table 5—Impact of Trainings on Business Performance

	Business closure	Average Monthly Profits (ETB)	Log Monthly Profits	Average Yearly Profits (ETB)	Average Monthly Revenues (ETB)	Business Costs Monthly (ETB)	Number of Employees	Hours owner worked per week	Capital Value (Machinery) (ETB)
	OLS (1)	ANCOVA (2)	ANCOVA (3)	ANCOVA (4)	ANCOVA (5)	ANCOVA (6)	ANCOVA (7)	ANCOVA (8)	ANCOVA (9)
Panel A: DOT study									
DOT_after one year	-0.0323 (0.0251)	1155.2** (559.3)	0.362** (0.182)	5709.3 (6194.4)	5466.2 (5831.0)	-9770.6 (7332.2)	-0.0898 (0.234)	-1.224 (2.348)	5722.9 (16927.3)
DOT_after two years	-0.0142 (0.0318)	964.7 (667.6)	0.238 (0.162)	8167.3 (6146.3)	-1825.9 (8289.2)	-8563.1 (9380.2)	-0.270 (0.221)	-2.861 (2.290)	2474.5 (18500.2)
Observations	1455	1119	1119	1065	1147	1184	1184	1177	1181
Control Group Mean	0.150 (0.0187)	4693.3 (378.4)	7.259 (0.138)	56299.1 (5164.8)	36569.7 (5066.4)	42594.8 (5824.7)	2.042 (0.241)	64.39 (1.792)	81381.99 (13971.95)
p_value: DOT_after one year = DOT_after two years	0.553	0.800	0.578	0.766	0.381	0.913	0.394	0.571	0.880
Panel B: PI/BSED									
Personal Initiative (PI)	-0.0312 (0.0226)	143.3 (768.2)	0.157 (0.129)	637.7 (9,876)	-7,339 (8,004)	-1462.89 (5315.19)	-0.0495 (0.237)	0.814 (1.642)	18,714 (42,857)
Basic Skills (BSED)	-0.00599 (0.0225)	895.5 (576.0)	0.283 (0.268)	2,566 (7,979)	-681.7 (10,249)	-3434.29 (6101.7)	-0.162 (0.203)	-1.338 (1.499)	-8,227 (44,689)
Observations	1,777	1,701	1,701	1,612	1,676	1,777	1,777	1,771	1,748
Control Group Mean	0.171 (0.0180)	12415.2 (1070.8)	7.988 (0.143)	116422.5 (10558.5)	76230.0 (10239.8)	72147.46 (8735.3)	4.168 (0.369)	48.94 (1.385)	256993.3 (40320.5)
Controls used	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes:

* significant at 10% level ** significant at 5% level *** significant at 1% level

(1) Controls include: received WEDP loan at baseline, age of owner, education more than secondary, number of children, number of workers and digitspan score at baseline.

(2) ANCOVA regressions are shown for businesses operational at follow-up

4.3.2 Impact on psychological constructs

Table 6 presents the impacts on psychological outcomes. We measure a change in business mindset by creating indices from a set of psychology statements that proxy for confidence and motivation. Panel A in

table 6 shows that the DOT training had an impact on the psychology of its trainees. Although the magnitude of changes in the measures of psychology are small, we find that entrepreneurs in the DOT treatment group, one year after the training, have statistically significant higher index levels of personal initiative and self-efficacy, relative to those in the control group. Entrepreneurs who are in the treatment group are more confident in their abilities with the trained entrepreneurs more likely to report that they can overcome problems they encounter and are more likely to feel that they are competent in managing their business well. In addition, the trained entrepreneurs appear to take more initiative, as a result of the training. They report that they do more than they are asked to, and that they are good at realizing ideas. Overall, the picture that emerges is that entrepreneurs who participate in the training benefit from an improved sense of confidence in their abilities and are more motivated to improve their businesses. The psychological outcomes for the DOT treatment group, when measured two years after the training, showed no significant differences to those of the control group.⁹ The time trend in the DOT study (not shown in the table) exhibits a fall over time in psychological outcomes for all business owners. We speculate that since the time frame of the study was between 2016 and 2017 this could be during a time of increased uncertainty in the business environment in Ethiopia, with the country in and out of a state of emergency during that period of time. The negative coefficient on entrepreneurial identity may be due to trainees being more critical about their own entrepreneurship two years after the training when impacts have faded perhaps making them question their own identity.

Panel B presents the results for the PI/BSED study where we find no evidence of an average impact on psychology among those who were offered the training. There is weak evidence of a boost in the error competence of BSED trainees. Without a more pronounced impact on psychological outcomes the channel for which profits can be influenced is missing.

⁹ As with profits, the personal initiative score at the two year follow up is not statistically different from the impacts at one year at conventional levels of significance. For self-efficacy, however, the 2-year coefficient is significantly lower than the one year impacts at a 10 percent level of significance.

Table 6–Impact of Trainings on Psychological Outcomes

	Personal Initiative (1-5)	Self Efficacy (1-5)	Entrepreneurial Identity (1-5)	Entrepreneurial locus of control (1-5)	Error management (1- 5)	Attitude to Risk (0=risk averse; 1=risk loving)
	OLS	OLS	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)	(5)	(6)
DOT study						
DOT_after one year	0.0848** (0.0371)	0.0891** (0.0413)	-0.0177 (0.0491)	0.0852 (0.0557)	0.0273 (0.0371)	-0.0117 (0.0264)
DOT_after two years	-0.00284 (0.0575)	-0.0246 (0.0521)	-0.209** (0.0964)	-0.0463 (0.0746)	0.0328 (0.0590)	0.0213 (0.0277)
Observations	1184	1184	1184	1184	1184	1184
Control Group Mean at Follow-up I	4.548 (0.0284)	4.333 (0.0305)	4.619 (0.0343)	4.046 (0.0408)	4.621 (0.0269)	0.529 (0.0193)
p_value: DOT_after one year = DOT_after two years	0.170	0.0601	0.0734	0.128	0.966	0.402
PI/BSED						
	ANCOVA	ANCOVA	ANCOVA	ANCOVA	ANCOVA	ANCOVA
	(1)	(2)	(3)	(4)	(5)	(6)
Personal Initiative (PI)_after 1.5 years	-0.0126 (0.0450)	-0.00302 (0.0502)	0.0214 (0.0369)	0.00501 (0.0447)	0.00819 (0.0242)	0.199 (0.159)
Basic Skills (BSED)_after 1.5 years	0.0123 (0.0362)	-0.0139 (0.0402)	0.0323 (0.0505)	0.0189 (0.0463)	0.0483* (0.0242)	0.0378 (0.145)
Observations	1,454	1,454	1,454	1,454	1,454	1,454
Control Group Mean at baseline	4.427 (0.0559)	4.159 (0.0411)	4.335 (0.0594)	3.954 (0.0821)	4.354 (0.0387)	4.294 (0.118)
Controls used	Yes	Yes	Yes	Yes	Yes	Yes

Notes:

* significant at 10% level ** significant at 5% level *** significant at 1% level

(1) Controls include: received WEDP loan at baseline, age of owner, marital status, education, household size, number of children and digitspan score at baseline.

(2) Analysis restricted to business owners who had businesses that were still operational at the time of the follow-up survey.

4.3.3 Impact on business practices

Table 7 presents the impact on indices of business practices that is created by taking an average of the practices that business has done in the last 12 months - record keeping, marketing, stock control and financial planning practices. This is by no means an exhaustive list of all the measured business practices in the surveys but highlights a few of the more common cited practices presented in business studies (McKenzie & Woodruff, 2017). Overall in Ethiopia, we do not observe changes to business practices or

business knowledge among the trainees, which could also be a channel of influence to achieve higher profits. We find no evidence, for example, that the trained entrepreneurs keep better financial records, improve their marketing, or exhibit higher financial literacy. The DOT trained firms were only more likely to report having analyzed the sales of the most important product over the last year. We find a higher likelihood that the BSED trained firms improve their record keeping, significant at the 10% level. However, we do not find evidence of an impact of the PI training on any of the measured business practices indices.


Table 7–Impact of Trainings on Business Performance

	Record Keeping Index (0-1)	Marketing Practices Index (0-1)	Stock Control Practices Index (0-1)	Financial Planning Practices Index (0-1)	Business Knowledge Index Score (0-7)	Detailed plans on any strategy to improve business (0-1)
	OLS	OLS	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)	(5)	(6)
DOT study						
DOT_after one year	0.0135 (0.0229)	0.0420 (0.0283)	0.0311 (0.0362)	0.0245 (0.0261)	-0.0960 (0.0741)	0.0186 (0.0381)
DOT_after two years	0.00716 (0.0261)	-0.0258 (0.0299)	-0.00413 (0.0334)	-0.0487 (0.0296)	0.00790 (0.103)	-0.0559 (0.0419)
Observations	1184	1183	1183	1183	1184	1181
Control Group Mean at Follow-up I	0.359 (0.0166)	0.477 (0.0205)	0.685 (0.0264)	0.606 (0.0187)	4.772 (0.0538)	0.630 (0.0274)
	Record Keeping Index (0-1)	Marketing Practices Index (0-1)	Stock Control Practices Index (0-1)	Financial Planning Practices Index (0-1)	Business Knowledge Index Score (0-7)	Detailed plans on any strategy to improve business (0-1)
	ANCOVA	ANCOVA	ANCOVA	ANCOVA	ANCOVA	ANCOVA
	(1)	(2)	(3)	(4)	(5)	(6)
PI/BSED						
Personal Initiative (PI)_after 1.5 years	0.0136 (0.0192)	0.0147 (0.0224)	0.0120 (0.0261)	-0.0314 (0.0224)	-0.0688 (0.0595)	-0.000793 (0.0323)
Basic Skills (BSED)_after 1.5 years	0.0336* (0.0192)	-0.00230 (0.0225)	-0.000625 (0.0261)	-0.0327 (0.0225)	-0.0839 (0.0591)	0.0365 (0.0325)
Observations	1,492	1,485	1,482	1,485	1,729	1,421
Control Group Mean at Follow-up	0.374 (0.0161)	0.632 (0.0172)	0.691 (0.0201)	0.758 (0.0172)	4.975 (0.0481)	0.653 (0.0253)

Notes:

* significant at 10% level ** significant at 5% level *** significant at 1% level

- (1) Controls include: received WEDP loan at baseline, age of owner, marital status, education, household size, number of children and digitspan score at baseline.
- (2) Record Keeping Index = Has a written business plan; Has a written annual budget; Keeps financial records
- (3) Marketing Practices Index = Visited at least one of its competitor's businesses to see what prices they are charging; Visited at least one of its competitor's businesses to see what products he or she offers; Asked existing customers whether there are products they would like you to offer; Asked a supplier about which products are selling well in this business' industry; looked for ways to improve your marketing and advertising strategies; Advertised in any form.
- (4) Stock Control Index = Negotiated with a supplier for a lower price on raw material; Compared the prices or quality offered by your supplier's product/service with other suppliers
- (5) Financial Planning Index = Analyzed if the sales of your most important product/services have increased, decreased or remained the same; looked for additional financial resources for your business; looked for new markets.



So far, we have looked at two channels by which the trainings could have changed profits. This section has shown that practices did not meaningfully move. However, the previous section showed that the psychological outcomes moved for participants in the DOT training but not at all for those in the PI and BSED trainings - both of which are aimed at psychology. We now turn to the likely main culprit for the lack of impact in the PI/BSED cohorts: the quality of the trainers.

4.3.4 Role of the trainer


Using detailed trainer characteristics and student data from the PI/BSED study we attempt to match which teacher attributes may have mattered for student outcomes.

The following analysis focuses on the sample of students who were trained (619 students; 17 primary trainers). The question we address: among the women entrepreneurs who participate in the trainings, what characteristics of the trainer are correlated with changes in their personal initiative, self-efficacy, error competence, entrepreneurial identity and locus of control scores, as measured at follow-up? The analysis incorporates various hypotheses by sequentially adding explanatory factors grouped into trainer attribute themes: demographic characteristics, business ownership, cognitive and noncognitive skills, job and career satisfaction and experience as a trainer. These themes were formulated based on various hypotheses by which we believe the trainer could influence the effectiveness of a training. For example, perhaps younger trainers are more dynamic and open towards a new training approach or those trainers with a higher error competence may be more likely to encourage entrepreneurs to act and learn from their errors and are therefore better trainers. The full set of hypotheses are discussed in more detail with the results presented below.

Table 8 first presents summary statistics of the 17 trainers included in the analysis. The average age of the trainers was 35 years which is similar to the average age of the WEDP entrepreneurs. There was an even split of female and male trainers and the likelihood that the trainer had ever been a business owner themselves was 41%. The average scores of the noncognitive skills measures for the trainers are relatively high compared to the scores among the entrepreneurs that chose to be trained.

Table 8–Descriptive Statistics for Trainer Characteristics

	<i>Trainer Characteristics</i>			
	Mean	Std. Dev	Min	Max
<i>Demographics</i>				
Age	35.24	10.53	25	56
Female teacher	.53	.51	0	1
Household members	4.24	2.11	1	8
Years at school	18.71	2.71	15	25
<i>Entrepreneurial experience</i>				
Ever been a business owner	.41	.51	0	1
Years as business owner	.85	1.33	0	4.5
Number of businesses started in life	.47	.62	0	2
Number of businesses running	.18	.39	0	1
HH members with business	.59	1.01	0	3
<i>Cognitive abilities</i>				
Digit-span score (forward + backward)	9.29	2.52	6	17
Raven test total	9.12	2.42	3	12
<i>Non-cognitive skills</i>				
Personal Initiative (PI)	4.55	.44	3.43	5
Error competence	4.73	.34	3.8	5
Prosocial orientation	4.82	.43	3.5	5
Learning motivation	4.91	.26	4	5
<i>Job satisfaction and involvement</i>				
How satisfied are you with your job?	4.06	.89	3	5
Given a choice, I would still become a teacher	3.94	1.29	1	5
Career satisfaction	4.35	1.06	2	5
Job involvement	3.98	.87	2	5
Organizational commitment	4.10	.83	2.44	5
<i>Years at TVET College and perceived skills</i>				
Years as teacher	12.85	11.72	.5	36
Years at TVET College in general	8.97	5.72	.5	23
Perceived entrepreneurial skills	4.24	.75	3	5
Observations	17			



Tables 9-13 report the results of the regressions of trainer characteristics on student psychology scores measured post training, among the sample of entrepreneurs who participated in the trainings. The regressions use ANCOVA estimation with standard errors clustered at the classroom level (the six TVET colleges had multiple training rounds where the student could have attended a training) and include the baseline measure of the dependent variable, i.e., the lagged psychology score is controlled for.

Column (5) in each table shows that there is a statistically significant positive association between students' psychology and the trainer having ever been a business owner themselves even after sequentially adding different sets of controls. Personal initiative, self-efficacy, locus of control and error competence measured 1.5 years after the training are all significantly higher among the students who had a trainer who had ever owned a business. These associations are stronger when the years as a teacher and years at TVET colleges are controlled for. The women entrepreneurs appear to benefit from having a shared identity with their trainer. The TVET trainers' limited exposure to the world of entrepreneurship may be one of the major barriers to successfully train women entrepreneurs on these socioemotional skills.


A supplemental qualitative analysis using videos of five trainers offering PI training sheds some light on how differences between trainers' attributes may manifest during the training (Wolf & Frese, 2019). The systematic comparison of training videos suggests that the PI trainer who has owned a business before differs from the remaining PI trainers with regard to his teaching behavior. First, according to the evaluation of three independent Ethiopian raters, the owner trainer is unanimously perceived as more competent, confident, and enthusiastic than his four non-owner trainer colleagues. Second, a qualitative content analysis of training video transcripts reveals that he has a more profound understanding of the training content than the non-owner trainers. They are more likely to communicate learning intentions, to make meaningful connections to students' daily life, and to provide informative feedback than his colleagues. It is conceivable, for example, that due to their own entrepreneurial past, the trainer finds it easier to relate the training content to students' daily experiences and challenges as entrepreneurs. Such teaching behaviors,

in turn, have been shown to be associated with student achievement by the education literature (Hattie, 2008, 2015) and are likely to promote the development of psychological skills and mindset.

Other things that matter across the variables are: the explanatory variable that asks the trainer, to which degree do you agree with the following statement: “if I had to choose again, I would still become a teacher” is negatively correlated with the psychological outcomes of the students. This contradicts what one might expect since choosing to be a teacher again perhaps should translate into more passion for teaching and therefore a greater likelihood to be able to shift the psychology of their students. However, one possible explanation for the negative correlation could be that those satisfied with being a teacher in a TVET college system are less open towards a training approach that somehow challenges the approach they have been using at TVET colleges for years.

The career satisfaction variable measured by the response of the trainer to “I am satisfied with the success I have achieved in my professional career” is positively correlated with the psychological outcomes of the students at follow-up. This is the directional relationship one would expect between trainer job satisfaction and trainer effectiveness since those trainers who are satisfied with their job are likely more enthusiastic and therefore stronger trainers.

In addition, since WEDP clients are all women they may have better identified with a female trainer where we find a positive association between a female trainer and a few of the student's psychology measures (PI and error competence scores). In terms of skills, the trainers' error competence score seems to positively correlate with some of the students' psychological outcomes (PI, self-efficacy and locus of control). Perhaps those trainers with a higher error competence are more likely to encourage entrepreneurs to act and learn from their errors and are therefore better trainers or that trainers only succeed in transmitting the training message (i.e. activating and increasing PI among students) if they show these behaviors themselves (i.e. if they are good role models).



Interestingly, we do not find evidence of years of schooling of the trainer or measures of cognitive ability correlating with the psychological outcomes of their students. This result is consistent with the education literature where teacher education and years on the job are found to not be consistently correlated with student learning.

The non-random allocation of students to classrooms may be a concern of bias in the estimates, if say, students choose a TVET college with a trainer they believe is more well-reputed. However, since the invitation of students to a specific TVET college was based on the locality of the business and the student would have not known the identity of the trainer before attending a session, we are confident that this selection is minimized. In addition, since we witnessed limited drop-outs (i.e. once an entrepreneur made it to the first session it was likely she remained for all 10 classes) it is unlikely the results are being driven by entrepreneurs who only stayed in a training if the trainer was perceived as strong by the student.

Since we do not have data on the trainer characteristics of the DOT trainers we are not able to replicate this analysis for the DOT study. Nonetheless, while the DOT evaluation shows the combination of improvements in psychological skills and increase in profits, this analysis shows us that there were some, small, set of trainers in the PI/BSED trainings who were able to effect change in their students' psychological outcomes.

Table 9–Trainer Characteristics on Student Psychology (Personal Initiative)

y = Personal Initiative score of students after training

		(1)	(2)	(3)	(4)	(5)	
		Personal Initiative (1-5)	Personal Initiative (1-5)	Personal Initiative (1-5)	Personal Initiative (1-5)	Personal Initiative (1-5)	
Trainer Characteristics	Demographics	Age	-0.00495 (0.00326)	-0.00111 (0.00301)	0.00190 (0.00811)	-0.0102 (0.0103)	-0.0282** (0.0124)
		Female	0.0918 (0.0833)	0.0564 (0.0671)	0.105 (0.113)	0.0360 (0.114)	0.498** (0.187)
		Years at school	-0.0164 (0.0112)	-0.00438 (0.0116)	-0.0287 (0.0192)	0.0000643 (0.0190)	-0.0227 (0.0207)
	Entrepreneur Role Model	Ever been a business owner		0.195*** (0.0561)	0.151** (0.0562)	0.149** (0.0563)	0.339*** (0.0818)
	Cognitive and non-cognitive skills	Digitspan score			0.0213 (0.0257)	-0.0258 (0.0353)	-0.0375 (0.0411)
		Raven test score			-0.0278 (0.0192)	-0.00645 (0.0164)	-0.0529* (0.0307)
		Personal initiative			-0.106 (0.136)	-0.270*** (0.0798)	-0.120 (0.189)
		Error competence			0.0868 (0.140)	0.505** (0.204)	0.356* (0.186)
		Prosocial orientation			0.151 (0.128)	-0.154 (0.157)	0.567 (0.398)
	Job satisfaction	How satisfied are you with your job?				0.123** (0.0537)	0.00919 (0.0573)
		Given a choice, would still be a teacher				-0.0632** (0.0291)	-0.0851** (0.0313)
		Career satisfaction				0.109*** (0.0299)	0.0805** (0.0328)
	Years at TVET college	Years as teacher					0.0182 (0.0222)
		Years at TVET Colleges					0.0379* (0.0220)
		Perceived entrepreneurial skills					-0.144 (0.0891)
	Average score for students at baseline	4.477 (0.0248)	4.477 (0.0248)	4.477 (0.0248)	4.477 (0.0248)	4.477 (0.0248)	
	Observations	565	565	565	565	565	

Notes:

* significant at 10% level ** significant at 5% level *** significant at 1% level

(1) OLS regressions sequentially add explanatory variables from columns (1) to (5)

Table 10–Trainer Characteristics on Student Psychology (Self Efficacy)

y = Self Efficacy score of students after training

		(1)	(2)	(3)	(4)	(5)
		Self Efficacy (1-5)	Self Efficacy (1-5)	Self Efficacy (1-5)	Self Efficacy (1-5)	Self Efficacy (1-5)
Demographics	Age	-0.00760 (0.00593)	0.000388 (0.00512)	0.00504 (0.0134)	-0.00435 (0.0158)	-0.0210 (0.0240)
	Female	0.0744 (0.129)	-0.000104 (0.111)	0.0967 (0.227)	-0.0193 (0.238)	0.356 (0.463)
	Years at school	0.0101 (0.0222)	0.0359 (0.0232)	-0.0000659 (0.0329)	0.0270 (0.0283)	0.0656 (0.0404)
Entrepreneur Role Model	Ever been a business owner		0.405*** (0.0975)	0.330*** (0.119)	0.366*** (0.0829)	0.374** (0.150)
Cognitive and non-cognitive skills	Digitspan score			0.0217 (0.0480)	-0.0172 (0.0571)	-0.0964 (0.0861)
	Raven test score			-0.0280 (0.0261)	0.0175 (0.0297)	-0.0328 (0.0654)
	Personal initiative			-0.334 (0.277)	-0.731*** (0.187)	-0.252 (0.495)
	Error competence			0.178 (0.218)	0.722*** (0.218)	0.916** (0.340)
	Prosocial orientation			0.381 (0.257)	0.0263 (0.221)	0.0754 (0.565)
Job satisfaction	How satisfied are you with your job?				0.189** (0.0725)	0.106 (0.129)
	Given a choice, would still be a teacher				-0.150*** (0.0303)	-0.130** (0.0417)
	Career satisfaction				0.180*** (0.0507)	0.127* (0.0639)
Years at TVET college	Years as teacher					0.0389 (0.0421)
	Years at TVET Colleges					-0.0114 (0.0322)
	Perceived entrepreneurial skills					-0.115 (0.164)
	Average score for students at baseline	4.215 (0.0264)	4.215 (0.0264)	4.215 (0.0264)	4.215 (0.0264)	4.215 (0.0264)
	Observations	559	559	559	559	559

Notes:

* significant at 10% level ** significant at 5% level *** significant at 1% level
OLS regressions sequentially add explanatory variables from columns (1) to (5)

Table 11–Trainer Characteristics on Student Psychology (Entrepreneurial Identity)

y = Entrepreneurial Identity score of students after training

		(1)	(2)	(3)	(4)	(5)	
		Entrepreneurial Identity (1-5)	Entrepreneurial Identity (1-5)	Entrepreneurial Identity (1-5)	Entrepreneurial Identity (1-5)	Entrepreneurial Identity (1-5)	
Trainer Characteristics	Demographics	Age	-0.00729* (0.00376)	-0.000886 (0.00312)	0.00360 (0.00550)	0.0132 (0.00790)	0.0167 (0.0155)
		Female	0.111 (0.0720)	0.0522 (0.0521)	0.176** (0.0681)	0.112* (0.0622)	0.162 (0.238)
		Years at school	0.0122 (0.0152)	0.0326* (0.0168)	-0.000325 (0.0283)	-0.0130 (0.0230)	-0.00524 (0.0287)
	Entrepreneur Role Model	Ever been a business owner		0.325*** (0.0752)	0.246*** (0.0857)	0.334*** (0.0738)	0.303*** (0.106)
		Cognitive and non-cognitive skills	Digitspan score			0.0251 (0.0234)	0.0571* (0.0291)
	Raven test score				-0.0392* (0.0204)	-0.00342 (0.0171)	0.00683 (0.0402)
	Personal initiative				-0.289* (0.169)	-0.574*** (0.126)	-0.433* (0.226)
	Error competence				0.0182 (0.175)	0.0436 (0.160)	0.272 (0.225)
	Prosocial orientation				0.377*** (0.131)	0.392*** (0.137)	0.107 (0.553)
	Job satisfaction	How satisfied are you with your job?				0.0379 (0.0549)	0.0657 (0.0741)
		Given a choice, would still be a teacher				-0.128*** (0.0342)	-0.137*** (0.0407)
		Career satisfaction				0.104*** (0.0354)	0.0841* (0.0471)
	Years at TVET college	Years as teacher					0.0312 (0.0246)
		Years at TVET Colleges					-0.0199 (0.0289)
		Perceived entrepreneurial skills					0.0609 (0.145)
	Average score for students at baseline	4.397 (0.0305)	4.397 (0.0305)	4.397 (0.0305)	4.397 (0.0305)	4.397 (0.0305)	
	Observations	564	564	564	564	564	

Notes:

* significant at 10% level ** significant at 5% level *** significant at 1% level

(1) OLS regressions sequentially add explanatory variables from columns (1) to (5)

Table 12–Trainer Characteristics on Student Psychology (Locus of Control)

y = Locus of control (LOC) score of students after training

		(1)	(2)	(3)	(4)	(5)	
		Entrepreneurial locus of control (1-5)	Entrepreneurial locus of control (1-5)	Entrepreneurial locus of control (1-5)	Entrepreneurial locus of control (1-5)	Entrepreneurial locus of control (1-5)	
Trainer Characteristics	Demographics	Age	-0.0111 (0.00717)	-0.00283 (0.00662)	-0.00562 (0.0114)	-0.0124 (0.0171)	-0.00378 (0.0304)
		Female	0.216 (0.137)	0.137 (0.117)	0.465** (0.186)	0.329* (0.194)	0.437 (0.474)
		Years at school	-0.0117 (0.0262)	0.0158 (0.0291)	-0.0142 (0.0412)	0.00958 (0.0438)	0.0114 (0.0453)
	Entrepreneur Role Model	Ever been a business owner		0.427*** (0.128)	0.344** (0.133)	0.421*** (0.102)	0.392** (0.177)
	Cognitive and non-cognitive skills	Digitspan score			-0.00905 (0.0483)	-0.0397 (0.0684)	-0.105 (0.0873)
		Raven test score			-0.0614** (0.0246)	-0.00855 (0.0268)	0.0186 (0.0725)
		Personal initiative			-0.397 (0.267)	-0.774*** (0.190)	-0.556 (0.494)
		Error competence			0.173 (0.243)	0.666** (0.324)	1.090*** (0.377)
		Prosocial orientation			0.695*** (0.240)	0.341 (0.237)	-0.155 (0.636)
	Job satisfaction	How satisfied are you with your job?				0.150 (0.107)	0.211 (0.137)
		Given a choice, would still be a teacher				-0.175*** (0.0458)	-0.208*** (0.0548)
		Career satisfaction				0.230*** (0.0719)	0.195** (0.0799)
	Years at TVET college	Years as teacher					0.0631 (0.0375)
		Years at TVET Colleges					-0.0333 (0.0400)
		Perceived entrepreneurial skills					0.137 (0.200)
Average score for students at baseline		3.987 (0.0455)	3.987 (0.0455)	3.987 (0.0455)	3.987 (0.0455)	3.987 (0.0455)	
Observations		557	557	557	557	557	

Notes:

* significant at 10% level ** significant at 5% level *** significant at 1% level

(1) OLS regressions sequentially add explanatory variables from columns (1) to (5)

Table 13–Trainer Characteristics on Student Psychology (Error Competence)

y = Error competence score of students after training

		(1)	(2)	(3)	(4)	(5)	
		Error competence (1-5)	Error competence (1-5)	Error competence (1-5)	Error competence (1-5)	Error competence (1-5)	
Trainer Characteristics	Demographics	Age	-0.00540* (0.00300)	-0.00145 (0.00264)	-0.00150 (0.00710)	0.00304 (0.0109)	-0.00229 (0.0127)
		Female	0.117* (0.0662)	0.0805 (0.0586)	0.183 (0.116)	0.143 (0.124)	0.431** (0.169)
		Years at school	-0.0175 (0.0107)	-0.00515 (0.0131)	-0.0292 (0.0183)	-0.0346 (0.0215)	-0.0669** (0.0273)
	Entrepreneur Role Model	Ever been a business owner		0.200*** (0.0656)	0.142** (0.0590)	0.200*** (0.0630)	0.341*** (0.0963)
	Cognitive and non-cognitive skills	Digitspan score			0.0137 (0.0245)	0.0282 (0.0402)	0.0212 (0.0469)
		Raven test score			-0.0434** (0.0183)	-0.0257 (0.0158)	-0.0348 (0.0271)
		Personal initiative			-0.0935 (0.113)	-0.182* (0.0990)	-0.147 (0.181)
		Error competence			0.173 (0.134)	0.166 (0.185)	0.145 (0.166)
		Prosocial orientation			0.153 (0.113)	0.146 (0.164)	0.521 (0.379)
	Job satisfaction	How satisfied are you with your job?				-0.0107 (0.0547)	-0.0490 (0.0525)
		Given a choice, would still be a teacher				-0.0629* (0.0328)	-0.101*** (0.0364)
		Career satisfaction				0.0767** (0.0357)	0.0583 (0.0367)
	Years at TVET college	Years as teacher					0.0263 (0.0172)
		Years at TVET Colleges					0.0221 (0.0199)
		Perceived entrepreneurial skills					-0.0212 (0.0850)
	Average score for students at baseline	4.432 (0.0270)	4.432 (0.0270)	4.432 (0.0270)	4.432 (0.0270)	4.432 (0.0270)	
	Observations	564	564	564	564	564	

Notes:

* significant at 10% level ** significant at 5% level *** significant at 1% level

(1) OLS regressions sequentially add explanatory variables from columns (1) to (5)

5 Conclusion

In the quest to support the growth of women-owned firms in emerging economies, the development of a replicable formula for effective business training is critical. New evidence is beginning to point to psychology or mindset-oriented approaches to business training as being more effective than traditional methods that focused on imparting practice-based business skills such as book-keeping, marketing, and business plan development (Campos et al., 2017).

This paper contributes to the evidence base on mindset-oriented approaches to business training. First, we show that this kind of training can be effective in the Ethiopian context. However, while we show that the mindset approach holds promise for increasing profits and business growth, how these skills are transferred requires more careful consideration. Psychology-oriented training approaches seem to require a greater personalization of the training content by instructors and seem more likely to be successful in instances where instructors can relate easily to students, perhaps by having been through similar experiences. Trainers who have been entrepreneurs themselves may have a better understanding of their students' specific challenges, can act as a role model and provide them with more practical examples.

Although business training interventions are beginning to evolve from traditional approaches focused on managerial practices to new approaches informed more heavily by psychology, further research on the best method of delivering these skills as well as the types of skills that might be appropriate is needed. The results for the successful DOT training suggest possible attenuation over time. If this is a real issue, additional booster sessions may be needed. Additionally, the finding that women who attend the training are among the lowest profitable businesses suggests that attracting some of the higher growth businesses may require alternative delivery mechanisms than just classroom-based training. For example, business networking events, coaching, or mentoring support may help reach a greater number of entrepreneurs.

The trainings in Ethiopia were significantly cheaper at around US\$30 per person than the Personal Initiative training in Togo, which was around US\$750 per person. Part of the increased cost in Togo was that trainers conducted monthly follow up visits for four months after the training to provide individual support to

entrepreneurs. Exploring lower-cost supplementary follow-up options in terms of mentoring or ongoing support deserves further exploration and research.

As economies grow and women are encouraged to enter business sectors where they may lack social support and have fewer identifiable role models, mindset-oriented business trainings can be used to support them to develop a mental attitude that will help them respond better to new and unfamiliar situations. Programs that enhance skills for women entrepreneurs, perhaps complemented by initiatives such as coaching and advising, can increase women's ability to take advantage of opportunities, and seemingly are best delivered by those who have trodden the beaten path before.

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Appendix A: Measures for psychological constructs

Unless noted otherwise, all measures were introduced using the instructions below. The introductory sentence was slightly modified depending on the specific content of the scale. In the following, I will present you a set of statements which describe the behavior of people in various situations. Please indicate how much each statement describes you. For each statement, please tell me whether you: 1. Strongly disagree, 2. Rather disagree, 3. Neither disagree nor agree, 4. Rather agree, or 5. Strongly agree. Your answers refer to how you think you are and not how you would like to be in the future.

6.1 WOMEN ENTREPRENEURS

- *PERSONAL INITIATIVE*: Mean of responses to seven items

- Based on Frese, Fay, Hilburger, Leng, & Tag (1997)

- Scale reliability: Cronbach's alpha = .87 (PI/BSED); .86 (DOT)

PI1. I actively attack problems.

PI2. Whenever something goes wrong, I search for a solution immediately.

PI3. Whenever there is a chance to get actively involved, I take it.

PI4. I take initiative immediately even when others do not.

PI5. I use opportunities quickly in order to attain my goals.

PI6. Usually I do more than I am asked to do.

PI7. I am particularly good at realizing ideas.

- *ERROR COMPETENCE*: Mean of responses to four items

- Based on Rybowskiak, Garst, Frese, & Batinic (1999)

- Scale reliability: Cronbach's alpha = .80 (PI/BSED); .85 (DOT)

EC1. When I have made a mistake, I know immediately how to correct it.

EC2. When I do something wrong at work, I correct it immediately

EC3. If it is at all possible to correct a mistake, then I usually know how to go about it.

EC4. I don't let go of the goal, although I make mistakes.

- *ENTREPRENEURIAL SELF-EFFICACY*: Mean of responses to seven items

- Based on (Gielnik et al., 2015) & Krauss (2003)

- Scale reliability: Cronbach's alpha = .89 (PI/BSED); .79 (DOT)

SE1. I perceive business opportunities well.

SE2. I do the marketing of my business well.

SE3. I overcome problems when running a business.

SE4. I negotiate with other entrepreneurs well.

SE5. I keep an overview of my financial affairs well.

SE6. I am competent to manage my business well.

SE7. I am competent to find financial capital for my business.

- *ENTREPRENEURIAL LOCUS OF CONTROL*: Mean of responses to seven items

- Based on Levenson (1974)

- Scale reliability: Cronbach's alpha = .93 (PI/BSED); .84 (DOT)

LC1. I can pretty much determine the success of my business

LC2. I am certain that I can have a significant impact on the society with my business.

LC3. I am sure that I can impact sales of my business.

LC4. I can pretty much determine what happens in my environment.

LC5. I can change the community around me with my business.

LC6. When others start their own businesses, it is because they take me as an example of how to do it.

LC7. My example leads others to be better business people.

- *ENTREPRENEURIAL IDENTITY*: Mean of responses to two items

- Based on Hagger & Chatzisarantis (2006)

- Scale reliability: Cronbach's alpha = .76 (PI/BSED); .85 (DOT)

EI1. Entrepreneurship is an important part of who I am.

EI2. I think of myself as someone who generally thinks about entrepreneurship.

- *ATTITUDE TO RISK*: Ranging from 1 = risk-averse to 8 = risk-loving

- Instructions: Now, imagine you want to start a new business and you can choose from eight types of businesses. Each business profit depends on whether the business has a good or a bad month. The probability of a good or bad month is 50%. You can see the profit of each business in a good and a bad month for the 8 businesses below. Which business would you choose?

Business: Profits in a bad month / Profits in a good month

Business 1 15.000 Birr / 15.000 Birr

Business 2 13.500 Birr / 28.500 Birr

Business 3 12.000 Birr / 36.000 Birr

Business 4 10.500 Birr / 37.500 Birr

Business 5 9.000 Birr / 45.000 Birr

Business 6 6.000 Birr / 48.000 Birr

Business 7 3.000 Birr / 57.000 Birr

Business 8 0 Birr / 60.000 Birr

6.2 TRAINERS

- *PERSONAL INITIATIVE*: see section 6.1

- Scale reliability: Cronbach's alpha = .75

- *ERROR COMPETENCE*: see section 6.1 but without item EC4

- Scale reliability: Cronbach's alpha = .73

- *PROSOCIAL ORIENTATION*: Mean of responses to five items

- Based on Grant (2008), Grant & Berry (2011), and Grant & Sumanth (2009)

- Scale reliability: Cronbach's alpha = .67

PO1. I get energized by working on tasks that have the potential to benefit others.

PO2. It is important to me to have the opportunity to use my abilities to benefit others.

PO3. I prefer to work on tasks that allow me to have a positive impact on others.

PO4. I do my best when I'm working on a task that contributes to the well-being of others.

PO5. I like to work on tasks that have the potential to benefit others.

- *LEARNING MOTIVATION*: Mean of responses to two items

- Based on Birdi, Allan, & Warr (1997), Noe & Wilk (1993), and Warr & Bunce (1995)

- Scale reliability: Cronbach's alpha = .83

LM1. I always look for opportunities to improve my skills.

LM2. I am very enthusiastic about learning new things.

- *JOB INVOLVEMENT*: Mean of responses to six items

-Based on Kanungo (1982)

- Scale reliability: Cronbach's alpha = .79

J11. The most important things that happen to me involve my present job.

J12. To me, my job is only a small part of who I am. (reverse)

J13. I am very much personally involved in my job.

J14. I live, eat, and breathe my job.

J15. Most of my interests are centered around my job.

J16. I have very strong ties with my present job which would be very difficult to break.

- *ORGANIZATIONAL COMMITMENT*: Mean of responses to eight items

- Based on Mowday, Steers, & Porter (1979)

- Scale reliability: Cronbach's alpha = .84

OC1. I am willing to put in a great deal of effort beyond that normally expected in order to help my college to be successful.

OC2. I talk about this college to my friends as a great institution to work for.

OC3. I would accept almost any type of job assignment in order to keep working for this college.

OC4. I find that my values and the college's values are very similar.

OC5. I am proud to tell others that I am part of this college.

OC6. This college really inspires the very best in me in the way of job performance.

OC7. It would take very little change in my present circumstances to cause me to leave this college. (reverse)

OC8. For me this is the best of all possible institutions for which to work.

Taking Management Digital

Lessons from the Development of an Innovative Management Information System for Small Businesses in Ethiopia

*Salman Alibhai, Francesco Strobbe, Espen Villanger**

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*Chr. Michelsen Institute, P.O. Box 6033, Bedriftssenteret, N-5892 Bergen, Norway. Email: espen.villanger@cmi.no. Phone: +4799799476.

Abstract

In many aid projects, monitoring and evaluation is a static exercise driven by donor reporting requirements. After project closure, there are seldom sustainable benefits of the monitoring and evaluation system. This paper examines how monitoring and evaluation can be transformed into a dynamic tool for effective project management, with benefits carrying over beyond the typical project lifecycle. The paper assesses an innovative, digital management information system developed under the Women Entrepreneurship Development Project, a Government of Ethiopia initiative financed by a World Bank International Development Association loan and grant funding from Global Affairs Canada. The paper examines the context of the development of the

management information system, its effectiveness, and its potential for sustainability. Ethiopia is among the poorest countries in the world, and government administration units involved in administering projects often face funding and resource shortfalls. The paper demonstrates how effective and sustainable monitoring and evaluation systems can be developed even in challenging contexts such as these, by focusing on simple technical solutions that can be maintained and refined locally, ensuring low development and maintenance costs compatible with government monitoring and evaluation budgets, and linking project-level monitoring and evaluation to broader government operations.

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

The Policy Research Working Paper Series disseminates the findings of work in progress to encourage the exchange of ideas about development issues. An objective of the series is to get the findings out quickly, even if the presentations are less than fully polished. The papers carry the names of the authors and should be cited accordingly. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the views of the International Bank for Reconstruction and Development/World Bank and its affiliated organizations, or those of the Executive Directors of the World Bank or the governments they represent.

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1. Introduction


How can project monitoring and evaluation (M&E) be transformed into a dynamic tool for effective project management? How can M&E tools be integrated into national government structures and carry over beyond the lifecycle of a project? These are the two key questions that this paper aims to address.

In many aid projects, M&E is a static exercise driven by donor system reporting requirements. An external consultant is often hired to develop the framework, the client reluctantly generates the data as an addition to its ordinary data collection, and the M&E serves solely project purposes. When the project closes, the M&E system is also shut down, and there are seldom any sustainable benefits of the M&E component. This seems to be a misuse of resources that would not be tolerated in other project components, where the requirement is usually that the benefits of a program continue after donor funding ceases (Chianca 2008).

Sustainability of the resources used for M&E in development projects should be a concern, with sustainability of development assistance defined as the extent to which the benefits of the project continue after donor assistance has been completed (OECD 2010a). Sustainability in foreign aid is one of five objectives the Organization for Economic Cooperation and Development recommends for inclusion in any evaluation of development aid projects (OECD 2010b), but there is usually very limited focus on sustainability of M&E components in development evaluation. For example, in a review of Norwegian evaluations, all sustainability assessments omitted the M&E components (Norad 2014).

Maintaining the benefits of M&E investments after project closure is challenging. Often, investments in M&E involve the design and deployment of novel management information systems (MIS), to track project-level outcomes. However, there is no consensus in the literature on information systems (IS) in developing countries on how to achieve sustainability of such technologies, and information technology (IT) projects in general have a high failure rate. In the government sector alone, failures of IS projects in developing countries are as high as 85 percent (Silva and Fernández 2016). A review of World Bank support of information and communications technology (ICT) from 2003 to 2010 found that only 25 percent of projects supporting diffusion and use of ICT achieve their results (IEG 2011). Moreover, fewer than 60 percent of the ICT components of World Bank projects achieved or were expected to achieve their intended results. Similarly, in more than 70 percent of projects supporting public sector governance, the ICT components of World Bank projects were modified, cancelled completely, or substantially delayed. Although some explanations have been offered, the reasons for the poor performance and high failure rates of ICT initiatives in development are poorly understood (Silva and Fernández 2016).

In this paper, we discuss the effectiveness and sustainability of the M&E component of an aid-funded project in Ethiopia: the Women Entrepreneurship Development Project (WEDP). This project was selected because we believe it provides some useful and illustrative lessons. Our aim is to document an innovative approach to developing the M&E framework that not only resulted in an effective online management information system (MIS), but also generated sustainable results in and of itself. The MIS used a low-cost, easily accessible platform that can be adapted to almost any other project or organization, with particular benefits when semi-autonomous entities collaborate and need to coordinate their M&E functions. In addition to serving project purposes in a timely and accurate manner, the MIS had a large potential catalytic function in that it served as a demonstration scheme for MISs within the recipient government.



The purpose of the paper is therefore twofold. First, the paper explores how an MIS can be created to serve as an effective project management tool, even under challenging conditions. Second, the paper assesses some features that lead to sustainability of an MIS. These discussions provide some practical guidance for others with similar intentions of developing an ambitious MIS at a very low cost in a developing country context. We document the process leading to a fully functional MIS that provides real-time access to all monitoring data across participating institutions that is accessible online from anywhere in the world.

The MIS examined was developed in Ethiopia, one of the poorest countries in the world, whose government administration units often face funding and resource shortfalls, especially for lower-level units responsible for data collection. The MIS was implemented at the central and regional or district levels in 45 sites around the country. This regional dispersion is something that greatly increases the complexity of the project and makes it much more challenging (Dener et al. 2010).

Despite a challenging context, local IT consultants developed the WEDP MIS at very low cost using free software platforms as its basis. We believe that similar MISs can be implemented in most other developing countries from similar challenging starting points. To facilitate learning from the development of the Ethiopia MIS, we also provide an overview of the system and document its features and advantages over the standard M&E approaches.

The main approach taken in this paper was to interview the key users of the MIS and the associated stakeholders and to assess the project documentation. The authors have played central roles in the WEDP and the development of the MIS on behalf of the World Bank, and we used our own reflections and experiences in conjunction with secondary sources in the assessment. Therefore, the judgements in this paper should be seen not as independent scrutiny but as a type of self-assessment. We do not believe that this biases the review or diminishes the importance of the findings. We make reference to the empirical foundations of our conclusions to facilitate subsequent independent evaluation of the WEDP and the MIS.

Our main finding is that the government's commitment to the project was one key to its success. In order for an MIS to be sustainable, it must serve the government's needs and be seen as a useful tool beyond project purposes. The system must be based on simple technical solutions that can be maintained and refined locally, and development and maintenance costs must be low and compatible with the government's M&E budget if the system is going to continue to be used. Finally, building an IT culture was important for making the system work in practice.

Section 2 is a review of the literature; section 3 explains the context; section 4 provides details of our methodology; sections 5 and 6 analyze the effectiveness and sustainability, respectively, and section 7 highlights lessons learned and concludes.

2. Literature review

There is a large and growing literature on IS in developing countries (Avgerou 2008, Pires and Fernández 2016). Coverage is broad, with specialized journals developed for such purposes, such as *Information Technology for Development*, *Information Technologies and International Development*,

and the electronic *Journal of Information Systems in Developing Countries*. Moreover, broad ICT journals such as the *Journal of Global Information Technology Management* often include papers on IS in developing countries, and there are general IS research conferences that include panel and paper sessions on developing countries. General IS journals also frequently publish papers on research in developing countries, including special issues on this topic.

Our paper is about the sustainability of IS in developing countries, especially assessments of what factors are important for system survival. This literature has much broader coverage than the scope of our project management IS-focused assessment. The literature assesses many information and communication systems with widely different functions, aims, sectors, implementers, and users,¹ but there are many useful lessons to be learned about why systems survive or not. We first focus on proposed, general explanatory factors for the failure and success of IS projects and components because this helps identify common characteristics. The material presented here is mainly taken from reviews and broader studies. Second, we present the existing evidence in a structured way according to this categorization, including a range of case studies in developing countries.

The sustainability of IS solutions in developing and developed countries is much discussed in the literature because sustainability is critical to the steady future flow of benefits from these projects (Yogesh et al. 2015; Pires and Fernández 2016). The literature notes an extraordinarily high incidence of failure rates of IS projects and components, which suggests that IS projects and components to a large degree have been a waste of resources. A striking example is World Bank investments in financial MIS, which amounts to approximately US\$2.2 billion from 1984 to the 2010 to finance 87 projects in 51 developing countries. Only approximately half of the projects completed by 2010 were rated as likely or highly likely to be sustainable (Dener et al. 2010).

There are many well-known examples of large, complex IS in developed countries on which hundreds of millions of dollars were spent on planning and development that never came into operation (Nelson 2007). The focus on the lack of sustainability in the literature on developing countries is not so much on the investment and preparation phase. The general impression seems to be that, with the right support, relatively simple systems can be made to work in the initial phase, albeit with substantial delays and changes to the original design (IEG 2011). The critical phase for sustainability seems to be after the system has been put into daily operation, particularly after donor financial and technical support has ended.

Because the continued high failure rates of IS are a common theme, the literature contains many assessments of what factors need to be in place for the systems to survive and function, although in developing countries, the literature is to a large extent anecdotal, focusing on achieving individual aspects of sustainability that by themselves may not solve the problem because the reasons for failure can often be a combination of factors (Pires and Fernández 2016). Moreover, it is sometimes

¹ Dener et al. (2010) provide many examples. In service delivery, for example, one would find IS in health projects with objectives ranging from strengthening medical statistics systems to setting up an integrated bio-behavioral surveillance system for HIV/AIDS. In disaster management, IS systems are used to develop better digital elevation models and obtain supporting satellite imagery. In social protection, pension projects use IS to improve efficiency of government services by financing IT improvements for pension offices and providing training for staff and management. In education, IS projects have been used to prepare for modern technology in the recipient country. In water and sanitation, a project intended to supply and install IT equipment to allow for regular, efficient monitoring of utility performance and program implementation.

impossible to determine exactly why the successes occurred because so many factors need to be in place for success (IEG 2011). The general IS literature contains many attempts to identify predictors of IS success (Petter et al. 2013). Most of these mirror the failure literature in that what is identified as a key factor to success (e.g., user involvement) is also identified as a key factor for failure (lack of user involvement).

It is inherently difficult to identify the critical factors leading to success because separating out the binding constraints may often be impossible. Identifying which factors led to failure may be more informative, although different stakeholders may have different opinions about what constitutes a failure and the reasons for the poor results (see Yogesh et al. 2015 for a discussion).

General factors of sustainability

Kumar and Best (2006) propose five factors of sustainability that together seem important for the continuation of IS after the initial investment stage:

1. Political and institutional sustainability: a political and institutional environment for IS implementation and continued system use and improvements.
2. Financial and economic sustainability: the financial support necessary for continued system use, maintenance, and enhancement.
3. Technological sustainability: technology-related support such as hardware, software, and infrastructure needed for continued use, such as interface and maintenance of the technology.
4. Cultural and social sustainability: a social setting and system culture receptive to the new approaches. Local customs (values and principles), equality or inequality of access to the system, and continued delivery of benefits to relevant actors are critical.
5. Environmental sustainability: environmental concern of IS implementation and use (IT equipment use, reuse, refurbishment, recycling, disposal).

Pires and Fernández (2016) take this further and argue that, within each of these factors, the IS needs to be shaped and adapted to the context by cultivating local learning processes and institutionalizing routines of use that persist over time. They also add a sixth factor that could explain lack of results of IS projects: the large number of actors with competing interests and different rationales.

Pires and Fernández (2016) also contend that the various involved parties (top management, vendors, donors, end users, project implementers) may have different incentives and agendas that could influence project sustainability and different interpretations of the realities and cultures of project management. When the new IT solution is implemented, this may affect the organization and in turn the positions and power structures, which can lead actors to oppose or change the direction of the implementation. The authors hence take a holistic approach to sustainability and argue that each of the six factors and not any single aspect or factor must shape IS design, implementation, and use. They claim that the high failure rates are a consequence of not taking into account all these factors that influence sustainability. This resonates with Dwivedi et al. (2015) and the Independent Evaluation

Group (IEG 2011), which emphasize the failure to account for complexity and multifactorial nature of problems as a reason for the failure of IS interventions.

Similarly, a World Bank review (Dener et al., 2010) of experiences with financial MIS in 55 projects revealed that lack of human resource capacity was the single most important factor in project failure, mentioned as a factor in 60% of the projects. In addition, they reveal that institutional and organizational resistance were key factors that could cause failure and that this was interlinked with weak leadership from senior management. This accords with the findings of Nelson (2007), who points to lack of proper management as a critical factor in failure. The last factor mentioned in the World Bank review was complexity of project design and lack of project preparation and planning.

Heeks (2002) developed two models for understanding and explaining failure of IS in government organizations, although the models apply more widely to general IS failure. The first, the Factor Model, uses five factors that can be sources of failure: strategy, management, design, competencies, and technology. The second, the Design-Reality Gap Model, assesses gaps between project design and the actual situation to explain failure, focusing on areas such as information, technology, processes, objectives and values, staffing and skills, management systems and structures, and other resources. Similarly, Rand Europe (2010) listed five capacities and readiness conditions (infrastructure, financial, institutional, human, relationship or receptivity) for using ICT successfully in service delivery.

In donor-funded projects that the recipient government implements, the question of recipient ownership and government commitment to the project usually plays a role. An evaluation of World Bank performance of all ICT components of projects between Fiscal Year 2003 (FY03) and FY10 highlights government commitment as an important factor that needs to be in place to avoid failure (IEG 2011). The IEG finds that the rate of achievement of ICT objectives is low (IEG 2011). Intended results are achieved in only half of the ICT components in projects supporting public sector governance in which MIS development is included. Again, the quality of design of ICT components is essential to avoid project failure and is listed as the most critical factor leading to poor performance. The poorly performing projects were found to have overly complex designs in contexts in which stakeholders lacked basic abilities to address problems. The IEG (2011) also highlights implementation shortcomings and a high rate of cancellation of ICT components. In a summary of others' experiences, the IEG refers to complexity that organizational and political pressure adds to "think and act big" as a source of failure, as well as users' lack of understanding of the system and failure to focus on real problems and needs.

Systematizing the case study evidence

Many case studies confirm the main findings described in the reviews and larger studies cited above. To provide a comprehensive picture of the factors, taking these case studies into account, Table 1 provides a summary of the evidence of factors that probably contribute to IS project failure.

Table 1—Main Factors Contributing to Information System (IS) Project Failure

Areas	Factors	Suggested effects (source of evidence)
Incentives and agenda	Agents with opposing incentive	-Local actors behave according to own values or vested interests not aligned with IS project requirements (Walsham and Sahay

	structures and agendas in preparation, implementation, and daily use	<p>1999; Leidner and Kayworth 2006; Kenny 2013; Imran and Gregor 2011).</p> <p>-Donor agency and foreign actors involved in IS implementation act in accordance with own agenda (Ciborra 2006).</p> <p>-Vendors push foreign solutions not adapted to local realities (Heeks 2002, 2003; Avgerou 2000).</p> <p>-IS projects change internal incentives that those who lose oppose (Kumar and Best 2006; Chan and Pan 2008; Jensen and Aanestad 2007; Montealegre and Keil 2000; Scott, Golden, and Hughes 2004; Bartis and Mitev 2008).</p>
	Misalignment with user interests	Misalignment with user interests leads to resistance, disparity in system use, unsustainable system implementation (Yogesh et al. 2015).
	Weak project management	Project is poorly estimated, scheduled, sized, or scoped; the effort and time required are incorrectly estimated, not taking into consideration resource availability or technical aspects of acquisition; follow-up is weak, contract management is poor (Nelson 2007; IEG 2011; Dener, Watkins, and Dorotinsky 2010).
Political and institutional setting	Lack of leadership	Lack of leadership and clear responsibilities lead to failure in system implementation and sustainability (IEG 2011; Imran and Gregor 2010; Young and Jordan 2008).
	Misalignment of goals and ambitions	Goals of relevant institutions are not aligned to deliver organizational changes that IS implementation requires, resulting in cancellation or minimum system use (IEG 2011; Dhillon 2004; Heeks and Stanforth 2007; Ciborra and Navarra 2005).
	Lack of involvement	Lack of involvement, leads to user resistance (Chan and Pan, 2008, Scott, Golden, and Hughes 2004; Lin and Silva 2005; Joia and Magalhães 2009; Jensen and Aanestad 2007).
	Asymmetric relationships between stakeholders	Top-down approaches and frequent changes are made to systems without consultations with stakeholders, conclusions about system success or failure conflict (Kimaro and Namphossa 2005; Bartis and Mitev 2008; Joia and Magalhaes 2009; Nyella and Mndeme 2010).
	Lack of trust	Direct donor handling of project financial transaction, leads to lack of cooperation between stakeholders or abandonment of IS because of lack of trust between core stakeholders (Kimaro and Nhampossa 2004; Vaidya, Myers, and Gardner 2013).
Ownership	Commitment	Lack of political commitment and ownership in implementing institution leads to project failure(IEG 2011).
	Preferential relationship	Vendor receipt of funding directly from donor, undermines client, leading to to lack of cooperation from client (Kimaro and Nhampossa 2004).

	Gap between design and reality	Gap between technological solutions and reality regarding environment, organization, and capacity of end-users results in long implementation process and unsuccessful system implementation (Heeks 2002; Nguyen and Fernandez, 2009).
Technology	Lack of technical capacity	Relevant users and operators in developing countries often lack technical capacity to develop, use, and maintain IS solutions; donors sometimes also lack technical capacity (IEG 2011; Imran and Gregor 2010; Lee 2001; Nguyen and Fernandez 2009).
	Technical solutions	Too-advanced, -ambitious, -complex technical solutions, lead to inability to implement is envisaged (IEG 2011)
	Dysfunctional relationships between stakeholders	Dysfunctional relationship between implementing institutions leads to poor system implementation and user resistance because of slow responses (Bartis and Mitev 2008, Kimara and Nhamossa 2004)
Culture	Organizational and national culture	There is lack of cooperation between actors, lack of system use, unclear decision-making process influenced by cultural background and knowledge; local context is not taken into consideration (IEG 2011; Walsham and Sahay 1999; Westrup et al. 2003).


3. The Ethiopian Context and the WEDP

The local context

With a per capita gross domestic product of US\$1,900, Ethiopia is one of the poorest countries in the world. Government administration units often face funding and resource shortfalls, especially the lower-level units responsible for data collection. The Government of Ethiopia takes a hands-on approach to project implementation, with strong ownership of their policies and projects. Once projects and policies have been decided on, there is a strong will to move toward implementation. The government structure is strictly hierarchical, and coordination challenges between lower-level administrative units are usually solved at a higher level on a case-by-case basis. For projects involving more than one ministry and semi-autonomous institution (e.g., Development Bank of Ethiopia (DBE), microfinance institutions (MFIs)), there is no formally established system for communication and interaction.

The hierarchical government structure has several layers, subdivided into regional states with a high degree of autonomy. Government offices have large variations in staff competencies and capabilities and a high degree of turnover, especially in the one-stop shops (OSSs), which are entry positions for young people into the government.

In our experience, at the lower administrative levels, staff lacked basic competencies for operating in an electronic office environment. For example, most data entry staff had no experience using the Internet for work purposes, such as emailing, saving and sending files, and using search engines, although most were well acquainted with mobile phone social media applications (e.g., Facebook) and



Internet-based communication (e.g., Viber, WhatsApp). They seldom required more than three to four days of training to be able to manage the MIS. In many OSSs, annual turnover exceeded 30 percent, with many staff leaving shortly after they had been trained on the MIS. Turnover was also high in MFIs and the DBE, making training of staff on the MIS a continuous, ongoing process.

WEDP: A complex project

Ethiopia has achieved high economic growth in the past decade, averaging 10.7 percent per year, establishing it among the fastest growing economies in Africa and the developing world, but it is falling behind its peers in terms of credit to the private sector. According to the World Bank Enterprise Surveys, micro (41 percent), small (36 percent), and medium (29 percent) enterprises in Ethiopia perceive access to finance to be the main business environment constraint, compared with Sub-Saharan Africa averages of 24 percent, 20 percent, and 16 percent, respectively.

Opportunities for female entrepreneurs in Ethiopia lag far behind those for men. In *The Economist* Women's Economic Opportunity index, Ethiopia ranks 107 of 112 countries. Most growth-oriented female entrepreneurs fall into a "missing middle" trap, in which neither commercial banks nor MFIs serve them. High minimum loan sizes and excessive collateral requirements restrict women's access to loans from commercial banks. MFIs primarily cater to micro-firms with group lending schemes that provide very small loans and tend to have poor outreach to women (30 percent). Growth-oriented women-owned enterprises are therefore starved of the investment they need to thrive.

To address this challenge, the Government of Ethiopia, with the support of the World Bank and the Governments of Canada and the United Kingdom, launched the WEDP in 2012 to support women-owned micro and small enterprises (MSEs). The WEDP aimed to increase the income of female entrepreneurs and to create employment and job opportunities. MSE development was critical to the government's efforts to increase the economic empowerment of women, and the development of income-generating activities for women was a specific aim of the five-year plan of the government at that time – the Growth and Transformation Plan 2011-2015.

The WEDP was established in October 2012 as a \$50 million International Development Association investment lending operation. In addition to the World Bank, the Governments of Canada and the United Kingdom were the core development partners, contributing an additional \$13 million. In 2017, the Governments of Japan and Italy added resources, bringing the total donor contribution to approximately \$130 million.

The project development objective of the WEDP has been to increase the earnings and employment of female-owned or partly owned MSEs in the five main cities of Ethiopia. This was to be achieved by removing two of the main barriers to female enterprise growth by tailoring financial instruments to the needs of the target group and ensuring availability of finance and by developing women's entrepreneurial and technical skills. The target beneficiaries were growth-oriented female entrepreneurs.

The implementing structure was complex, involving entities from several different government structures. The components included access to finance; entrepreneurial skills development; and project management, advocacy and outreach, M&E, and impact evaluation.

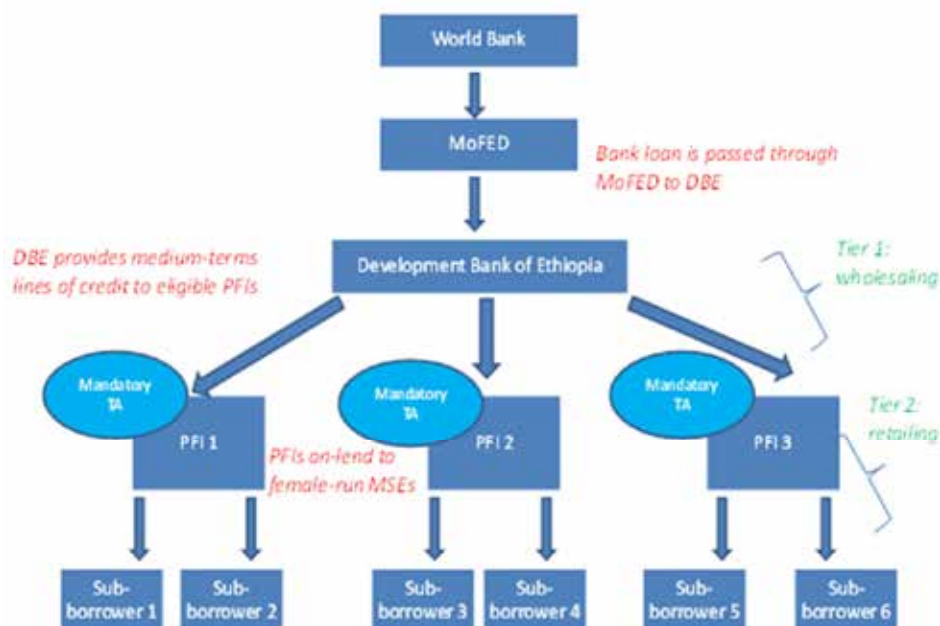
Access to finance

To facilitate access to finance for female entrepreneurs, WEDP created a dedicated line of credit, with the DBE acting as a wholesaler and MFIs acting as retailers. The project used an incentive-based approach aimed at helping the DBE develop a new business line involving wholesaling of MSE subsidiary loans, providing related technical support to participating MFIs, and helping the MFIs build up a high-quality MSE loan portfolio based on lending techniques that have been developed and validated under successful MFI expansion approaches in other countries.

Using a dedicated technical assistance component, WEDP built the capacity of Ethiopia's leading MFIs to deliver loans to female entrepreneurs on an individual basis with larger average loan sizes. The MFIs' improved ability to appraise loan applications resulted in their capacity to reduce the collateral requirements from an average of 200 percent of the value of the loan to 125 percent. At the same time, WEDP MFIs are adopting and diffusing new techniques to reach and serve female entrepreneurs better. They are developing new loan products and recognizing new forms of collateral such as vehicles, personal guarantees, and even business inventory to secure loans.

The disbursement and management of the line of credit required a complex structure, with multiple financial intermediaries bearing full credit risk. Figure 1 provides an overview of the resource flows of the component.

Figure 1—Resource Flow in the Access-to-Finance Component of the Women Entrepreneurship Development Project



Notes: MoFEC, Ministry of Finance and Economic Cooperation; DBE, Development Bank of Ethiopia; PFI, Participating Financial Institution; TA, Technical Assistance; MSE, Micro or Small Enterprise.

Entrepreneurial skills development

The aim of this component was to develop growth-oriented female entrepreneurs' skills in a way that would help them to increase their profit. An international consulting firm was hired to design and implement a top-class capacity-building technical assistance program to increase the capacity of the institutions that provided direct services—primarily the technical and vocational education and training (TVET) institutions. Training modules were developed and offered at 11 selected TVET colleges in the five cities. Two additional training providers were commissioned to broaden the scope of training offered: the Digital Opportunity Trust,² supported by Canada, and the Entrepreneurship Development Centre³, a quasi-governmental entity established under the framework of the Entrepreneurship Development Program developed in partnership with the UN Development Programme.

The Federal Urban Job Creation and Food Security Agency (FUJCFSA) had direct responsibility for planning, designing, and coordinating the WEDP project in close collaboration with the National TVET Agency. FUJCFSA also had the overall responsibility for ensuring delivery of high-quality training and support to WEDP members in entrepreneurship and technical skills. The two additional training providers were also reporting training achievements to FUJCFSA.

Implementing structure

The implementing structure for WEDP implied that the DBE and MFIs were central in service delivery under the project, with responsibility for disbursement of credit to female entrepreneurs. At the same time, the TVET Agency and its colleges and two private training providers in the country, Digital Opportunities Trust and the Entrepreneurship Development Centre, taught entrepreneurial skills to the same target population. Adding to the complexity, project management was assigned to FUJCFSA, which reports not to either of the two main service providers but to the Ministry of Urban Development and Construction. The project was a national urban project covering the four regional capitals of Tigray; Amhara; Southern Nations, Nationalities, and Peoples' Region; and Oromiya and the two chartered cities, Addis Ababa and Dire Dawa. These features and the geographic coverage required coordination, especially for monitoring progress and collecting and compiling data. Five government ministries and agencies and dozens of implementing entities below them are involved in running the WEDP project.

This complexity necessitated a sophisticated MIS to collect and provide access to project information for management and supervision. Developing and establishing a suitable M&E system to accurately track and assess the progress and results of WEDP was a subcomponent of component 3 of the project. During development of the WEDP, it was not envisaged that MIS development would be used as a catalyst for reforming the client's approach to using data for monitoring its own performance but that a consultant would be hired to perform the tasks. The initial proposed terms of reference for the M&E work confirm this approach and specify assignment of consultants to develop a turnkey M&E system that would require a minimum of client involvement in development (World Bank 2012). Nevertheless, the project design stipulated that "the data collection and reporting on WEDP will be based on the existing structures and Federal Medium and Small Enterprises Development Agency's (FeMSEDA)⁴ own

² <https://ethiopia.dotrust.org/about/about-us/>

³ <https://www.edcethiopia.org/index.php/contact>

⁴ In 2016, as part of the Ethiopia government restructuring, FeMSEDA was restructured to be the Federal Urban Job Creation and Food Security Agency (FUJCFSA).

M&E system,” although this was abandoned during implementation of the MIS, especially because the compilation and oversight functions in the hierarchical structure were no longer needed when the data were automatically aggregated and instantly available online for involved institutions.

During implementation of the WEDP, the approach to developing the M&E system gradually became a partnership, with active client participation. The Government of Ethiopia made the decision to develop and test an ambitious online real-time MIS, which they deemed could potentially be useful to the government structure more broadly. The government therefore engaged its own IT experts from the IT department at FeMSEDA to assist the WEDP in developing specifications for the MIS and ensure that the system would be developed so that it would be useful at a later stage. On the technical side hardware such as servers, networks, and server rooms were upgraded to serve larger data flows than what the WEDP would generate. The client’s eagerness to develop the MIS into a system of general applicability highlights the potential for using M&E efforts to generate sustainable results in capacity building.

A local IT company was hired through a competitive bidding process to develop the MIS. Based on initial rounds of developing the MIS specifications, a simple, low-cost solution satisfying some minimum requirements was selected. The aim was to develop a real-time web platform-based system that was as simple as possible and at the same time choose solutions that would enable the FeMSEDA IT department to manage and develop the system once the IT company withdrew from the project. The contract with the IT company included one year of support after start-up of the MIS. It was envisaged that FeMSEDA could subsequently manage the MIS without external support.


Finally, the WEDP had a unique design in that rigorous impact evaluations were included in a separate component of the project (World Bank 2012). Hence, from the start the involved parties wanted to learn about how the WEDP was working and how to increase its effect. This may have increased awareness of the usefulness of accurate, timely data and interest in using data to monitor progress and achievements.

4. Methodology

The empirical foundations for this paper are the experiences of the involved stakeholders as reflected in qualitative interviews collected in Addis Ababa in June 2017, approximately six months after the MIS had started basic operations. We also used the full archive of project documents and internal World Bank documentation used in developing the MIS. Our own experiences complement this.

At the data collection stage, the WEDP project was coming to an end,⁵ and World Bank support to project M&E was at a minimum. We collected data from the key stakeholders, primarily focusing on the three main user categories of the MIS: FUJCFSA, DBE and the micro finance institutions, and the Federal TVET Agency.

⁵ The project was extended for two additional years with additional funding from the Governments of Italy and Japan. As of September 2018, the project implementation end date is expected to be December 31, 2019.



To capture any broader strategic use of the MIS in the government, we also interviewed representatives from the Federal Small and Medium Manufacturing Industries Development Agency because they expressed interest in developing an agency-wide MIS with the same structure as that of the WEDP MIS. We also interviewed the Association of Ethiopian Microfinance Institutions (AEMFI) because they were planning a similar MIS for connecting MFIs and because they attempt to coordinate MFI M&E and reporting systems.

Conceptually, one can think of developing an M&E framework for a project on three levels. On the most basic level, the M&E framework needs to deliver as required from the project perspective. This includes the donor's, client's, implementers', and other stakeholders' needs to be informed about project progress and likely outcomes. In this case, the standard approach entails hiring an external M&E consultant to develop the framework.

The second level involves more-integrated development of the M&E framework using the client's M&E systems. The donor and client together map out the indicators, modes of data collection, and other components of the system. Although learning may not be part of the objective, working closely together usually entails some capacity building to meet the required standards.

On the third and most-advanced level, there is an explicit capacity-building aim, with the client learning through the project how to develop its own M&E systems and systematically using the information provided to manage the project. In this latter case, the system for generating the data for the M&E is often referred to as an MIS.

5. Effectiveness: How to Establish an Effective MIS

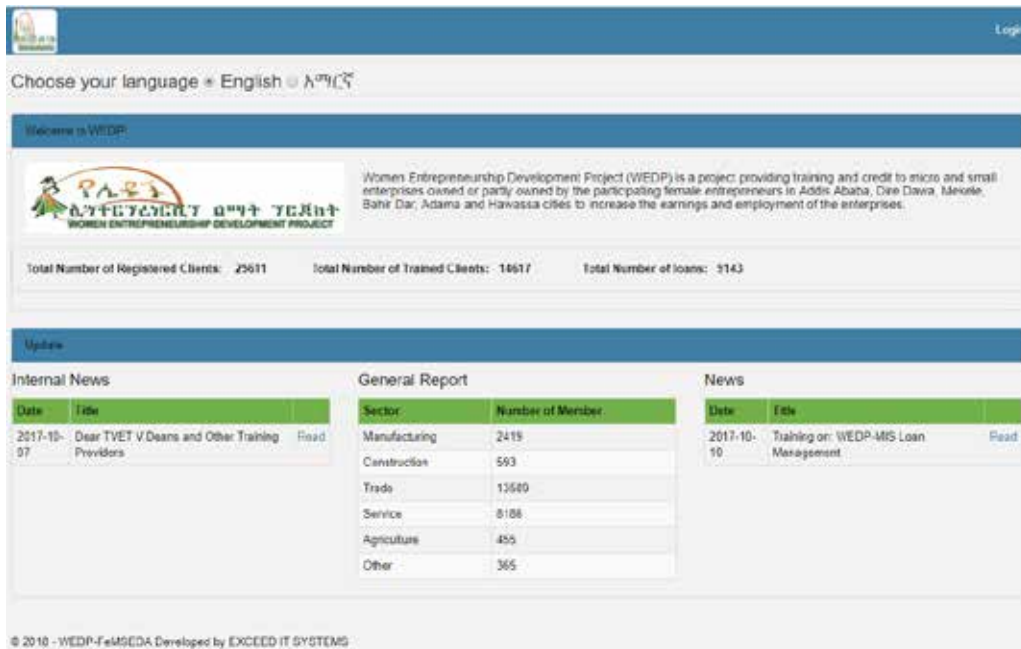
5.1 An effective MIS

By September 2018, the MIS contained a database of approximately 25,611 female business owners who had applied to the WEDP and fulfilled the participation criteria. Data are entered in the MIS at three main points: when an eligible client registers with the WEDP, takes training, and takes a loan from the MFI. We present information from each of the sources and provide a graphic overview of some of the functions that can be applied to display the overview of the data and trends.

The MIS has an easy-access user-friendly interface that is suitable even for people without basic computer skills. Most users at the entry level have had no prior experience with computers, and only some have experience with the Internet through mobile phone applications. The start page when accessing the webpage (available here: <http://197.156.90.249:8100/>)

The website start page contains real-time data on project indicators, number of clients, number of clients trained, and number of loans that these clients have taken out. Refreshing the browser provides instant changes in the figures when a new client has been registered, some training has been completed, or a loan has been disbursed. Everything can be viewed in Amharic to ensure that nothing is lost in translation for individuals without strong English skills, for instance, lower-level government staff.

Image 1–Screenshot of WEDP MIS Webpage Start Page (as of September 29, 2018)



The front page is also used to present WEDP news, and the MIS can provide messages directly to various participating institutions. Logging on would then provide the user with a dashboard displaying categories of reports, tables, and figures that can be produced with a few clicks. The full database is available for WEDP management to export into Excel for more-advanced analysis. We return to this below.

Registration data

Entrepreneurs register locally in OSSs at the lowest government administrative level (kebele or subcity office) in the five largest cities in Ethiopia. During registration, basic information on the entrepreneur and her business is collected. Entrepreneur data include personal information such as education; years of business experience; whether the registrant has taken out a loan before and, if so, the largest amount taken; and what services she needs to expand her business.

Registration data on the entrepreneur’s business include the year the business was established, the current number of female and male employees, her ownership share in the business, the starting capital for that business, its yearly earnings, and the number of employees. Upon completion of registration, the client receives a membership card with a unique WEDP identification number that WEDP service providers use to identify each client.

If a WEDP staff member requires information about a WEDP member, he or she can click on “Details” on the member of interest in the membership list, which will display the registration details in the system for each client.

Image 2—Screenshot of the First of Four Steps for Entering Registration Information

The screenshot shows a web application interface for registration. At the top, there is a navigation bar with menu items: Registration, Admin, Import, General Report, Training Report, Loan Report, and Help/Export. Below the navigation bar, there is a language selection dropdown set to 'English' with an Amharic option. The main heading is 'Account Registration' followed by 'Member Registration'. A progress indicator shows four steps, with 'Step 1' highlighted. The form fields for Step 1 are: Full Name in English (text input), Full Name in Amharic (text input), City (dropdown menu), Starting OSS Code Configuration (dropdown menu), Age (text input), Starting Capital (text input), and Education (dropdown menu with '—select one—' selected). At the bottom left, there are 'Next' and 'Back to List' buttons.

When the client obtains a WEDP loan or takes WEDP training, the service provider accesses the MIS and registers detailed information about the services provided to each client. The database therefore contains a wealth of information on clients that is accessible to WEDP staff with access rights to the various types of data.⁶

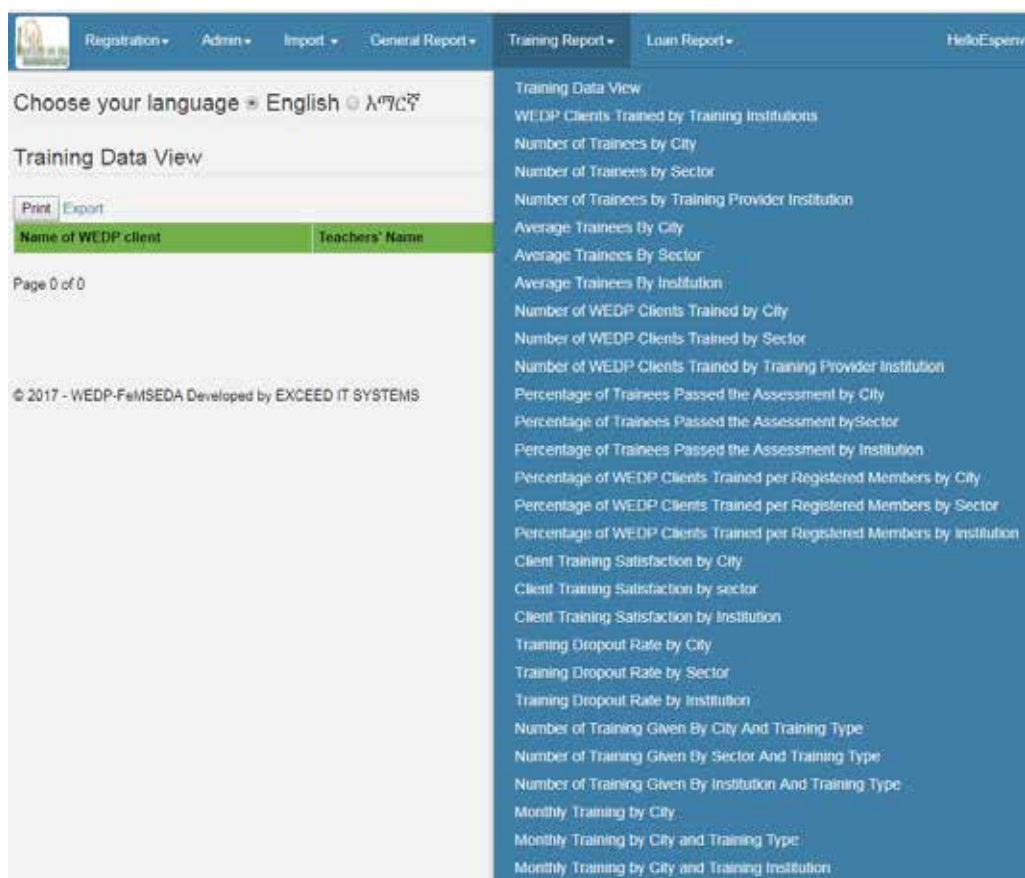
Training data

Training data are available in the MIS for each individual, including information about categories of training the client has taken, training content, and duration of training completed. An examination is administered after completion of each course, and the client's performance is recorded.

A detailed record of previous WEDP and non-WEDP training taken is also available, as well as an assessment of each client's needs for further training. Client satisfaction is also reported after each course. For management purposes, it is important to identify the training provider and the trainers, including names and contact information, so that it is easy for the WEDP to follow up on poor performance, report problems, and perform other quality checks.

⁶ There is a detailed list of access rights to various information in the MIS, and clear responsibilities have been assigned to the appropriate staff.

Image 3—Screenshot of Report Category in the Pull-Down Menu



Loan data

Loan data registered in the MIS contain information about the loan (size, date of agreement, MFI branch), intended use of funds, and sector and subsector of intended investment. The reporting opportunities link this information to the registration and training data so that a compound picture of borrowers can be provided. The MIS webpage can show reporting opportunities for WEDP staff and a display of average loan size for those who have never borrowed before.⁷

⁷ Average loan size for those who have never borrowed before is an important indicator of market imperfections for female entrepreneurs in finance: Why had the women not borrowed before but then suddenly started to take large loans when WEDP gave them the opportunity to do so? The most likely answer, and the answer we get from discussing this with clients, is that they were credit constrained and not able to access large loans in the market.

Table 2–Number of First Time Loan Clients (as of September 2018)

Sector	Number of Loans	Average Loan (ETB)
Manufacturing	569	ETB 273,088.00
Construction	191	ETB 298,660.00
Trade	3467	ETB 232,220.00
Service	2277	ETB 248,185.00
Agriculture	131	ETB 164,924.00
Other	127	ETB 322,520.00

Management tools and reports

The MIS can generate a range of descriptive reports that are useful for project implementers at the local and central levels to monitor and analyze project progress under their responsibility in their area. It also provides project management with detailed and aggregated figures and trajectories that enable them to see whether the project is achieving its overall aims. Management can easily identify whether local units are delivering according to plan and immediately identify those that are not.

The critical performance indicators are number of clients registered, number of trainings delivered, and number of loans disbursed. These indicators are reported in a standard format that individuals with basic understanding of the software can amend.

Other examples of reports useful for management are those that provides users with basic WEDP performance indicators, average number of female and male employees that WEDP clients in each sector have hired, average earnings, and average loan size (not including themselves), such as the loan report by sector.

Chart 1–Trends of WEDP Members Registration, Training and Loan (as of September 2018)

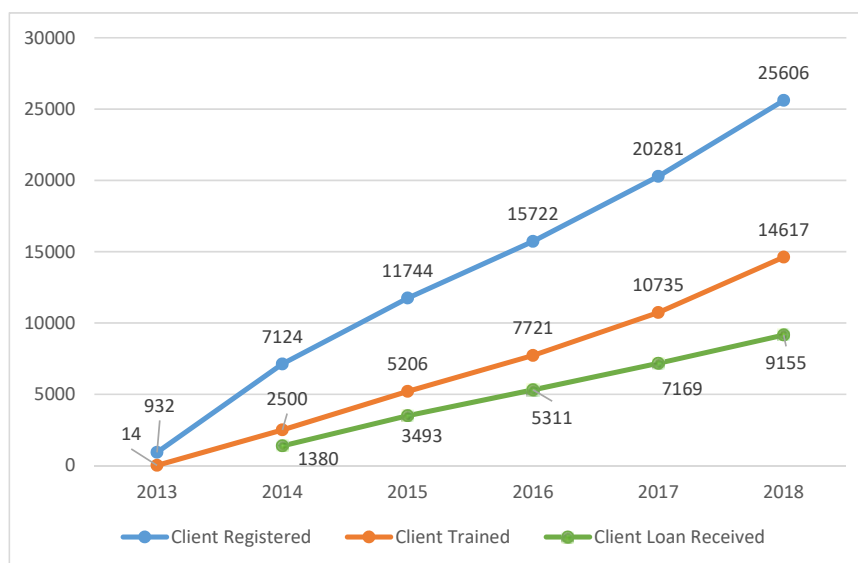


Table 3–Loan Report by Sector (as of September 2018)

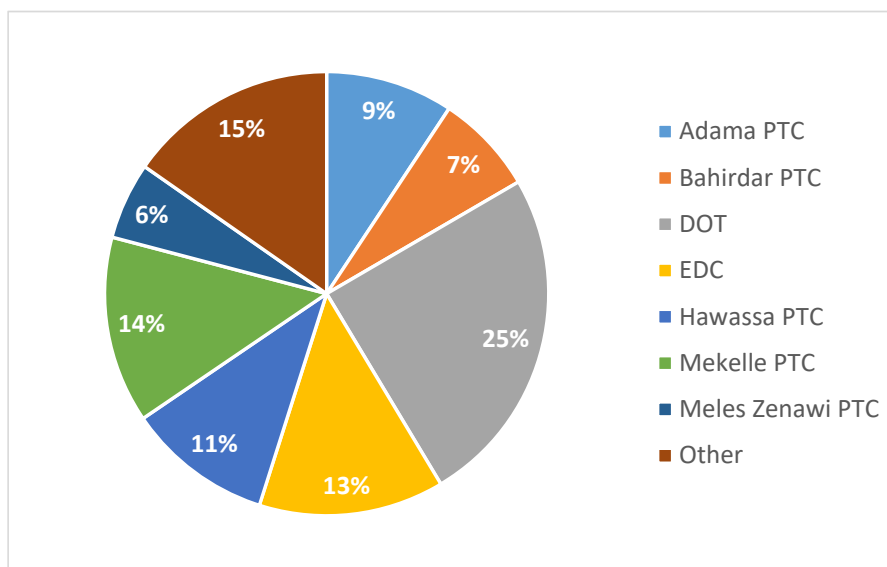
Sector	Ave. Female Employees	Ave. Male Employees	Average Earning	Average Loan Taken
Agriculture	1.85	1.4	ETB 546,796.00	ETB 193,055.00
Construction	2.68	3.32	ETB 361,921.00	ETB 325,797.00
Manufacturing	2.29	1.77	ETB 807,156.00	ETB 282,563.00
Other	2.76	1.97	ETB 367,175.00	ETB 378,036.00
Service	2.29	1.36	ETB 823,229.00	ETB 260,160.00
Trade	10.59	0.64	ETB 554,863.00	ETB 238,844.00
Total	22.46	10.46	ETB 3,461,140.00	ETB 1,678,455.00

Management and local staff can also obtain disaggregated figures to see how WEDP performs locally. For example, the number of clients that have registered in each city can easily be provided, as well as the number registered at each OSS.

Much of the information can be displayed for any time period specified and disaggregated according to OSS, MFI, TVET Agency, and city for various indicators and information collected. Data can be extracted and used for advanced analysis using statistical software. Frequently used WEDP bimonthly reports generated from MIS data include the training provided report, the lending performance reports, and the report on the discrepancy between new members registered and trained.

1. *Training provided*

Chart 2–WEDP Training by Training Institutions (as of September 2018)



2. Lending performance

According to WEDP MIS reports, 2,538 new clients who have received WEDP loan between July 2017 to July 2018, a 48% increase from the number of new clients the year before. So far, a total of 9,338 loan data has been uploaded in MIS, which can track WEDP loan by city and by disbursing MFI respectively.

Table 4–Number and Size of Loans by City (as of June 2018)

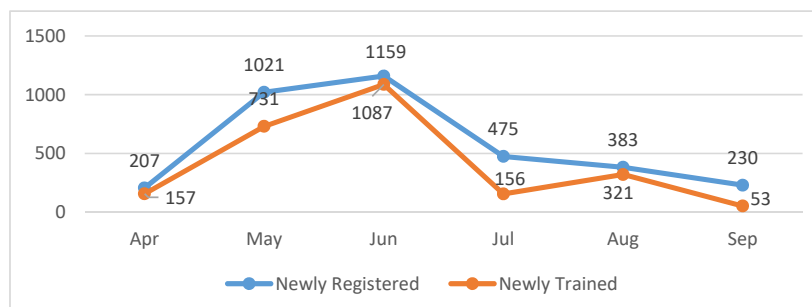
City	Number of Loans	Ave. Loan Size
Addis Ababa	5085	ETB 274,057
Bahir Dar	1064	ETB 389,659
Hawassa	312	ETB 256,170
Adama	1269	ETB 192,032
Mekelle	1180	ETB 172,883
Dire Dawa	232	ETB 118,095
Assela	13	ETB 253,077
Total	9155	ETB 236,568

Table 5–Number and Size of Loans by MFIs (as of July 2018)

MFI	Number of Loan	Ave. Loan Size
WASASA	358	ETB 356,022
SFPI	308	ETB 418,498
OCSSCO	1,380	ETB 283,019
ADCSI	2,957	ETB 224,826
ACSI	1,079	ETB 628,908
DECSI	1,195	ETB 290,835
HARBU	249	ETB 291,332
OMO	204	ETB 413,501
MEKLIT	80	ETB 200,018
METEMAMEN	206	ETB 283,226
AGAR	715	ETB 304,663
VISION	606	ETB 231,654
Total	9,337	ETB 327,208

3. Discrepancy between registration and training of new members

Chart 3–Trends of WEDP Client Registration and Training from April 2018 to September 2018



5.2 Establishing the MIS and success factors

This section describes the evolution of the M&E of the project and what factors have contributed to success in developing an effective MIS. We use the categories found in the literature review when they are relevant to our case. We highlight not only functional and system developments, but also processes leading to various achievements.

Establishing an IT culture

The experiences of the involved parties indicate that it would not have been possible to establish the MIS without developing an IT work culture. This accords with findings in the literature on IS solutions but adds a new dimension: The WEDP was established in a work setting that was not digitalized.

From the beginning, most staff involved in WEDP tasks were not used to digital work solutions. In particular, OSS and TVET staff had used only paper-based systems, although some MFIs had digital solutions. The project therefore not only provided software and hardware for OSSs, TVETs, and the FUJCFSA WEDP office, but FUJCFSA IT staff also provided a substantial amount of training to operate the systems.

FUJCFSA staff emphasized that one of the keys to making the MIS work was developing an IT culture among involved WEDP staff. In the beginning, operating the IT systems was seen as a burden, but at the time of our interviews, most involved parties saw the usefulness of operations and management having an instantly updated overview of project implementation.


We also found that maintaining an effective MIS required user acceptance. To achieve user acceptance, solutions must be compatible with users' skills, and the system must improve their work operations. To this end, the WEDP developed videos that show the functionalities, which serves as refresher training between regular face-to-face staff trainings. This was a popular way to learn how to operate the MIS.

Finally, development of the MIS was strongly embedded in the local context, which is an additional condition for success in terms of cultural sustainability. Given that the FUJCFSA, which also took responsibility for detailing the specifications, commissioned the MIS, the starting point for developing the MIS was the existing capabilities of the FUJCFSA's IT department. Moreover, a local IT firm designed the MIS, the government paid for it, and a local project implementation unit ran and maintained it, which contributed to establishing the IT culture and to a feeling of strong ownership of the system.

Political setting and ownership

As discussed in the literature review, embarking on an inclusive process in which the client takes ownership of the project seems to be essential to developing a system that works well once World Bank supervision ends. Similarly, without clear leadership, likelihood of IS failure is high.

Our interviews revealed that a strong, hierarchical political leadership endorses the MIS and wants to broaden its reach to other enterprises in the country. Over the extended project period, the WEDP is opening operations in four new cities; the MIS will have to be established there first. Compatibility



between the low-tech MIS solutions, the local situation for the implementing organizations, and the capacity of the end-users contributed to a high degree of local ownership of the MIS.

Local solutions

Developing simple, accessible technical solutions also contributed to establishing an effective MIS. An Ethiopian IT firm developed the technical solutions locally, which were based on free software with a user-friendly design, so even if many of the individuals involved lacked technical capacity to develop, use, and maintain the IS solutions, which the literature has identified as a risk factor, the low-tech solution helped overcome this challenge.

Developing the MIS was a long process, starting with initial specification of the core data requirements for the project and development of a full M&E manual. The first steps in registering clients involved developing and testing of an Excel-based registration form, which provided useful insights into what a functioning MIS should look like.

Attention to Data Quality

The WEDP intended to provide several services to clients, mostly financial services and training. Because clients could access many combinations of services from different service providers that were not linked to each other, it was essential from the planning stage of the MIS that WEDP services provided should be identified for each client. The first step was therefore to develop a unique client identifier.

Another important challenge was to ensure basic data quality. Given that so many diverse users were accessing and uploading data to the system, it was important to develop quality checks to minimize errors in data entry and avoid misunderstandings. To avoid confusion, training and demonstration videos were complemented with pop-up boxes that would explain in the local language exactly what information needed to be entered. If an incorrect data format was used, the user would receive an error message with an explanation of the correct format or type of information to enter. In addition, experience suggested that pull-down menus with fixed choices simplified data entry and minimized likelihood of errors.

In the initial phase, tests were run on the database to ensure data quality. The database could be exported to Excel and then used with any statistical software. This was helpful for detecting errors in the system and refining data entry procedures. Moreover, WEDP M&E staff used exported data regularly to conduct advanced analysis. Although the built-in reporting functions shown in the previous section worked well for basic monitoring and provided some standard evaluation tools, the richness of the database could be used in a range of ways when not restricted to prespecified parameters.

The WEDP also had a database expert conduct in-depth advanced data quality assessments and check for errors,⁸ which provided useful technical inputs for refining the system.

⁸ It was necessary in this case to inquire into errors leading to incorrect identifications when uploading data from the first-phase Excel-based system into the final version of the MIS. It is difficult to guard against human errors, but the MIS minimizes the likelihood of such errors.

Finally, the role of users in ensuring data quality should not be underestimated. Users have a unique opportunity to detect errors in their daily work with the system, and it is important to create feedback loops from them to the system manager. Users had good suggestions for developing automatic aggregations for key figures and for how the data should be displayed, such as how it should appear in terms of tables, graphs, charts, and the like.

Although the MIS has generally been a success, there were many rounds of fixing problems until it was working in an acceptable manner. Some of the challenges encountered stemmed from lack of Internet reliability in Ethiopia. Frequent Internet interruptions can lead to duplication errors with automatic database updates and data not being automatically uploaded to the central server from satellite offices. Close monitoring and checking data transfer was therefore needed, even when the MIS was in regular operation.

6. Sustainability

At the time of our fieldwork, the MIS was functioning well and was popular among users, although its sustainability depends on the sustainability of the WEDP. If the WEDP is discontinued, there will be no need for joint reporting even if training and finance continue to be provided to growth-oriented female entrepreneurs. M&E of the services would then be integrated into the regular government system, and it would probably not be possible to continue to identify growth-oriented female entrepreneurs registered in the WEDP (under the current government SME registry).


Our sustainability assessment is therefore split into two parts. First, we assess sustainability based on the assumption that the WEDP would continue as a dedicated program after donor support ends and assess the likelihood that the government will continue with the MIS, as opposed to integrating it into their regular M&E system. Then, we assess spillovers from the MIS and the benefits generated beyond its functions as an MIS project.

Continuation of the MIS beyond project life

If the WEDP is maintained after donor financing ends, it is mostly a question of the costs of running the MIS in relation to FUJCFSA IT operating costs. We inquired into the operating costs of the MIS and those of the regular FUJCFSA IT system.

The operating costs for the MIS at the TVET colleges are minor, and the TVET colleges could take them on easily if they continue to provide training after project closure. One relatively costly support function has been the WEDP city coordinators, who have facilitated data transfer. They have acted as a link between the implementing institutions (mainly OSS and TVETS) and the head office. In the first phase of the WEDP, they were instrumental in collecting and submitting data. As the MIS started to function and gradually improved, their contributions decreased, although they still represent a substantial cost in operating the MIS.

The city coordinators have mainly provided temporary support in the start-up phase. Challenges such as poor Internet connections, high OSS staff turnover, and limited administrative resources for WEDP management have made the role of city coordinators important. For the TVETS, for example, once



their new fiber cables are installed, there will be no need for city coordinator support as long as TVET management assigns administrative personnel capable of basic data entry. Only a short training is needed, depending on staff knowledge of the Internet and basic use of Excel.

Microfinance

Duplication of efforts in the registration process needs to be avoided to obtain microfinance support. This is an inherent challenge for any finance project; loans provided to clients from project funds must be recorded to account for resources provided, and if the client's MIS is not compatible with that of the MFI, loan transactions must be recorded twice—first as a WEDP loan and then entered into the MIS of the MFI. If the WEDP is discontinued, all stakeholders indicated that the MFIs would be unlikely to continue to maintain such a double registry. WEDP clients would then be treated like any other customer and be registered in the ordinary system. The proposed solution was to make the WEDP MIS compatible with the MFI MIS. Our interviews with AEMFI made it clear that it was important to align donor reporting needs with the current MFI systems. AEMFI has initiated a large MIS project with the goal of connecting all MFI reporting and information sharing in real time.

Spillovers

A qualitatively different benefit of the MIS is the learning effect on other government entities and on other projects.

There were two initiatives in which there were direct influences of the WEDP MIS on government learning and using the knowledge generated. First, the FUJCFSA has developed a new MIS that will connect the 1,600 OSSs in the country. They used experiences and took many components of the new system from the WEDP MIS.

Second, the newly created Federal Small and Medium Manufacturing Industry Development Agency, which has de facto responsibility for support to SMEs in Ethiopia, expressed strong interest in obtaining their own MIS, with a similar structure to that of the WEDP MIS. The Director General stated that, with the churn in the SME sector, it is necessary to have a system that can easily be updated. Moreover, the agency had recently developed a catalog of SMEs in Ethiopia, but it was already outdated and no longer used. The WEDP MIS could easily connect information from licensing offices with the agency and provide real-time information about the number of SMEs in the country.

The WEDP MIS has also influenced other World Bank–supported projects in Ethiopia, especially the SME finance and urban food security and safety projects.

The government's commitment to the project is one aspect of its success. Moreover, for this approach to be sustainable, the MIS must serve the government's needs and be seen as a useful tool, be based on simple technical solutions that can be maintained and refined locally, and have low development and maintenance costs that are compatible with the government's M&E budgets.

7. Lessons learned and conclusions

An important lesson from the WEDP experience is that the government's commitment to the project was critical to its success. By developing a system that served the government's needs and was seen as a useful tool beyond project purposes, the WEDP MIS generated extensive local support.

A second lesson from the WEDP experience is that the MIS must be integrated into local cost and implementation structures. The WEDP MIS achieved a high degree of sustainability by developing a simple technical solution that can be maintained and refined locally and is compatible with the skills of the involved parties.

A final lesson from the WEDP experience was that building an IT culture was important for making the system work in practice. Creating an IT culture in a low-tech, largely analog environment is a challenging but achievable task. In this case, government commitment and willingness to endure were central to success.

The main reason for the success of the WEDP MIS was the interplay of these critical factors to make the system work; government commitment helped generate an IT culture of working with a system that the local staff was able to operate. In addition, because local government entities can afford to maintain and operate it, the sustainability of the MIS is high. As long as the WEDP continues, the MIS will continue in its current form. Once the WEDP closes, the MIS is likely to transform into a broader tool to help manage future government initiatives providing support to private enterprises in the country.

Given the high failure rate of IS interventions around the world, the WEDP lessons seem particularly germane. By garnering deep government support, developing a locally relevant solution, and staying the course in a challenging context, an effective system for information management was developed, and a lasting technological solution was provided to manage complex public sector programs in Ethiopia.

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Stakeholders interviewed

Name	Affiliation	Role	Date
Ato Asfaw Abebe Eregnew	Federal Small and Medium Manufacturing Industry Development Agency	Director General	15.06.17
Ato Yohannes Solomon	FUJCFSA	WEDP project leader	14-15.06.17
Ato Getachew Yimer	Federal Small and Medium Manufacturing Industry Development Agency	Advisor to Director General of FUJCSA	15.06.17
Dr. Behailu Kassaye	Development Bank of Ethiopia, Special Funds Administration	Director	19.06.17
Ato Teklit Berhe	FUJCFSA	FUJCSA Information and Communications Technology Director	15.06.17
Ato Ahmed M	FUJCFSA	WEDP Information Technology Specialist	14-15.06.17
Ato Dagnachew Amberbir	FUJCFSA	WEDP Monitoring and Evaluation Coordinator	14.06.17
Ato Mulugeta Alemu	Nefas Silk technical and vocational education and training college, Addis Ababa	Regular and extension division training program coordinator, WEDP focal person at Nefas Silk college	16.06.17
W/ru Tsigereda Worku	Association of Ethiopian Microfinance Institutions	Ethiopia Inclusive Finance Training and Research Institute Management Information System Officer	21.06.17
W/ru Seblewongel Ayalew	World Bank		14-15.06.17
W/ru Tsedey Asheber	World Bank	WEDP Skills Development Specialist	14-15.06.17

Notes: FUJCFSA, Federal Urban Job Creation and Food Security Agency; WEDP, Women Entrepreneurship Development Project.

